



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

July 9, 2012

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
CALLAWAY PLANT UNIT 1 LICENSE RENEWAL APPLICATION, SET 4
(TAC NO. ME7708)

Dear Mr. Heflin:

By letter dated December 15, 2011, Union Electric Company submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54) for renewal of Operating License NPF-30 for the Callaway Plant Unit 1. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing this application in accordance with the guidance in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." During its review, the staff has identified areas where additional information is needed to complete the review. The staff's requests for additional information are included in the enclosure. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Sarah G. Kovaleski, of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-2946 or by e-mail at Samuel.CuadradoDeJesus@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Samuel Cuadrado de Jesús".

Samuel Cuadrado de Jesús, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure:
As stated

cc w/encl: Listserv

CALLAWAY PLANT UNIT 1
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION, SET 4

RAI 2.1-1

Background:

Title 10, Section 54.4, "Scope," of the *Code of Federal Regulations* (CFR) states, in part:

- (a) Plant systems, structures and components within the scope of this part are –
- (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions –
- (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.

Issue:

During the on-site scoping and screening methodology audit, the staff determined that the applicant had used a plant equipment database, the Callaway Equipment List contained within the eB Director (CEL/eB Director), which provides design and quality classification for each component, as an information source used in identifying systems, structures, and components (SSCs) within the scope of license renewal. The CEL/eB Director contains a quality field "Q" used to identify safety-related SSCs included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). However, during the audit the staff determined that not all components identified as "Q" were included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1).

Request:

The staff requests that the applicant perform a review of this issue and provide a description of the process used to evaluate components identified as Q in the CEL/eB Director and the basis for not including components identified as Q within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). Indicate if the review concludes that use of the scoping methodology precluded the identification of SSCs that should have been included within the scope of license renewal in accordance with 10 CFR 54.4(a). Describe any additional scoping evaluations performed to address the 10 CFR 54.4(a) criteria. List any additional SSCs included within the scope of license renewal as a result of the review, and any structures and components (SCs) for which aging management reviews were performed. For SCs for which aging management

ENCLOSURE

reviews (AMRs) were performed, describe the aging management programs (AMPs), as applicable, to be credited for managing the identified aging effects.

RAI 2.1-2

Background:

Title 10, Section 54.4, "Scope," of the CFR states, in part:

- (a) Plant systems, structures and components within the scope of this part are –
 - (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions –
 - (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.
 - (2) All nonsafety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in (a)(1)(i), (ii), or (iii) of this section.

Issue:

During the on-site scoping and screening methodology audit the staff reviewed the license renewal application (LRA), the 10 CFR 54.4(a)(2) implementing documents and license renewal drawings, and also performed plant walkdowns. LRA Section 2.4-4 does not indicate that the turbine building contains safety-related SSCs, however, the applicable license renewal drawings were marked to indicate that safety-related piping components are located within the turbine building. During discussion with the applicant, the staff determined that the applicant had identified safety-related portions of the main steam supply system, main feedwater system and steam generator blowdown system located within the turbine building. However the applicant had performed an evaluation and concluded that the safety-related portions of the systems located within the turbine building were not included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). In addition, the applicant had not included the nonsafety-related SSCs located within the turbine building and within the proximity of safety-related SSCs, whose failure could prevent satisfactory accomplishment of the intended functions of safety-related SSCs, within the scope of license renewal in accordance with 10 CFR 54.4(a)(2).

Request:

The staff requests that the applicant describe the process used to identify and evaluate safety-related piping components located within the turbine building, the results of the

evaluation, and the basis for any determination to not include safety-related SSCs within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). In addition, describe the process used to identify and evaluate nonsafety-related SSCs located in the turbine building whose potential failure could impact safety-related SSCs, the results of the evaluation, and the basis for any determination to not include the nonsafety-related SSCs within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). The staff requests that the applicant perform a review of this issue and indicate if the review concludes that use of the scoping methodology precluded the identification of SSCs that should have been included within the scope of license renewal in accordance with 10 CFR 54.4(a). Describe any additional scoping evaluations performed to address the 10 CFR 54.4(a) criteria. List any additional SSCs included within the scope of license renewal as a result of the review, and any SCs for which AMRs were performed. For SCs for which AMRs were performed, describe the AMPs, as applicable, to be credited for managing the identified aging effects.

RAI 2.1-3

Background:

Title 10, Section 54.4, "Scope," of the CFR states, in part:

- (a) Plant systems, structures and components within the scope of this part are –
 - (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions –
 - (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.
 - (2) All nonsafety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in (a)(1)(i), (ii), or (iii) of this section.

Issue:

During the on-site scoping and screening methodology audit the staff reviewed the LRA, the 10 CFR 54.4(a)(2) implementing documents and license renewal drawings, and also performed plant walkdowns. The staff determined that the applicant had identified safety-related electrical SSCs, located within the turbine building, that were not included within the scope of license renewal in accordance with 10 CFR 54.4(a)(1).

Request:

The staff requests that the applicant describe the process used to identify and evaluate the safety-related electrical SSCs, located within the turbine building, and the basis to not include the SSCs within the scope of license renewal in accordance with 10 CFR 54.4(a)(1). The staff requests that the applicant perform a review of this issue and indicate if the review concludes that use of the scoping methodology precluded the identification of SSCs that should have included within the scope of license renewal in accordance with 10 CFR 54.4(a). Describe any additional scoping evaluations performed to address the 10 CFR 54.4(a) criteria. List any additional SSCs included within the scope of license renewal as a result of the review, and any SCs for which AMRs were performed. For SCs for which AMRs were performed, describe the AMPs, as applicable, to be credited for managing the identified aging effects.

RAI 2.1-4

Background:

Title 10, Section 54.4, "Scope," of the CFR states, in part:

- (a) Plant systems, structures and components within the scope of this part are –
 - (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions –
 - (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.
 - (2) All nonsafety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in (a)(1)(i), (ii), or (iii) of this section.

