

## **NRR-DMPSPeM Resource**

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**From:** Klos, John  
**Sent:** Wednesday, January 9, 2019 8:38 AM  
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**Cc:** Klos, John  
**Subject:** Formal release of RAIs Ref: Callaway Plant Class 1E LAR, L-2018-LLA-0062

**Importance:** High

Tom,

By letter dated March 9, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18068A686, Union Electric Co., (the licensee), DBA as Ameren Missouri submitted a license amendment request (LAR) requesting for approval of a new Technical Specification (TS) related to room cooling for essential electrical equipment for Callaway Plant Unit 1 (Callaway).

The proposed amendment would add new TS 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) System," to the Callaway TSs. New TS 3.7.20 will include the Limiting Conditions for Operation (LCO) statement, Applicability during which the LCO must be met, Actions (with Conditions, Required Actions, and Completion Times) to be applied when the LCO is not met, and surveillance requirements (SRs) with a specified Frequency to demonstrate that the LCO is met for the Class 1E Electrical Equipment A/C System trains at Callaway. The main purpose of the proposed amendment is to allow an inoperable Class 1E electrical equipment A/C train to be restored to OPERABLE status within 30 days. The 30 day Completion Time (CT) is based on the capability of the remaining OPERABLE Class 1E electrical equipment A/C train to provide adequate area cooling for both trains of electrical equipment during normal and accident conditions. Mitigating actions are required by operating supplemental cooling equipment along with room temperature monitoring that supports this 30 day CT.

A regulatory audit was held at the Callaway on September 26<sup>th</sup> and 27<sup>th</sup> 2018. During the audit, discussions were held to develop an understanding of the technical basis developed to support the LAR. At the conclusion of the audit, it was determined that the following questions would be addressed via the Request for Additional Information (RAI) process and the licensee would provide a formal response.

A clarification call was held with your staff on December 18, and December 21 2018 to further define the question below and these RAIs are now released formally with a **30 day** calendar response time from today; thereby, these RAIs are due Friday February 28, 2019 by the close of business.

### **CALLAWAY CURRENT LICENSING BASIS**

Callaway's current licensing basis for the Ultimate Heat Sink (UHS) includes conformance to NRC Regulatory Guide (RG) 1.27, Revision 2, January 1976 "Ultimate Heat Sink For Nuclear Power Plants", ADAMS Accession No. ML003739969. RG 1.27, section B, "Discussion", states that the capacity of the UHS should be sufficient to provide cooling for the time necessary to evaluate the situation and take corrective action. A period

of 30 days is considered adequate for these purposes. In addition, procedures should be available for ensuring the continued capability of the UHS beyond 30 days.

Callaway FSAR Section 9.2.5.3, "Safety Evaluation", Rev. OL-22, ADAMS Accession No. ML17061A204, states that the UHS is capable of providing enough cooling water for a safe shutdown and for continued cooling of the reactor for 30 days following an accident.

Callaway FSAR Section 15.0.1, "Classification of Plant Conditions", Rev. OL-22, ADAMS Accession No. ML17065A090 describes four categories of plant conditions in accordance with ANSI-N18.2, "Nuclear Safety Criteria for the Design of Stationary PWR Plants," Section 5, 1973 and further states that, "This means that seismic Category I, Class IE, and IEEE qualified equipment, instrumentation, and components are used in the ultimate mitigation of the consequences of Conditions II, III, and IV events."

The NRC issued Amendment No. 208, dated June 17, 2014 (ADAMS Accession No. ML14149A164) to Callaway which approved TS revisions to TS 3.7.9, "Ultimate Heat Sink (UHS)," to incorporate more restrictive UHS water level and water pond temperature limits. This amendment also approved operator action to isolate a train of essential service water system (ESWS) within 7 days of a large break loss of coolant accident (LBLOCA) initiation if both trains are still running.

## **REGULATORY BASIS**

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50 (10 CFR 50), Appendix A, "General Design Criteria for Nuclear Power Plants" (GDC) has the following applicable criterion:

- a) Criterion 17 - "Electrical Power Systems," states that an onsite electric power system and an offsite electric power system shall be provided to permit the functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.
- b) *Criterion 2 - "Design bases for protection against natural phenomena" requires structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions.*
- c) Criterion 44, "Cooling Water," requires, in part, that a system to transfer heat from SSCs important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these SSCs under normal operating and accident conditions. Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and

for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

The regulation at 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors" requires, in part, that each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding must be provided with an emergency core cooling system (ECCS). Section 50.46b(5) "Long Term Cooling" also states, "After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core."

## **Background**

Section 3.2, "Single Cooling Train Operation" of the LAR's Attachment 2, ADAMS Accession No. ML18068A688, references Callaway's Gothic calculation, "Callaway Control Building with Control Room Loss of Class 1 E A/C GOTHIC Room Heat Up With Installed Fans and Louvers." This calculation evaluates the capability of one train of the Class 1E Electrical Equipment A/C System to supply adequate cooling for both trains of the Class 1E electrical equipment while one of the trains is inoperable.

