



May 27, 2021

ULNRC-06664

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

10 CFR 50.90

Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT AND REGULATORY
EXEMPTIONS FOR A RISK-INFORMED APPROACH TO ADDRESS GSI-191
AND RESPOND TO GL 2004-02 (LDCN 19-0014)**

- References:
1. Ameren Missouri letter ULNRC-06526, "Request for License Amendment and Regulatory Exemptions for a Risk-Informed Approach to Address GSI-191 and Respond to GL 2004-02 (LDCN 19-0014)," dated March 31, 2021 (ADAMS Accession No. ML21090A184)
 2. NRC Letter from Mahesh L. Chawla, Project Manager - Plant Licensing Branch IV, to Fadi Diya, Senior Vice President and Chief Nuclear Officer, Callaway Plant, "Callaway Plant, Unit No. 1 - Supplemental Information Needed for Acceptance of Requested Licensing Actions Re: License Amendment and Regulatory Exemptions for a Risk-Informed Approach to Address Generic Safety Issue-191 and Respond to Generic Letter 2004-02 (EPID L-2021-LLA-0059 and EPID L-2021-LLE-0021)," dated May 11, 2021 (ADAMS Accession No. ML21130A588)

In the letter identified as Reference 1, Union Electric Company (Ameren Missouri) submitted its proposed resolution for addressing GSI-191 and responding to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," for the Callaway Plant. The Reference 1 letter and its enclosures constitute a combined request for regulatory exemptions and a license amendment, as well as a request for NRC approval of the risk-informed "RoverD" approach for addressing concerns about accident generated debris in the containment and its potential effects on sump performance and core cooling.

Subsequent to submittal of the Reference 1 letter and its enclosures on March 31, 2021, the NRC staff performed an acceptance review of the submittal. The results of that review were provided in a letter from the NRC to Ameren Missouri, identified as Reference 2, in which the NRC stated that supplemental information is needed in order for the staff to make an independent assessment regarding the acceptability of the proposed amendment request and exemptions. Specifically, in order to make Ameren Missouri's application for the license amendment and regulatory exemptions complete, the NRC staff requested that Ameren Missouri supplement its application to address the information delineated in the enclosure of the Reference 2 letter. It was noted that if the supplemental information is provided by May 27, 2021, it would enable the NRC staff to begin its detailed technical review.

This letter is being submitted in order to provide the supplemental information requested in Reference 2. Specifically, the information is provided in the Enclosure to this letter.

The provided information is supplemental to Ameren Missouri's application and involves no revision of the requested changes themselves. As such, the supplemental information provided via this letter does not change the "No Significant Hazards Consideration" conclusions reached in the LAR, nor does it change the conclusion reached in regard to no need for an environmental assessment based on the categorical exclusion provisions of 10 CFR 51.22.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," Section (b)(1), a copy of this supplemental information submittal provided in connection with the March 31, 2021 amendment application is being provided to the designated Missouri State official.

This letter does not contain new commitments.

For any questions regarding this submittal, please contact Mr. Tom Elwood at 314-225-1905.

I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,



Steve J. Meyer
Manager, Regulatory Affairs

Executed on: 05/27/2021

Enclosure: Supplemental Information

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Supplemental Information

10 CFR 50.46 requires plants to be able to maintain adequate long-term core cooling to ensure that the fuel in the core can be cooled and maintained in a safe and stable configuration following a postulated accident. Generic Letter (GL) 2004-02 requested that licensees provide information confirming that their plants are in compliance with the regulation, in light of the concern for potentially adverse effects of accident-generated debris in the containment building.

As the final means for resolving the concerns of GL 2004-02 for the Callaway Plant, Ameren Missouri submitted a license amendment request (LAR) (i.e., a combined request for license amendment and regulatory exemptions) on March 31, 2021, which is identified as Reference 1 in the cover letter of this enclosure. From their acceptance review of Ameren Missouri's LAR, the NRC staff identified that additional information must be provided as a supplement to the Reference 1 request. This was documented in a letter summarizing the results of the NRC's acceptance review, as issued by the NRC on May 11, 2021 (and identified as Reference 2 in the cover letter of this enclosure).

The supplemental information to be provided by Ameren Missouri was requested via six individual requests, i.e., items "a" through "f," in an enclosure to the NRC's May 11, 2021 letter. The NRC noted in their letter that the requested information is what was expected to be provided in Ameren Missouri's LAR in order to address potential in-vessel effects, in accordance with the NRC's guidance, "U.S. Nuclear Regulatory Commission Staff Review Guidance for In-Vessel Downstream Effects Supporting Review of Generic Letter 2004-02 Responses" (ML19228A011). Accordingly, the requested supplemental information is now provided as responses to items "a" through "f" below.