Issue:

During the on-site scoping and screening methodology audit the staff reviewed the LRA, the 10 CFR 54.4(a)(2) implementing documents and license renewal drawings, and also performed plant walkdowns. The staff determined that LRA Section 2.1.2.2, "10 CFR 54.4(a)(2) – Nonsafety-Related Affecting Safety-Related," states that for nonsafety-related SSCs directly connected to safety-related SSCs, "equivalent anchors as defined in the Current Licensing Basis (CLB)," were not used because equivalent anchors are not defined in the Callaway CLB. However, during a review of the license renewal drawings, the staff noted examples where the drawing notes credited "equivalent anchors as defined in the CLB" as the termination point for attached piping included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2).

Request:

The staff requests that the applicant discuss the use of equivalent anchors supporting nonsafety-related SSCs, connected to safety-related SSCs, included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). The staff requests that the applicant perform a review of this issue and indicate if the review concludes that use of the scoping methodology precluded the identification of SSCs that should have been included within the scope of license renewal in accordance with 10 CFR 54.4(a). Describe any additional scoping evaluations performed to address the 10 CFR 54.4(a) criteria. List any additional SSCs included within the scope of license renewal as a result of the review, and any SCs for which AMRs were performed. For SCs for which AMRs were performed, describe the AMPs, as applicable, to be credited for managing the identified aging effects.

RAI B2.1.26-1

Background:

LRA Section B2.1.26, states that the American Society for Mechanical Engineers (ASME) Section XI, Subsection IWE Program is an existing program that, following enhancement, will be consistent with NUREG 1801, "Generic Aging Lessons Learned (GALL) Report", AMP XI.S1, "ASME Section XI, Subsection IWE," Program Element 3, "parameters monitored or inspected," of the GALL Report AMP XI.S1 recommends the examination of "moisture barriers" for wear, damage, erosion, tear, surface cracks, or other defects that permit intrusion of moisture in the inaccessible areas of the pressure retaining surfaces of the metal containment shell or liner. Furthermore, ASME Section XI, Subsection IWE, Table-2500-1 "Examination Category E-A" requires 100 percent general visual examinations of moisture barriers (E1.30) during each examination period.

Issue:

During the audit, the staff reviewed Callaway Plant Aging Management Program Evaluation Report, "ASME Section XI, Subsection IWE-B2.1.26." The staff noted that Program Element 3, "parameters monitored or inspected," of this evaluation report does not include inspection of moisture barriers as part of the IWE program. In addition, during the audit, the staff did not find any reference to the moisture barriers in the IWE periodic examination inspection reports.

Request:

- a) Confirm if moisture barriers, as shown in Figure IWE-2500-1 of the ASME Section XI, Subsection IWE Code, are installed in the Callaway containment.
- b) If moisture barriers have been installed, provide justification for not including the examinations of "moisture barriers" during each examination period.

RAI B2.1.27-1

Background:

GALL Report AMP XI.S1 "ASME Section XI, Subsection IWL," Program Element 6, "acceptance criteria," recommends acceptance criteria provided in IWL-2510, which references American

Concrete Institute (ACI) 201.1R and ACI 349.3R for identification of concrete degradation. The LRA AMP basis document for Program Element 6, "acceptance criteria," states that Callaway acceptance criteria for concrete degradation is in accordance with IWL-2510, and is consistent with ACI 201.1R and ACI 349.3R.

Issue:

During its onsite audit, staff reviewed plant procedures applicable to the applicant's IWL program and could not find a reference to ACI 349.3R in any plant procedures. The staff also reviewed results of previous IWL examinations and noted that it appeared that the evaluation criteria specified in ACI 349.3R Chapter 5, "Evaluation Criteria," are not used during the examinations of the concrete containment building.

Request:

State whether plant procedures reference ACI 349.3R, and if so, how the procedures incorporate the code. Also, provide clarification on whether the evaluation criteria specified in ACI 349.3R Chapter 5 are used during IWL examinations, or justification for not using those code provisions during the examinations of the concrete containment building.

RAI B2.1.27-2

Background:

GALL Report AMP XI.S1 "ASME Section XI, Subsection IWL," Program Element 10, "operating experience," references NUREG-1522, "Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures," that described instances of cracked, spalled, and degraded concrete for reinforced and prestressed concrete containments. During the staff's onsite walkdown on May 2, 2012, mapped cracks in concrete were identified around the vertical tendon casings in the tendon gallery.

Issue:

The 25th Year Containment IWL Precision Surveillance Corporation (PSC) Inspection Report identified the referenced cracks as "hair line cracks," less than 0.040 inches in width. The second-tier evaluation criteria of ACI 349.3R is 0.04 inches for "passive cracks." It is not clear to the staff whether those cracks were determined to be "passive cracks," and whether the "Evaluation Criteria" of ACI 349.3R was used to evaluate the findings.

Request:

Provide justification whether the mapped cracks in concrete around the vertical tendon casings in the tendon gallery are "passive cracks," and provide the evaluation criteria used for accepting those conditions.

RAI B2.1.27-3

Background:

During its walkdown on May 2, 2012, the staff observed the containment at various elevations

and noted that the containment vent duct installation is blocking a section of the containment exterior surface.

Issue:

ASME IWL requires visual inspection of the concrete containment. The staff could not determine how the area of concrete that is obstructed by the containment vent duct installation has been/will be visually inspected in accordance with the ASME Code.

Request:

Describe how the area of concrete containment that is obstructed by the containment vent duct has been/will be examined during the scheduled IWL inspections, to ensure that the effects of aging of the containment concrete are adequately managed.

RAI B2.1.28-1

Background:

LRA sections B2.1.28 and B2.1.31 state that the applicant's ASME Section XI, Subsection IWF and Structures Monitoring programs are existing programs that after enhancement will be consistent with the GALL Report AMPs XI.S3 and XI.S6, respectively. GALL Report AMP XI.S3 "ASME Section XI, Subsection IWF," and XI.S6, "Structures Monitoring Program," recommend volumetric examinations for high-strength (actual measured yield strength greater or equal to 150 ksi) bolting greater than 1 inch in diameter. The GALL Report also recommends that molybdenum disulfide should not be used as a lubricant.

