



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

September 25, 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 12 (TAC
NO. ME7708)

Dear Mr. Heflin:

By letter dated December 15, 2011, Union Electric Company d/b/a Ameren Missouri (the applicant) submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54) for renewal of Operating License No. NPF-30 for the Callaway Plant Unit 1 (Callaway). 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", written over a horizontal line.

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 12

RAI B2.1.6-4

Background:

Nuclear Energy Institute (NEI) Report No. NEI-95-10, Revision 6, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," provides NEI's recommendations for formatting license renewal applications for U.S nuclear plants. NEI-95-10, Revision 6, states that Appendix C of LRAs represents an optional appendix that may be used for plant-specific information that is needed or required for the LRAs but that does not appropriately fit into any other of the sections that are recommended for LRAs. Callaway's LRA states that LRA Appendix C was not used.

The Callaway LRA includes AMP B2.1.6, "PWR Vessel Internals," which is based in part on the recommended guidelines for Westinghouse-designed RVI components in EPRI Report No. 1022863, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)." The EPRI Report was approved in a revised NRC safety evaluation (SE, Revision 1) dated December 16, 2011. This safety evaluation included appropriate applicant/licensee action items (A/LAIs) that were to be responded to for incoming LRAs.

Issue:

Per the NEI-95-10, Revision 6 guidelines, LRA Appendix C is the appropriate place for providing responses to A/LAIs; however, LRA Appendix C does not currently include Callaway's responses to the A/LAIs on MRP-227-A.

Request:

Provide your basis for omitting responses to the applicable A/LAIs on MRP-227-A for Westinghouse-designed RVI components from the scope of the Callaway LRA. Alternatively, Callaway may amend its LRA to include the appropriate responses to those A/LAIs that have been issued on the MRP-227-A report and are applicable to the design of the Westinghouse-designed RVI components.

RAI 3.1.2.1-3

Background:

LRA Table 3.1.2-1 provides a list of the AMR items for aging management of the Callaway RPV and RVI components. LRA page 3.1-69 provides the AMR items for managing loss of material and changes in dimension of the RVI baffle-former assembly. In these AMR items, the applicant credits the Water Chemistry Program (LRA AMP B2.1.2) to manage loss of material in

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the RVI baffle-former assembly and the PWR Vessel Internals Program (LRA AMP B2.1.6) to manage changes in dimension of the RVI baffle-former assembly.

Table 4.3-3 of MRP-227-A includes the EPRI MRP's recommended criteria for performing VT-3 visual inspections of Westinghouse-design baffle-to-former assembly components, including the baffle plates, former plates, and baffle-to-edge bolts.

Issue:

It is not evident to the staff which components are within the scope of the AMR items for the generic terminology "RVI baffle-former assembly." In addition, in Table 4-3 of MRP-227-A, the EPRI MRP identifies that the VT-3 examinations on the applicable RVI baffle-former assembly components looks for evidence of both changes in dimension that initiates by component distortion and cracking that initiates by an irradiation-assisted stress corrosion cracking mechanism. Although the LRA Table 3.1.2-1 does include appropriate AMR items on management of cracking for the Callaway baffle-to-edge bolts, it does not include any AMR items on management of cracking in the plant's baffle plates or former plates.

Request:

Clarify whether the scope of the AMR items for managing changes in dimension and loss of material in the "RVI baffle-former assembly" include baffle plates and former plates in the assembly. Provide the basis on why LRA Table 3.1.2-1 does not include any AMR items on management of cracking in the baffle plates and former plates of the baffle-former assembly.

