Ameren MISSOURI

Callaway Plant

September 10, 2012

ULNRC-05905

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

10 CFR 50.55a(a)(3)(ii)

Ladies and Gentlemen:

**DOCKET NUMBER 50-483**
**CALLAWAY PLANT UNIT 1**
**UNION ELECTRIC CO.**
**FACILITY OPERATING LICENSE NPF-30**
**RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING 10 CFR 50.55a REQUEST: PROPOSED ALTERNATIVE TO ASME OM CODE REPLACEMENT INTERVAL FOR MAIN STEAM ISOLATION VALVE ACTUATOR RUPTURE DISKS (TAC NO. ME8319)**

References:
1. Ameren Missouri Letter ULNRC-05844, "10 CFR 50.55a Request: Proposed Alternative Regarding ASME OM Code Replacement Interval for Main Steam Isolation Valve Actuator Rupture Disks," dated March 30, 2012
2. Ameren Missouri Letter ULNRC-05855, "Response to NRC Request for Information Regarding 10 CFR 50.55a Request: Proposed Alternative Regarding ASME OM Code Replacement Interval for Main Steam Isolation Valve Actuator Rupture Disks," dated April 19, 2012
3. Electronic Request for Additional Information (RAI) from NRC dated August 9, 2012

By letter dated March 30, 2012 (Reference 1) and pursuant to 10 CFR 50.55a(a)(3)(ii), Union Electric Company (Ameren Missouri) submitted a request for NRC approval of Relief Request VR-01 regarding requirements of the ASME OM Code, Mandatory Appendix 1, 1-1360 for periodic replacement of Class 2 and 3 non-reclosing pressure relief devices.

The request, for which written NRC approval is still pending, specifically pertains to the rupture disks associated with the main steam line isolation valves (MSIVs) at Callaway. An alternative to the Code-required five-year replacement interval was requested so that replacement of the rupture disks can be deferred until the next refueling outage. This was based on (1) the fact that the five-year replacement

interval was due to expire during the current Operating cycle, and (2) the determination that rupture disk replacement should not be performed during plant operation.

Following NRC receipt of the Reference 1 letter, and from initial review of the request, the NRC staff identified the need for additional information to support their review. Requests for additional information were transmitted via e-mail to the Callaway plant staff, and the responses to these requests were transmitted to the NRC via Reference 2.

Following submittal of the NRC-requested information per Reference 2, a telephone conference was conducted with the NRC on April 20, 2012, for the purpose of requesting the NRC's verbal approval of Relief Request VR-01 prior to expiration of the noted five-year replacement interval. During that call, the NRC verbally approved the subject relief request. It was noted that written approval of the relief request would follow.

To support completion of the NRC's review and written approval of Relief Request VR-01, the NRC recently identified the need for additional information. A request for additional information (RAI) was therefore electronically submitted to Ameren Missouri on August 9, 2012. A response within 30 days was requested.

This letter provides, via the enclosure, a response to the NRC RAI received on August 9, 2012. The attached response supports the Relief Request as proposed. Please contact Scott A. Maglio at 573-676-8719 or Tom Elwood at 314-225-1905 for any questions you may have regarding the response.

Sincerely,

Scott A. Maglio

Scott A. Maglio
Regulatory Affairs Manager

DJW/nls

Enclosure: Response to NRC Request for Additional Information

cc: U.S. Nuclear Regulatory Commission (Original and 1 copy)
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**Response to NRC Request for Additional Information**

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by the licensee for Callaway Plant in its letter dated March 30, 2012, as supplemented by letter dated April 19, 2012, and determined that additional information is necessary to complete the review of the amendment request. Please provide a response which addresses the following questions.