The audit also identified a supplemental calculation to the Gothic calculation above related to the electrical heat loads titled "Electrical Heat Loads in the Control Building During Normal and ESFAS Conditions," which was used to support the room heat up calculation.

This electrical head load calculation specifically identified the heat loads at time T=0, T=24 hours and T=7 days. The U. S. Nuclear Regulatory Commission (NRC) staff identified that there was a significant reduction in heat load at T=7 days and the licensee stated that one operating train safety related systems is procedurally secured after 7 days into an event.

This supplemental electrical heat load calculation also revealed, in its detailed calculation of heat load section that;

- a) for conservatism, the voltages from electrical calculation, case LOCA no. 1, are used to calculate the maximum continuous breaker currents and that
- b) the power source for engineered safety feature (ESF) equipment is the Emergency Diesel Generator NE01 4.16 KV Swgr NB0111 breaker with NE01 maximum test load of 6,201 KW @ 0.8 power factor.

The licensee is implementing plant modifications to maintain the environment for operability of onsite and offsite power systems required for conformance with GDC 17. In the LAR, the licensee has discussed the proposed temperature range for the GDC 17 required power sources.

## **RAIs**

The LAR proposes a new TS 3.7.20 to allow 30 day operation with one train of HVAC system for redundant electrical equipment. Shutting down a complete train of ESF equipment (after 7 days), with one HVAC train

unavailable prior to an event, may complicate plant safety considering the significant equipment in one train (with inoperable HVAC) which may also not be available for an extended period.

The NRC staff is also reviewing the combinations of events and plant conditions that were considered for heat load calculations. The NRC staff is requesting the below additional information considering the actions to be taken to reduce heat loads following an event.

The staff is requesting additional information on events and accidents considered and equipment needed, during allowable ranges for room temperatures during normal operation, for anticipated operational occurrences, and for accident conditions.

1. Please provide a tabulated listing with descriptive names of large loads, greater than 50 horsepower, that are operating at the onset of the event including the nameplate rating, brake horsepower used in the heat calculations, and the time that the load is disconnected. Please include discretionary or procedure required loads that are manually started and include the duration of operation for the large loads.
2. FSAR Section 15.0.1 describes four categories of plant conditions. Please provide a discussion explaining why loss of offsite power (LOOP) with LB-LOCA is the limiting case in the supplemental electrical head load calculations, considering heat contribution from electrical equipment during the 30 day post-accident period with one Class 1E electrical equipment A/C train initially inoperable while balancing ESF equipment operating in redundant trains at the onset of the event.
3. In the unlikely event of an external hazard (such as described in GDC-2) occurring with one Class 1E electrical equipment A/C train inoperable, and considering the post-event 30 day heat rejection time period for the UHS coupled with preplanned shutdown of one train of ESF equipment after 7 days, please provide a detailed discussion on ESF equipment that will be available for plant shutdown during the 30-day post-event period, with an initially inoperable Class 1E electrical equipment A/C train. If non-safety related systems such as offsite power are credited for restoration of systems, please provide a discussion on the capability to restore such sources following a GDC-2 event.
4. Callaway's FSAR Section 9.2.1, "Station Service Water System" states that a method of adding makeup to the UHS is to use the Service Water System. During the audit, the licensee stated that though Callaway's FSAR discusses some defense in depth options for refilling the ESW pond post-accident, these options make use of non-safety-related, non-seismic systems, structures and components (SSCs). Hence, SSCs that are not qualified to withstand such events may not be available. Additionally, use of these options would likely require local operator actions in areas that might be exposed to a post-accident, radioactive plume.

Considering the UHS 30 heat rejection time period and the preplanned shutdown one train of ESF equipment after 7 days coupled with one HVAC train's unavailability, please provide a discussion on the ESF equipment that will be available for plant shutdown during the four categories of events discussed in FSAR Chapter 15.0.1.

5. With regard to Callaway's amendment no. 208 for the UHS, that addressed maintaining UHS operability and requires shutting down one train of ESWS after seven days, the premise for that amendment is that:

- a. Both ESF trains of equipment are assumed to be operating for 7 days without a single failure (apart from a single-failure of the EFHV0065 valve or EFHV0066 valve), and that
- b. A design basis accident is in progress.

This proposed amendment, to add a new TS 3.7.20 will have a CT of 30 days for restoring an inoperable Class 1E electrical equipment A/C train to Operable status.

In the event of an accident occurring with one Class 1E electrical equipment A/C train inoperable, the preplanned shutdown of one ESF train seven days after the accident would also have to be met. When discussing this scenario during the audit, the licensee stated that if equipment issues were to occur on the operating train, the train that was secured would remain available for possible restart.

Assuming that the ESF train with the associated inoperable Class 1E electrical equipment A/C train is secured after 7 days, in the event of equipment failure in the operating ESF train, please provide a discussion on how the train without an available Class 1E electrical equipment A/C train could be re-started to provide cooling for the ESF equipment required to support plant shutdown after a postulated event. Please include references to applicable plant procedures.

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