RAI 3.1.2.1-4

Background:

License renewal application (LRA) Table 3.1.2-1 provides a list of the aging management review (AMR) items for aging management of the Callaway reactor pressure vessel (RPV) and reactor vessel internal (RVI) components. LRA pages 3.1-72 and 3.1-73 provide the AMR items for the control rod guide tube (CRGT) support pins (CRGT split pins). AMR items for the Callaway core barrel flange are provided on LRA page 3.1-74 and AMR items for the Callaway upper core plate are provided on LRA page 3.1-83. In the set of the AMR items for CRGT split pins, for the upper core plate, and upper core barrel flanges, Union Electric Company d/b/a Ameren Missouri (the applicant) credits its Water Chemistry Program (LRA AMP B2.1.2) to manage loss of material that might occur in the components during the period of extended operation. The LRA indicates that these components are all made from stainless steel materials and are exposed to the reactor coolant environment.

In LRA Amendment No. 1, the applicant added an AMR item on loss of material (due to wear) for the upper core plate and credited the PWR Vessel Internals Program to manage loss of material due to wear in the upper core plate by identifying them as "Expansion Category" components for the program. Electric Power Research Institute (EPRI) Report No. 1022863, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation

Guidelines (MRP-227-A)," identifies that the CRGT lower flange weld is the "Primary Category" link for upper core plate.

In LRA Amendment No. 1, the applicant also amended its AMR item on cracking for the core barrel flange to credit the Water Chemistry Program and PWR Vessel Internal Program to manage the aging effect and identified that the core barrel flange is an "Expansion Category" component for the applicant's PWR Vessel Internals Program. MRP-227-A identifies that the CRGT lower flange weld is the "Primary Category" link for upper core plate.

Issue:

In Table 3-3 of EPRI Report No. 1022863, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)," the EPRI MRP identifies that loss of material due to wear is an applicable aging effect for these components. Wear is a mechanical mechanism for inducing loss of material in a metallic component. Therefore, water chemistry control programs are not effective means for managing loss of material that could initiate in a metallic component as a consequence of wear because they are mitigative programs that are designed to control chemical species in the various plant coolant systems. Thus, the staff does not have sufficient information to conclude that wear would not be applicable to the CRGT split pins or how loss of material due to wear could be adequately managed solely through implementation of the Callaway Water Chemistry Program.

For the Westinghouse-designed core barrel flanges, the basis in MRP-227-A would have the applicant identify these components as ASME Section XI, "Existing Program" components, and not as "Expansion Category" components. If the core plates were actual ASME Section XI, Examination Category B-N-3 components for the current licensing basis (CLB), the MRP-227-A report would have the applicant perform ASME Section XI VT-3 visual "Existing Program" inspections of the core barrel flange using the existing ASME Section XI, Examination Category B-N-3 requirements in order to manage loss of material that might occur in the components as a result of wear. Under NUREG-1801, "Generic Aging Lessons Learned Report," (GALL Report) AMR item IV.B2.RP-24, the Water Chemistry Program (by itself) is only acceptable to manage loss of material that initiates by either a general corrosion or pitting corrosion mechanism.

Request:

- a) Provide the basis as to why loss of material due to wear was not considered as an applicable aging effect and mechanism requiring management (AERM) for the CRGT split pins when this AERM is identified in the MRP-227-A report for these components. If loss of material due to wear is an applicable AERM for CRGT split pins, justify your basis for managing loss of material in the components using only the Callaway Water Chemistry Program. With regard to aging management of the CRGT split pins, specifically justify why the combination of the PWR Vessel Internals Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, IWD Program had not been credited to manage potential loss of material due to wear in the split pins similar to the manner in which the applicant had credited this combination of AMPs to manage cracking in the components.