Issue:

The LRA AMPs include enhancements to perform volumetric examinations on high strength bolting; however, the documents do not clearly state the number of high strength bolts within the scope of the program, or how the high strength bolts will be selected for inspection. The documents also do not discuss molybdenum disulfide lubricants and whether or not they have been used at Callaway.

Request:

- a) Clearly explain whether or not high strength bolts are included within the scope of the IWF program and the Structures Monitoring program.
- b) If high strength bolts are within scope of either program, explain how the high strength bolts will be selected for volumetric inspection (i.e., all in-scope high strength bolts or a sampling of in-scope high strength bolts). If a sampling approach will be used clearly justify the technical adequacy of the approach, including the sample size and the methodology.
- c) State whether or not molybdenum disulfide lubricants have been used on high strength bolts within the scope of either program. If these lubricants have been used, explain what will be done to age manage bolts lubricated with molybdenum disulfide.
- d) Explain how the IWF Program will address the GALL Report recommendation to refrain from using molybdenum disulfide as a lubricant.

RAI B2.1.28-2

Background:

The GALL Report AMP XI.S3 Program Element 2, "preventive actions" states that if American Society for Testing and Materials (ASTM) A325, ASTM F1852, and/or ASTM A490 bolts are used, the preventive actions as discussed in Section 2 of the Research Council for Structural Connections (RCSC) "Specification for Structural Joints Using ASTM A325 or A490 Bolts" should be followed. An enhancement in the LRA states that whenever replacement of bolting is required, bolting material, installation torque or tension, and use of lubricants and sealants are in accordance with the applicable EPRI guidelines, ASTM standards, AISC specifications, and NUREG recommendations to prevent or mitigate degradation and failure of safety-related bolting due to stress corrosion cracking.

Issue:

It is not clear whether the applicant follows the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

Request:

If ASTM A325, ASTM F1852, and/or ASTM A490 bolts are used, explain how the preventive actions discussed in Section 2 of "Specification for Structural Joints Using ASTM A325 or A490 Bolts" are addressed, or why they are unnecessary. If this document will be added as a reference for the program, include a specific reference to the document in the Final Safety Analysis Report (FSAR) Supplement program summary for the IWF program.

RAI B2.1.28-3

Background:

The LRA states that the ASME Section XI, Subsection IWF program, with enhancements, is consistent with GALL Report AMP XI.S3. The GALL Report AMP XI.S3 states that the ASME Code, Section XI, Subsection IWF, constitutes an existing mandated program applicable to managing aging of ASME Class 1, 2, 3 and MC component supports for license renewal. ASME Section XI, Subsection IWF, states that to the extent practical, the same supports selected for examination during the first inspection interval shall be examined during each successive inspection interval.

Recent industry operating experience has revealed situations where supports within the IWF sample were degraded, but did not meet the IWF threshold for repair. The supports were reworked to as-new condition and remained in the IWF sample.

The staff's concern with respect to aging management is that if ASME Code, Section XI, Subsection IWF supports that are part of the inspection sample are reworked to as-new condition, they are no longer typical of the other supports in the population. Subsequent ASME Code, Section XI, Subsection IWF inspections of the same sample would not represent the age-related degradation of the rest of the population.

Issue:

The applicant's LRA and associated basis documents provide no discussion of how this issue would be addressed, or how the IWF sample would be altered if a support within the original sample was reworked.

Request:

Describe how the LRA ASME Section XI, Subsection IWF program would address a situation where supports in the sample population are reworked or replaced even though they do not necessarily require corrective actions per the ASME Section XI, Subsection IWF acceptance criteria. Clearly explain how the sample population would continue to be representative of the overall population.

RAI B2.1.29-1

Background:

LRA Section B2.1.29 states that the 10 CFR Part 50 Appendix J AMP has implemented Option B for the 10 CFR Part 50 Appendix J leak rate tests (LRTs) and is consistent with the GALL Report, Revision 2, AMP XI.S4. The LRA further states that the 10 CFR Part 50 Appendix J program ensures that the structural integrity of the containment will be maintained to withstand the maximum calculated pressure in the event of a loss of coolant accident (LOCA). Measure of leakage rates across pressure containing or leakage limiting boundaries and inspections as implemented through the program provide for the detection of age-related pressure boundary degradation for the period of extended operation. Per the "scope of program," program element of the GALL Report AMP XI.S4, all containment boundary pressure-retaining components are subject to leak rate testing and inspections.

Issue:

Callaway Plant Unit 1 FSAR-SP, and "ESP-SM-01001, Containment Leakage Rate Testing Program," procedure indicate that a number of penetrations are excluded from local leak rate tests (LLRTs). In addition, the audited plant's operating experience database indicated that the applicant has substituted LLRTs in lieu of VT-2 inspections. It is not clear how the applicant will manage the aging effects for any components that are not included in its "scope of program," program element.

Request:

For those components (valves, penetrations, and other components) that have been excluded from the 10 CFR Part 50 Appendix J program, identify how aging effects will be managed during the period of extended operation. Indicate which AMPs will be used to manage the aging effects for each of the exempted/excluded components, or justify why an AMP is not necessary for the period of extended operation.

RAI B2.1.30-1

Background:

Callaway LRA Section B2.1.30, "Masonry Walls" program, states that the program is an existing program that is consistent with GALL Report AMP XI.S5. Element 6, "acceptance criteria" of GALL Report AMP XI.S5, states that further evaluation is conducted if the extent of cracking and loss of material is sufficient to impact the intended function of the wall or invalidate its evaluation basis.

Issue:

During its audit, the staff reviewed Appendix D of the applicant's procedure ESP-ZZ-01013, "Maintenance Rule Structures Inspection," which includes quantitative acceptance criteria for Masonry Walls. However, it was unclear what the basis was for the acceptance criteria and how the criteria related to the recommended acceptance criteria in the GALL Report AMP.