1. Please provide information to identify the events considered in Final Safety Analysis Report (FSAR) Chapter 15 analysis that credited the main steam isolation valve (MSIV) for mitigating the event consequences and specify the specific features of the MSIV that were credited in the identified events. If the MSIV closure time is credited in the analysis, please specify the analytical closure time and provide information including plant data and applicable analysis to show that the credited MSIV closure time can be maintained for the conditions when the required 5-year surveillance replacement of the rupture disk is not met.

**Response:**

The following postulated events described in the FSAR credit the main steam isolation valves:

- Steam System Piping Failure (15.1.5) and Inadvertent Opening of a Steam Generator Relief or Safety Valve (15.1.4)
  - MSIVs are credited to close 17 seconds after the existence of conditions that would cause the generation of an isolation signal
    - 2 seconds of signal processing time
    - 15 second valve closure time
- Feedwater System Pipe Break (15.2.8)
  - Steam flow is assumed to conservatively assumed to occur 0.5 seconds after the generation of the reactor trip signal and occurs concurrently with the turbine trip.
- Small Break Loss of Coolant Accident (15.6.5)
  - Main steam isolation is assumed to occur concurrently with the reactor trip to minimize energy removed from the reactor coolant system
- Large Break Loss of Coolant Accident (15.6.5)
  - Main steam isolation is assumed to occur concurrently with the break initiation.
- Steamline Break Inside Containment (6.2.1.4)
  - MSIVs are credited to close 17 seconds after reaching the low steam line pressure setpoint or the high-2 containment pressure setpoint
- Steamline Break Outside Containment (3B4.2.3)
  - MSIVs are credited to close 17 seconds after reaching the low steam line pressure setpoint
- Steam Generator Tube Rupture (15.6.3)
  - No automatic steam line isolation signals are generated by this event, but manual isolation is required during recovery. Early steam line isolation is conservative and is assumed to occur at the same time as the reactor trip

In Reference 2 identified in the cover letter (i.e., ULNRC-05855, dated April 19, 2012), information was provided to the NRC giving specific information on the design, layout and function of the MSIV and/or actuator, including the attendant valves and rupture disks. Briefly, it was described how the safety function of the rupture disks is to open to allow the lower piston chamber (LPC) of the MSIV actuators to vent and close the MSIV within the required time frame. To close an MSIV, the LPC must be open or vented. Two vent lines are provided for each MSIV actuator. The normal, non-safety vent line is routed from the actuator through a locked open manual valve and back to the condenser. The backup vent line is routed from the MSIV actuator through a locked open manual isolation valve and is safety-related up to the rupture disk set at 150 psig to an equipment floor drain.

For the accidents/events listed on the previous page, the credited safety function for the MSIVs is to close on demand (so as to effect main steam line isolation as assumed/required). In that regard, the concern behind the relief request would be the potential for any adverse impact on the rupture disk performing its safety function to rupture on demand. As described in Reference 2, however, it is highly unlikely for the safety function of a rupture disk to be adversely impacted by an extension of its service time (i.e., by an extension of its replacement interval). With regard to the rupture point for the disk, the overall tendency is for the rupture point to not be affected or to decrease over time for the reasons explained in Reference 2. It has therefore been determined that the potential for the credited safety function of the MSIVs to be adversely impacted, including the assumed MSIV closure times (as applicable), is negligible with respect to proposed relief request. The accident analyses are thus not affected. (For a discussion of the potential effects of a spurious rupture of an MSIV's rupture disk due to fatigue and the resultant lowering of its rupture point, see the response to Question 2, as follows.)

2. Please address whether the requested MSIV rupture disk replacement extension will result in new events that were not previously analyzed. For example, if the disk rupture occurs during the extension period, discuss what events will result.

**Response:**

No new events are required to be postulated or evaluated due to extension of the rupture disk replacement. If a disk were to leak or rupture during the extension period the consequence would be to introduce a source of air leakage into the main condenser. Air leakage into the condenser may be an operational concern, but it is not an unanalyzed or new event/condition. The safety function of the MSIV would not be impacted.