- b) With regard to aging management of the core barrel flanges, clarify why the AMR item on cracking of the core barrel flanges in LRA Amendment No. 1 identifies these components as "Expansion Category" components and not as ASME Section XI "Existing Program" components and justify your basis on how the Water Chemistry Program, by itself, would be capable of managing loss of material in the core barrel flange(s) that initiates by a wear-induced mechanism (or similar mechanisms such as fretting or abrasion). Clarify whether the core barrel flange is defined in the Callaway CLB as an ASME Section XI, Examination Category B-N-3 core support structure component. If the core barrel flange is a B-N-3 component for the CLB, provide the basis for not crediting either the PWR Vessel Internals Program's ASME Section XI-based "Existing Program" Examination Category protocols or the applicant's ASME Section XI Inservice Inspection, Subsections IWB, IWC, IWD Program as the basis for managing both loss of material due to wear and cracking that may occur in the core barrel flanges. If the upper core flange is not defined in the CLB as an ASME Section XI, Examination Category B-N-3 core support structure component:
- i) identify the RVI "Primary Category" component or components that will be inspected for cracking and loss of material due to wear and will be used to determine whether the core barrel flange will need to be inspected for these aging effects,
 - ii) identify the inspection methods and frequency that will be applied to both the "Primary Category" component links and potentially to the core barrel flange as an "Expansion Category" component for those components, and
 - iii) justify the "Expansion Category" bases that will be applied to potential inspections of the core barrel flange.

RAI 3.1.2.1-5

Background:

In LRA Amendment No. 1, the applicant provided changes to the AMR items for the following RVI components at Callaway:

- core barrel girth and axial welds
- core barrel outlet nozzles and welds
- core support forging
- upper core plate.

Issue:

In the AMR item changes, the applicant either amended the LRA to correct the aging effect or mechanism consistent with those reported for the components in MRP-227-A or to propose aging management bases under the PWR Vessel Internals that were consistent with the recommended aging management bases as proposed in MRP-227-A report and endorsed by the staff for "Primary Category" or "Expansion Category" RVI components. However, the staff has noted that these components may fall into multiple inspection category bases if the components are also defined in the CLB as ASME Section XI, Examination Category B-N-3 core support structure components. Therefore, the staff seeks additional information on

whether the core barrel girth welds, core barrel axial welds; core barrel outlet nozzles and welds; core support forging; and upper core plate are ASME Section XI, Examination Category B-N-3 components for the CLB.

Request:

Clarify whether the core barrel girth welds, core barrel axial welds, core barrel outlet nozzles and welds, core support forging, and upper core plate are ASME Section XI, Examination Category B-N-3 components for the CLB. If so, justify why the ASME Section XI, Subsection IWB, IWC, IWD, or the ASME Section XI "Existing Program" protocols of the PWR Vessel Internals Program have not been credited in addition to the appropriate "Primary Category" or "Expansion Category" bases that have been identified for the components.

RAI 3.1.2.2-1

Background:

LRA Section 3.1.2.2.9 provides the applicant's basis for assessing cracking in (a) the inaccessible areas of RVI components; or (b) the redundant components (such as bolting) in those redundant components that are inaccessible to inspection, if the inspections of the accessible areas of the components or redundant RVI components of the accessible redundant components reveal evidence of cracking in the components. LRA Section 3.1.2.2.10 provides the applicant's analogous assessment for loss of material due to wear, loss of fracture toughness, changes in dimension due to void swelling or distortion, or loss of preload in fastened RVI connections (e.g., bolted, pinned, or keyed connections). These LRA sections are based on the NRC's further evaluation "acceptance criteria" recommendations for assessing inaccessible RVI component areas or inaccessible redundant RVI components in SRP-LR Sections 3.1.2.2.9 and 3.1.2.2.10.

The applicant typically credits the MRP-defined "Primary Category" and "Expansion Category" inspections of its PWR Vessel Internals Program (LRA AMP B2.1.6) for performing condition monitoring-based aging management of those RVI components at Callaway that are defined as MRP-based "Primary Category" or "Expansion Category" components.

In LRA Amendment No. 1, the applicant stated the following with respect to the PWR Vessel Internals Program, as given in LRA Section B2.1.6:

"PWR Vessel Internals (B2.1.6) examines one hundred percent of the accessible volume/area of each component for the Primary and Expansion components inspection category components. The minimum examination coverage for primary and expansion inspection categories is 75 percent of the component's total (accessible plus inaccessible) inspection area/volume to be examined. When addressing a set of like components (e.g. bolting), the minimum examination coverage for primary and expansion inspection categories is 75 percent of the component's total population of like components (accessible plus inaccessible).