Request:

Provide the basis for the acceptance criteria described in Appendix D of procedure ESP-ZZ-01013. In addition, explain how the criteria meet the recommendations in Element 6 of the GALL Report AMP XI.S5.

RAI B2.1.31-1

Background:

LRA Sections B2.1.30, "Masonry Walls," and B2.1.32, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," states that these programs are consistent with the GALL Report, Revision 2, AMPs XI.S5 and XI.S7, respectively. In addition, Callaway LRA Section B2.1.31, "Structures Monitoring" program, states that the program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. GALL Report AMPs XI.S5 "Masonry Walls," XI.S6, "Structures Monitoring Program," and XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," recommend structures within scope of the programs be inspected on a frequency not to exceed five years.

Issue:

Program Element 4, "detection of aging effects," of the basis documents of the associated LRA programs state that inspections are performed at intervals of not more than five years. Although this is stated in the basis documents, no discussion of inspection interval is provided in the LRA or the FSAR supplement program summary. This level of detail needs to be captured in the FSAR supplement to provide the staff assurance that the programs will be properly implemented during the period of extended operation.

Request:

Include a statement of the inspection interval in the FSAR supplement. If the interval is greater than five years, list the structures that will be inspected under the longer interval and provide a technical justification for the extended interval. This issue applies to the Masonry Wall,

Structures Monitoring, and Regulatory Guide (RG) 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants programs.

RAI B2.1.31-2

Background:

LRA Section B2.1.31, "Structures Monitoring" program, states that the Structures Monitoring program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. The GALL Report XI.S6, "Structures Monitoring Program," in "parameters monitored or inspected," element states that ACI 349.3R and American National Standards Institute (ANSI)/American Society of Civil Engineers (ASCE) 11 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements. In addition, GALL Report XI.S6, "detection of aging effects" element states that qualifications of inspection and evaluation personnel specified in ACI 349.3R are acceptable for license renewal. The GALL Report also states that applicants who are not committed to ACI 349.3R and elect to use plant-specific criteria for concrete structures should describe the criteria and provide a technical basis for deviations from those listed in ACI 349.3R.

Issue:

In Element 3 of the LRA Structures Monitoring program basis document it states that the inspection methods, inspection frequency, and inspector qualifications at Callaway are consistent with the guidance provided in ACI 349.3R-96. However, a review of the Callaway implementing procedure ESP-ZZ-01013, "Maintenance Rule Structures Inspection," indicates that the inspection methods, including walkdown examination guidance, and qualification requirements for inspectors are not consistent with ACI 349.3R.

Callaway procedure ESP-ZZ-01013, Section 4.0, states that an assigned engineer from the Civil/Structural Design Group will perform the engineering responsibilities for Maintenance Rule Structures Inspection Program. The assigned engineer will possess the experience and skills in civil/structural engineering, consistent with the requirements of the current civil/structural Position Guide and the Engineering Qualification Module. This is inconsistent with the requirements specified in ACI 349.3R which states that responsible-in-charge engineer should be a licensed professional engineer, knowledgeable in the design, evaluation, and in-service inspection of concrete structures and performance requirements of nuclear safety-related structures; or structural engineering graduate of an Accreditation Board for Engineering and Technology, Inc. accredited college or university with at least 10 year's experience in the design, construction, and inspection of concrete structures, and with knowledge of the performance requirements of nuclear safety-related structures and potential degradation processes.

ACI 349.3R recommends a three tier quantitative evaluation criteria for inspection of structures. However, the walkdown guidelines in the Callaway procedure ESP-ZZ-010013 require inspection based on a qualitative acceptance criteria.

Request:

Explain the reason for inconsistency in inspection methods and inspector qualifications as described in the LRA Section B2.1.31 and implementing procedure ESP-ZZ-01013 as identified above.

RAI B2.1.31-3

Background:

Callaway LRA Section B2.1.31, "Structures Monitoring" program, states that the Structures Monitoring program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. The GALL Report XI.S6, "Structures Monitoring Program," in the "acceptance criteria" element, states that acceptance criteria should be derived from design bases codes and standards that include ACI 349.3R, ACI 318, ANSI/ASCE 11, or the relevant American Institute of Steel Construction (AISC) specifications, as applicable, and consider industry and plant operating experience. The criteria are directed at the identification and evaluation of degradation that may affect the ability of the structure or component to perform its intended function. Applicants who are not committed to ACI 349.3R and elect to use plant-specific criteria for concrete structures should describe the criteria and provide a technical basis for deviations from those in ACI 349.3R.

Issue:

In Element 6 of the LRA Structures Monitoring program basis document it states that the Callaway Structures Monitoring program provides guidance for the determination of the performance criteria for SSCs included within the scope of Maintenance Rule (Reference: ESP-ZZ-01013, Appendix B). These guidelines were used to establish the inspection attributes for SSCs. Callaway's Structures Monitoring program uses "Acceptable," "Acceptable with Deficiencies," and "Unacceptable," to classify levels of aging effects for each inspection attribute. Element 6 of the program also states that the Structures Monitoring program will be enhanced to quantify acceptance criteria and critical parameters for monitoring degradation, and procedures will also be enhanced to incorporate applicable industry codes, standards and guidelines for acceptance criteria.

The staff reviewed the proposed enhancement described in Appendix D of the procedure ESP-ZZ-01013, and could not find the basis or reference to any industry standard for some of the acceptance criteria. In addition, Section 7.5 and Appendix D of the procedure ESP-ZZ-01013 do not appear to have consistent acceptance criteria.

Request:

Provide the basis for the acceptance criteria described in Appendix D of procedure ESP-ZZ-01013. In addition, explain the inconsistency between Structures Monitoring program acceptance criteria of "Acceptable," "Acceptable with Deficiencies," and "Unacceptable," as identified in Section 7.5, and quantitative acceptance criteria described in Appendix D of the procedure ESP-ZZ-01013.