- a. Identify which test group number represents the Callaway-specific chemical effect test in WCAP-17788-P, Revision 1, "Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090) – Autoclave Chemical Effects Testing for GSI-191 Long Tern Cooling."

Response

Callaway uses trisodium phosphate (TSP) as a post-LOCA pH buffering agent and is represented by WCAP-17788-P Revision 1 Test Group 36.

- b. [Describe the Callaway] fuel design

Response

The current Callaway reactor core fuel design includes 189 Westinghouse Performance+ assemblies and 4 Framatome GAIA lead fuel assemblies (193 total fuel assemblies).

- c. [Provide] details on the method used to calculate the debris amount at the core inlet. (How was the time dependent filtration function developed, and why is it acceptable compared to the WCAP-17788 filtration method?)

Response

The four-parameter Callaway filtration model is calibrated as a function of fiber debris load to plant-specific strainer test data (ALION-CAL-CEC-9345-004, "Strainer Head Loss Analysis Report"). For conservatism with respect to downstream effects, the model explicitly accounts for loss of fiber from the strainer debris bed (shedding) after it has been captured. The WCAP-17788 constant filtration model does not account for shedding, and it is difficult to select a single average filtration efficiency that accurately represents the entire fiber time history. Callaway assumes 100% filtration and retention when fiber arrives at the core inlet or passes through alternate flow paths. Time-dependent filtration is controlled by the WCAP-17788 circulation model that determines when fiber arrives at the strainer by accounting for recirculation water volume, time-dependent ECCS total flow rate, and a spray flow return fraction. The Callaway strainer filtration efficiency increases with time because the strainer fiber debris inventory is increasing with time; a higher fraction of arriving fiber passes through the clean strainer than what passes through a progressively loaded strainer.

The Callaway filtration model provides a higher fidelity description of the core-inlet inventory at early times compared to applying a single average filtration fraction as allowed by WCAP-17788. The high-fidelity core fiber inventory is important for proper comparison to time-dependent decay heat, given Callaway's relatively early sump switch-over (SSO) time of approximately 12 minutes. For consistency across all LAR analyses, Callaway applies the same filtration model for downstream effects and for strainer loading assessments.

- d. [Provide an] evaluation of chemical effects timing vs. hot-leg switchover (HLSO) timing. (Note that it appears that chemicals may occur at 6 hours and that HLSO is at 13 hours, which requires additional evaluation.)

Response

Callaway uses trisodium phosphate (TSP) as a post-LOCA pH buffering agent. WCAP-17788-P, Volume 5, Section 5.6 Table 5-5, Page 104, "Summary of Plant Status Regarding Chemical Effects," indicates that there are no chemical effects expected at either 6 hours or at 24 hours for TSP plants, so no chemical effects are expected at the HLSO time of 13 hours.

- e. [Provide an] alternate flow path resistance comparison between the plant and the WCAP-17788 model.

Response

Callaway is a Westinghouse, four-loop, up-flow design, just like the representative plant analyzed for WCAP-17788.

Further, the WCAP-17788-P, Vol 4, Appendix A RAI-4.2 response demonstrates that assumed calculation model alternate flow path (AFP) parameters assign a conservatively high flow resistance compared to actual Callaway conditions and thus minimize the cooling flow credit calculated for AFP bypass flow into the heated core region. Although actual Callaway AFP flow may occur sooner and be larger than modeled by WCAP-17788-P methodology, at no time does the total core fiber inventory exceed the recommended total limit.

- f. [Provide the] minimum Emergency Core Cooling System flow per fuel assembly.

Response

WCAP-17788-P, Vol. 4, Part 1 (Rev. 1), Section 4.2 Item 4 states that single-train ECCS injection is assumed for thermal-hydraulic analyses. The Callaway ECCS is designed such that during the recirculation phase the RHR pump takes suction from the ECCS strainers while the SI pumps and CCPs take suction from the RHR pump discharge lines. The RHR pump design flow is given in FSAR Table 6.3-1 as 3,800 gpm which equates to the minimum ECCS flow rate for a break that provides some system back pressure. The Callaway core design includes 193 fuel assemblies, giving a minimum flow rate of approximately 19.7 gpm per fuel assembly which is within the WCAP-17788 Volume 4 Thermal Hydraulics simulation acceptance criteria of 8 – 40 gpm/FA.