If defects are discovered during the examination, Callaway will enter the information into the corrective action program and evaluate whether the results of the examination ensure that the component (or set of components) will continue to meet its intended function under all licensing basis conditions of operation until the next scheduled examination. Engineering evaluations that demonstrate the acceptability of a detected condition will be performed consistent with WCAP-17096-NP.”

Issue:

The aging management bases in LRA Sections 3.1.2.2.9 and 3.1.2.2.10 only discuss how the applicant will conform to the EPRI MRP’s recommended inspection coverage bases for “Primary Category” and “Expansion Category” RVI components at Callaway. LRA Sections 3.1.2.2.9 and 3.1.2.2.10 do not discuss or explain how the applicant would evaluate relevant aging effects in those portions of the components that are inaccessible to the examinations, or for redundant components with areas inaccessible to the inspection techniques being performed (e.g., bolting).

In addition, the methodology in WCAP-17096-NP, Revision 2, “Reactor Internals Acceptance Criteria Methodology and Data Requirements” (ML101460156), was submitted by the EPRI MRP and Westinghouse Company for NRC review and approval. However, this report has not yet been approved by the staff and implementation of the methodology in WCAP-17096-NP, if approved, may be subject to additional limitations or Applicant/Licensee Action Items that derive from the staff’s conclusions on the acceptability of the report’s methodology.

Request:

- a) For those “Primary Category” or “Expansion Category” inspections that reveal evidence of aging, clarify when and how the evaluations of the inaccessible areas or inaccessible redundant components (such as inaccessible bolts) would be performed. Specifically, identify the types of structural or flaw tolerance evaluations that would be performed for the relevant aging effects that are assumed to occur in inaccessible RVI component areas or for redundant components in the inaccessible redundant RVI components. In addition, describe the specific acceptance criteria and relevant assumptions that will be used to initiate such structural or flaw tolerance evaluations of the inaccessible areas or inaccessible redundant components. With respect to these clarifications, provide separate inaccessible area/inaccessible component clarifications for the assessment of aging in non-redundant “Primary Category” RVI components, redundant “Primary Category” RVI components, non-redundant “Expansion Category” RVI components and redundant “Expansion Category” RVI components. In particular, for RVI “Expansion Category” components or redundant RVI “Expansion Category” components, the staff seeks clarification on whether it would only take detection of relevant aging effects in the “Primary Component” links to initiate such structural evaluations or flaw tolerance evaluations of the inaccessible “Expansion Category” component areas or inaccessible redundant “Expansion Category” components, or whether evidence of relevant aging effects would actually need to be detected in the Expansion

Category components to initiate such inaccessible area or inaccessible component evaluations. Justify all bases made in response to this part of the RAI.

- b) Justify your basis for relying on WCAP-17096-NP as part of the monitoring and evaluation bases for the PWR Vessel Internals Program when the methodology in WCAP-17096-NP has not yet been approved by the NRC for use and may be subject to additional limitations or Application/Licensee Action Items. If the report is eventually approved for use by the staff, clarify and justify how the applicant will address any limitations or Applicant/Licensee Action Items (or equivalent) that may be issued on the report, as identified in the NRC safety evaluation will be issued on the report's methodology. Clarify and justify how the evaluation of flaws or degraded areas will be evaluated in the RVI components at Callaway if WCAP-17096-NP is rejected for use by the NRC.

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 12 (TAC
NO. ME7708)

Dear Mr. Heflin:

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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/enc: Listserv

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NAME	IKing	SCuadrado	DMorey	SCuadrado
DATE	9/20/2012	9/21/2012	9/25/2012	9/25/2012

OFFICIAL RECORD COPY

Letter to A. Heflin from S. Cuadrado DeJesus dated September 25, 2012

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
CALLAWAY PLANT UNIT 1 LICENSE RENEWAL APPLICATION, SET 12 (TAC
NO. ME7708)

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