RAI B2.1.31-4

Background:

LRA Section B2.1.31, "Structures Monitoring," program states that the Structures Monitoring program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. The GALL Report requires that operating experience involving the AMP, including past corrective actions resulting in program enhancements or additional

programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation.

Issue:

Appendix C of the implementing procedure ESP-ZZ-01013 for the Structures Monitoring program states that gaps filled with an elastomeric are deemed to have degraded when they no longer perform their intended function. Functionality is compromised if the elastomer is cracked, torn, brittle, not bonded to adjoining media, or shows signs of in-leakage. Furthermore, an elastomer filled gap is deemed to have been degraded if the gap is occupied by a foreign material and is considered to have failed if the as-found gap dimension is less than that prescribed by design.

During the audit, the staff reviewed Callaway Action Request (CAR) 200609470, and also observed during plant walkdowns that elastomers in the seismic gaps of the containment, turbine and auxiliary buildings have been degraded and are not functional. According to CAR 200609470, this condition has been identified in 2006 and has caused in-leakage of ground and rain water into the buildings. In addition, during the audit, the staff observed that in one area in the auxiliary building the elastomer has been replaced with a foreign material. Lack of flexible elastomer gap can cause seismic interaction between the buildings resulting in stresses not considered in the design that may affect structural integrity of the structures during the period of extended operation.

Request:

Provide a summary of the plans and schedules to replace the non-functional elastomers located in seismic gaps. This information is required to determine if the Structures Monitoring AMP is effective and being implemented to ensure that the aging of the containment, auxiliary, and turbine buildings concrete will be managed adequately during the period of extended operation.

RAI B2.1.31-5

Background:

LRA Section B2.1.31, "Structures Monitoring" program, states that the program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. In the "program description," of LRA Section B2.1.31, the applicant states that the Structures Monitoring program implements the requirements of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants."

Issue:

Paragraph 50.65(b) of 10 CFR states:

- (b) The scope of the monitoring program specified in paragraph (a)(1) of this section shall include safety related and nonsafety related structures, systems, and components, as follows:
 - (1) Safety-related structures, systems and components that are relied upon to remain functional during and following design basis events to ensure the

integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in [Sec.] 50.34(a)(1), [Sec.] 50.67(b)(2), or [Sec.] 100.11 of this chapter, as applicable.

(2) Nonsafety related structures, systems, or components:

(i) That are relied upon to mitigate accidents or transients or are used in plant emergency operating procedures (EOPs); or

(ii) Whose failure could prevent safety-related structures, systems, and components from fulfilling their safety-related function; or

(iii) Whose failure could cause a reactor scram or actuation of a safety-related system.

Callaway LRA Section B2.1.31, "Structures Monitoring" program, and Commitment No. 23 state that the program will be enhanced before the period of extended operation to include inspections of penetrations, transmission towers, electrical conduits, raceways, cable trays, electrical cabinets/enclosures, and associated anchorages. However, contrary to 10 CFR 50.65 requirements, Element 1, "scope of program," of the Structures Monitoring program basis document as well as the implementing procedure, ESP-ZZ-01013 of the Structures Monitoring program has excluded penetrations, pipe and raceway supports, cable trays, anchor bolts, transmission towers, electrical conduits, and ultimate heat sink retention pond from the scope of existing AMP. None of these structures have been inspected until now, and the applicant has no plans to inspect them until the period of extended operation. Baseline inspection and trending of degradations in the excluded structures prior to the period of extended operation is necessary for appropriate aging management.

Request:

Provide summary description of plans and schedule for baseline inspection and trending of degradations of the structures noted above that have been excluded from Element 1, "scope of program," of the Structures Monitoring program. In addition, provide technical basis for not including baseline inspection of penetrations, transmission towers, electrical conduits, raceways, cable trays, electrical cabinets/enclosures, and associated anchorages, and ultimate sink retention pond as a part of the Structures Monitoring program.

RAI B2.1.31-6

Background:

Callaway LRA Section B2.1.31, "Structures Monitoring" program, states that the program is an existing program that, following enhancement, will be consistent with GALL Report, Revision 2, AMP XI.S6. In the GALL Report AMP XI.S6, Program Element 4, "detection of aging effects," notes that the Structures Monitoring program addresses detection of aging effects for inaccessible, below-grade concrete structural elements, and for plants with non-aggressive ground water/soil (pH greater than 5.5, chlorides less than 500 ppm, or sulfates less than 1500 ppm). The program recommends: (a) evaluating the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in,

degradation to such inaccessible areas and (b) examining representative samples of the exposed portions of the below grade concrete, when excavated for any reason. The GALL Report also notes that for plants with aggressive ground water/soil (pH less than 5.5, chlorides greater than 500 ppm, or sulfates greater than 1500 ppm) and/or where the concrete structural elements have experienced degradation, a plant-specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.

Issue:

The LRA states that groundwater is monitored for pH, chlorides, and sulfates every five years, and the results evaluated by engineering to assess the impact, if any, on below grade structures. The LRA further states that groundwater has been sampled quarterly since November 2009. With the exception of two monitoring wells, pH, chlorides, and sulfates concentrations have been within the prescribed limits for non-aggressive ground water/soil. The two wells have shown seasonal increases in chloride levels of up to 680 mg/L while the pH and sulfate concentrations have remained non-aggressive. The LRA further states that Callaway will continue to monitor the results from the groundwater samples and will perform an engineering evaluation to determine if any adverse aging effects have occurred in any inaccessible concrete structural elements. The LRA does not provide any details on how the aging of the inaccessible concrete elements will be managed during the period of extended operation due to the presence of high chloride concentrations.

Request:

- a) Provide historical results, including seasonal variations, for groundwater chemistry (i.e., pH, sulfates, and chlorides) to demonstrate that the groundwater is either aggressive or non-aggressive.
- b) Provide details on how the aging of the inaccessible concrete elements will be managed during the period of extended operation due to the presence of high chloride concentrations.