In Enclosure 3 of Reference 2, descriptions are provided of the failure modes, their causes and effects, how they may be detected, etc. With regard to the failure mode(s) in which a rupture disk bursts at a higher or lower than rated pressure, the pressure and temperature cycling that the rupture disks experience over time will only weaken them (not strengthen them), causing them to burst at a lower pressure. Rupturing of the disk at a lower pressure when closing the MSIV would not adversely affect the safety function of the MSIV. The table on page 4 of this enclosure is a reproduction of the Table summarizing the failure modes evaluation as originally presented in Enclosure 3 of Reference 2.

3. If the new events were not analyzed previously, please provide the analyses of the events based on the approved methods and assumptions in accordance with the approach used in FSAR Chapter 15 analysis, and provide results for the NRC to review and approve. The information should include: (1) postulated initial core and reactor conditions; (2) the methods of the thermal-hydraulic analyses; (3) the sequence of events; (4) the assumed reaction of reactor system components; (5) the functional and operational characteristics of the reactor protection system; (6) operator actions; and (7) the proposed acceptance criteria and the results of the transient analyses.

**Response:**

As explained above (and in Reference 2), extension of the rupture disk replacement interval does not impact the safety function of the rupture disk to open (rupture) on demand, and no new or unanalyzed event or condition is introduced by the extension. Therefore, no new analyses are required.

| Component | Safety Function | Failure Modes | Failure Causes | Failure Effects | Failure Detection | Comments |
|---|---|---|---|---|---|---|
| ABPSE0001, ABPSE0002, ABPSE0003, ABPSE0004 (1" Rupture Disks) | Modes 1, 2, and 3 - For main steam isolation signal generated by low steam lines pressure, high steam line negative pressure rate, or High-2 containment pressure, MSIVs close and rupture disk is credited to burst. | Rupture disk is leaking | The rupture disk has been fatigued and is cracking along the edges due to cycling. | Minor amounts of steam will be leaking into the equipment drain. The disk may rupture at lower pressure. | The drain outlet can be checked to see if a vacuum is present and ensure the integrity is maintained. | If the disc ruptures at a lower pressure, the associated MSIV closure time will not be adversely impacted; thus performing its design function. |
| | | Rupture disk bursts at lower pressure | The rupture disk has been degraded after being exposed to high temperatures and/or differential pressure (>90% of burst pressure). | Upon Main Steam Isolation Signal, the MSIV closes at a lower pressure than required. | The drain outlet can be checked to see if a vacuum is present. The disc can be tested after it is removed. | If the disc ruptures at a lower pressure, the associated MSIV closure time will not be adversely impacted; thus performing its design function. |
| | Modes 1, 2, and 3 - For loss of actuation power, the MSIVs fail closed and rupture disk is credited to burst. | Rupture disk is leaking | The rupture disk has been fatigued and is cracking along the edges due to cycling. | Minor amounts of steam will be leaking into the equipment drain. The disk may rupture at lower pressure. | The drain outlet can be checked to see if a vacuum is present and ensure the integrity is maintained. | If the disc ruptures at a lower pressure, the associated MSIV closure time will not be adversely impacted; thus performing its design function. |
| | | Rupture disk bursts at lower pressure | The rupture disk has been degraded after being exposed to high temperatures and/or differential pressure (>90% of burst pressure). | Upon Main Steam Isolation Signal, the MSIV closes at a lower pressure than required. | The drain outlet can be checked to see if a vacuum is present. The disc can be tested after it is removed. | If the disc ruptures at a lower pressure, the associated MSIV closure time will not be adversely impacted; thus performing its design function. |
| | Modes 1, 2, and 3 - For loss of control signal, the MSIVs fail as is and rupture disk has no function. | None. The rupture disc is not required to function. | Not Applicable. | Not Applicable. | Not Applicable. | The rupture discs are required to burst in order to close the MSIVs. If the valves are not required to be manipulated, the rupture discs will not be challenged. |