RAI 3.5.2.11-1

Background:

LRA Section B2.1.31 states that The Structures Monitoring program is an existing program that, following enhancement, will be consistent with GALL Report AMP XI.S6, "Structures Monitoring Program." In GALL Report AMP XI.S6, Elements 3 and 4 state that for each structure/aging effect combination the specific parameters monitored or inspected are selected to ensure that the aging degradation leading to loss of intended function will be detected and quantified before there is a loss of intended function. For stainless steel submerged in water (water-standing), the GALL Report, Item III.A7.T.23, lists cracking and loss of material as possible aging effects and recommends a plant specific AMP is to be evaluated.

Issue:

LRA Table 3.5.2-11 lists stainless steel supports in a submerged environment and does not include cracking as an applicable aging effect. In addition, it states that the loss of material will be managed by the Structures Monitoring program.

Request:

- a) Describe the type, condition, and temperature of water in which the stainless steel supports are submerged.
- b) Explain why cracking is not an applicable aging effect for the submerged stainless steel supports or include an appropriate AMP to manage cracking in submerged stainless steel supports.
- c) If an AMP is credited with managing the aging effect due to cracking, please provide a technical justification for the credited aging management technique (i.e., inspection method, frequency, and acceptance criteria).
- d) Explain how the Structures Monitoring program will manage aging effects due to loss of material (i.e., inspection method, frequency, and acceptance criteria).

RAI 3.5.2.11-2

Background:

LRA Section B2.1.31 states that the Structures Monitoring program is an existing program that, following enhancement, will be consistent with GALL Report AMP XI.S6, "Structures Monitoring Program." In GALL Report AMP XI.S6, program Elements 3 and 4 state that for each structure/aging effect combination the specific parameters monitored or inspected are selected to ensure that the aging degradation leading to loss of intended function will be detected and quantified before there is a loss of intended function.

Issue:

LRA Table 3.5.2-11 states that the aging of the fiberglass reinforced plastic exposed to atmosphere/weather environment will be managed in accordance with the Structures Monitoring program by monitoring for cracking, blistering, change in color. However, a review of LRA Section B2.1.31, "Structures Monitoring" program indicates that this program does not have any specific guidance for monitoring or acceptance criteria for fiberglass reinforced plastic material.

Request:

Explain what parameters will be monitored and acceptance criteria will be used for aging management of fiberglass reinforced plastic components exposed to atmosphere/weather environment.

RAI 3.5.2.12-1

Background:

LRA Section B2.1.28 states that the ASME Section XI, Subsection IWF program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S3, "ASME Section XI, Subsection IWF." LRA Section B2.1.32 states that the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is an existing program that is consistent with GALL Report AMP XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants." GALL Report AMP XI.S3,

“ASME Section XI, Subsection IWF,” states that ASME Code, Section XI, Subsection IWF, constitutes an existing mandated program applicable to managing aging of ASME Class 1, 2, 3, and MC component supports for license renewal.

Issue:

LRA Table 3.5.2-12 states that the aging of the ASME Class 2 and 3 carbon steel supports that are submerged in water will be managed by GALL Report AMP XI.S7, “RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants,” by monitoring for loss of material. The scope, frequency, and acceptance criteria as specified in GALL Report AMP XI.S3 for ASME Class 2 and 3 supports is different from that specified in GALL Report AMP XI.S7 for non ASME steel components monitored for loss of material due to corrosion. GALL Report AMP XI.S3 recommends that a sample of ASME Class 1, 2, and 3 component supports that are not exempt from examination and 100 percent of MC component supports be examined as specified in Table IWF-2500-1. The sample size examined for ASME Class 1, 2, and 3 component supports is as specified in Table IWF-2410-2. The detailed acceptance standards for ASME Class 1, 2, and 3 component supports are delineated in IWF-3400. GALL Report AMP XI.S7 recommends inspection of structures and components at a frequency of five years in accordance with ACI 349.3R.

Request:

Explain why LRA AMP B2.1.32 instead of LRA AMP B2.1.28 is being used to monitor ASME Class 2 and 3 supports that are submerged in water. This should include a discussion on how the scope, frequency, and acceptance criteria specified in ASME Section III, Subsection IWF can be implemented by LRA AMP B2.1.32 for ASME Class 2 and 3 carbon steel supports that are submerged in water.

RAI B2.1.36-1

Background:

Callaway LRA Section B2.1.36, “Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” states that the program is an existing program that, following enhancement, will be consistent with GALL Report AMP XI.E3. The GALL Report AMP XI.E3 “scope of program” program element recommends a voltage level of greater than or equal to 400V.

Issue:

The “scope of program” program element of basis document CW-AMP-B2.1.36, “Inaccessible Power Cable Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” does not indicate the voltage level of in-scope inaccessible power cable (e.g., greater than or equal to 400 Volts). Additionally, LRA FSAR Supplement A1.36 and Table A4-1, “License Renewal Commitments,” do not specify voltage level.

Request:

Explain why the “scope of program” program element for basis document CW-AMP-B2.1.36, “Inaccessible Power Cable Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” LRA FSAR Supplement A1.36, “Inaccessible Power Cables Not Subject to

10 CFR 50.49 Environmental Qualification Requirements,” and Table A4-1, “License Renewal Commitments,” do not reference in-scope inaccessible power cable voltage level (greater than or equal to 400 Volts).

RAI B2.1.36-2

Background:

Basis document CW-AMP-B2.1.36, “Inaccessible Power Cable Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” specifies the in-scope manholes under “scope of program” program element.

Issue:

Basis document CW-AMP-B2.1.36, “Inaccessible Power Cable Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” does not include in-scope manholes MH59-8A and MH59-8B. See Table 2 of draft procedure EDP-ZZ-07001.

Request:

Explain why in-scope manholes MH59-8A and MH59-8B are not included in basis document CW-AMP-B2.1.36, “scope of program” program element.

RAI B2.1.36-3

Background:

GALL Report AMP XI.E3 Program Element 2, “preventive actions,” recommends that the inspection should include direct observation that cables are not wetted or submerged, that cable/splices and support structures are intact, and that dewatering/drainage systems (i.e., sump pumps) and associated alarms operate properly. In addition, operation of dewatering devices should be inspected and operation verified prior to any known or predicted heavy rain or flooding events. GALL Report AMP XI.E3 Program Element 4, “monitoring and trending,” includes trending actions as part of the AMP, although the ability to trend results is dependent on the specific tests or inspection. GALL Report AMP XI.E3 Program Element 6, “acceptance criteria,” recommends that the acceptance criteria for each test are defined by the specific type of test performed and the specific cable tested. GALL Report AMP XI.E3 Program Element 7, “corrective actions,” states that corrective actions are taken and an engineering evaluation is performed when the test or inspection criteria are not met.

Issue:

The enhancements listed in LRA Appendix A, Table A4-1 Commitment No. 27, and the AMP described in LRA FSAR Supplement A1.36, are not in agreement. Specifically, Table A4-1 includes enhancements that state the following but are not addressed in LRA FSAR Supplement A1.36.

- a. Operation of dewatering devices will be inspected and operation verified prior to any known or predicted heavy rain or flooding events.

- b. Compare test results to previous test results to evaluate for additional information on the rate of cable degradation.
- c. Acceptance criteria for cable testing will be defined prior to each test.
- d. Require an engineering evaluation when the test or inspection acceptance criteria are not met.

Request:

Explain why the above enhancements described in LRA Appendix A, Table A4-1, Commitment No. 27 are not included in Appendix A FSAR Supplement A1.36.

RAI B2.1.36-4

Background:

GALL Report AMP XI.E3 Program Element 4, "detection of aging effects," recommends that for power cables exposed to significant moisture, test frequencies are to be at least once every six years adjusted based on test results (including trending of degradation where applicable) and operating experience.

Issue:

Basis document CW-AMP-B2.1.36 "detection of aging effects" program element, procedure EDP-ZZ-07001, and LRA FSAR Supplement A1.36 do not state that test frequencies are adjusted based on test results as well as operating experience.

Request:

Explain why Basis Document CW-AMP-B2.1.36 Element 4, LRA FSAR Supplement A1.36, and procedure EDP-ZZ-07001 do not include revising test frequencies consistent with the recommendations in GALL Report AMP XI.E3 program element "detection of aging effects."

RAI B2.1.36-5

Background:

The applicant's responses to GL 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," and the applicant's discussion of plant operating experience for AMP B2.1.36 states that operating experience with the existing program did not identify any cable failures attributed to submergence or water intrusion.

Issue:

During the audit the staff noted that CAR 201008001 states that some Callaway cable failures were attributed to water submergence.

Request:

Describe the cable failures at Callaway that have been attributed to submergence and describe any changes to the existing program as a result of operating experience gained from these failures.

RAI B2.1.36-6

Background:

Draft procedure EDP-ZZ-07001 Section 2.0, "Scope" states that Table 2 lists the Inaccessible Power Cables not subject to environmental qualification requirements and within the scope of license renewal aging management. Table 2 is entitled Underground Cable Requiring Aging Management.

Issue:

Table 2 lists additional cables not in-scope of basis document CW-AMP-B2.1.36 or LRA AMP B2.1.36. Additionally, in-scope cable (B2.1.36) CA-3331L2 is duplicated in Table 2 with different routing.

Request:

Reconcile Table 2 title and Section 2, "Scope," descriptions of included cable for aging management. Identify cables in-scope of the LRA (license renewal) and associated AMPs, including LRA AMP B2.1.36 (GALL Report AMP XI.E3) in Table 2. Provide clarification on duplicate cable listing for CA-3331L2 in Table 2.

RAI B2.1.36-7

Background:

GALL Report AMP XI.E3 Program Element 7, "corrective actions," states that corrective actions are taken and an engineering evaluation is performed when the test or inspection acceptance criteria is not met.

Issue:

Draft procedure EDP-ZZ-07001 Section 4.2.6 states that appropriate corrective actions shall be taken if significant aging that results from adverse environments is identified or suspected.

The corrective action is not consistent with GALL Report AMP XI.E3 Program Element 7, Corrective Actions or basis document CW-AMP-B2.1.36.

Request:

Explain why the corrective actions as described in EDP-ZZ-07001, Section 4.2.6 are not consistent with GALL Report AMP XI.E3 Program Element 7, "corrective actions," or basis document CW-AMP-B2.1.36.

RAI B2.1.37-1

Background:

GALL AMP XI.E6 acceptance criteria states that cable connections should not indicate abnormal temperature for the application when thermography is used. In the Callaway Plant Aging Management Program Evaluation Report for Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements AMP, under the same program element, the applicant states that the acceptance criteria for thermography testing will be based on the temperature rise above the reference temperature. The reference temperature will be ambient temperature or the baseline temperature data from the same type of connections being tested. The applicant referenced procedure EDP-ZZ-07001 Section 4.3.13. Section 4.3.13 of this procedure states that the acceptance criteria for the review of thermography result on the one-time inspection of cable connections will be based on the temperature rise above a reference temperature. The reference temperature will be ambient temperature or the baseline temperature data from the connections being tested.

Issue:

The procedure does not specify the acceptance criteria for thermography testing. The acceptance criteria for the program are used to perform an evaluation if the thermography test acceptance criteria are not met. The evaluation may include changes to one-time inspection, increased inspection frequency, and replacement or repair of the affected connections.

Request:

Describe specific acceptance criteria for thermography or reference a plant specific procedure that specifies the acceptance criteria for thermography testing.

RAI 3.5.2.2.1.9-1

Background:

SRP-LR Sections 3.5.3.2.1.9, 3.5.3.2.2.1.4 and 3.5.3.2.2.3.3 recommend further evaluation of programs to manage increase in porosity and permeability due to leaching of calcium hydroxide and carbonation in inaccessible areas. The SRP-LR further states that a plant-specific aging management program is not required, even if reinforced concrete is exposed to flowing water if (1) there is evidence in the accessible areas that the flowing water has not caused leaching and carbonation, or (2) evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.

Issue:

The corresponding sections of the LRA state that concrete structures were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Therefore, the LRA states that the aging effect of leaching of calcium hydroxide and carbonation is not applicable, and a plant-specific program is not necessary. However, during the AMP audit, the staff observed

indications of concrete leaching in the tendon gallery and reviewed CAR 200806266 which documented the leaching. The LRA does not discuss any operating experience related to leaching.

Request:

- a. Provide a summary of observed leaching throughout the site.
- b. Provide an AMP to manage increases in porosity and permeability due to leaching in inaccessible areas, or provide an evaluation that demonstrates that the observed leaching has no impact on the intended functions of affected structures. This evaluation should cover all affected concrete within the scope of license renewal.

RAI 4.2.4-1

LRA Section 4.2.4 indicates that the Callaway pressure-temperature (P-T) limit curves and adjusted nil-ductility reference temperature (RT_{NDT}) values are established in a P-T Limits Report (PTLR), the contents of which are controlled in accordance with Technical Specification (TS) 5.6.6 requirements. The current Callaway PTLR (Revision 5) documents chemistry factor (CF) calculations based on the application of surveillance data from capsules "U", "Y", "V" and "X" using the methods in RG 1.99, "Radiation Embrittlement of Reactor Vessel Materials," Revision 2, Position 2.1. Section 4.0 of the Callaway PTLR states that all of the measured ΔRT_{NDT} data for the surveillance plate and weld materials are deemed credible based on the RG 1.99, Revision 2 surveillance data credibility assessment.

- (a) Please confirm whether surveillance capsule "X" was the last capsule pulled from the Callaway reactor vessel. If not, the CF calculation must be revised to include the additional surveillance data.
- (b) Table 5.0-2 of the Callaway PTLR lists the RG 1.99, Revision 2, Position 2.1 CF for the surveillance plate as 25 °F and the adjusted CF for the surveillance weld as 39.9 °F. However, LRA Table 4.2-4 of the Callaway LRA lists a Position 2.1 CF of 25.6 °F for the surveillance plate and 40.8 °F for the surveillance weld. Please explain this discrepancy.
- (c) Please identify the calendar year when the current 28 EFPY P-T limit curves are projected to expire.

LRA Section 4.2.4 states that the P-T limit curves, as established in the PTLR, will be maintained and updated as necessary by TS 3.4.3 and TS 5.6.6, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

Part 50, Appendix G, Paragraph IV.A of 10 CFR states that,

[T]he pressure-retaining components of the reactor coolant pressure boundary [RCPB] that are made of ferritic materials must meet the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code [ASME Code, Section III], supplemented by the additional requirements set forth

in [paragraph IV.A.2, "Pressure-Temperature (P-T) Limits and Minimum Temperature Requirements"]

Therefore, 10 CFR Part 50, Appendix G requires that P-T limits be developed for the ferritic materials in the reactor vessel beltline (neutron fluence $\geq 1 \times 10^{17}$ n/cm², E > 1 MeV), as well as ferritic materials not in the reactor vessel beltline (neutron fluence $< 1 \times 10^{17}$ n/cm², E > 1 MeV). Further, 10 CFR Part 50, Appendix G requires that all reactor coolant pressure boundary (RCPB) components must meet the ASME Code, Section III requirements. The relevant ASME Code, Section III requirement that will affect the P-T limits is the lowest service temperature requirement for all RCPB components specified in Section III, NB-2332(b).

The current Callaway PTLR and the PTLR methodology described in Topical Report WCAP-14040-NP-A, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and Reactor Coolant System Heatup and Cooldown Limit Curves," Revision 4, dated May 2004, address P-T limit curve calculations for only the reactor vessel beltline shell region.

P-T limit calculations for ferritic RCPB components that are not reactor vessel beltline shell materials may define P-T curves that are more limiting than those calculated for the reactor vessel beltline shell materials. This may be due to the following factors:

- i. Reactor vessel nozzles, penetrations, and other discontinuities have complex geometries that may exhibit significantly higher stresses than those for the reactor vessel beltline shell region. These higher stresses can potentially result in more restrictive P-T limits, even if the RT_{NDT} for these components is not as high as that of reactor vessel beltline shell materials that have simpler geometries.
 - ii. Ferritic RCPB components that are not part of the reactor vessel may have initial RT_{NDT} values, which may define a more restrictive lowest operating temperature in the P-T limits than those for the reactor vessel beltline shell materials.
- (d) Describe how the P-T limit curves to be developed for use in the period of extended operation, and the methodology used to develop these curves, will consider all reactor vessel materials (beltline and non-beltline) and the lowest service temperature of all ferritic RCPB materials, consistent with the requirements of 10 CFR Part 50, Appendix G.

July 9, 2012

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
CALLAWAY PLANT UNIT 1 LICENSE RENEWAL APPLICATION, SET 4
(TAC NO. ME7708)

Dear Mr. Heflin:

By letter dated December 15, 2011, Union Electric Company submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54) for renewal of Operating License NPF-30 for the Callaway Plant Unit 1. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing this application in accordance with the guidance in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." During its review, the staff has identified areas where additional information is needed to complete the review. The staff's requests for additional information are included in the enclosure. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Sarah G. Kovaleski, of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-2946 or by e-mail at Samuel.CuadradoDeJesus@nrc.gov.

Sincerely,

/RA/

Samuel Cuadrado de Jesús, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure:

As stated

cc w/encl: Listserv

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DATE	6/28/2012	6/28/2012	7/9/2012	7/9/2012

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Letter to A. Heflin from S. Cuadrado DeJesus dated, July 9, 2012

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
CALLAWAY PLANT UNIT 1 LICENSE RENEWAL APPLICATION, SET 4
(TAC NO. ME7708)

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