# EVALUATION OF THE PROPOSED CHANGE

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## 1.0 SUMMARY DESCRIPTION

The proposed amendment would add new Technical Specification (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 Condition 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 to periodically demonstrate that the LCO is met for the Class 1E Electrical Equipment A/C System trains at Callaway Plant.

## 2.0 DETAILED DESCRIPTION

### 2.1 Proposed Changes

The proposed amendment would add new TS 3.7.20, "Class 1E Electrical Equipment Air-Conditioning (A/C) System," with requirements established for the Class 1E Electrical Equipment A/C System trains (including A/C units SGK05A/B). The TS markups and retyped pages are provided in Attachments 1 and 3, respectively. Corresponding TS Bases changes and FSAR changes are provided in Attachments 2 and 4, respectively.

The LCO for new TS 3.7.20 would require that two Class 1E Electrical Equipment A/C trains be OPERABLE. The LCO Applicability would include MODES 1, 2, 3, 4, 5, and 6, and during movement of irradiated fuel assemblies. The Applicability for this new support system LCO reflects the TS Applicabilities for the systems supported by the Class 1E Electrical Equipment A/C trains, as specified in the following TSs:

- 3.8.4, "DC Sources – Operating"
- 3.8.5, "DC Sources – Shutdown"
- 3.8.6, "Battery Cell Parameters"
- 3.8.7, "Inverters – Operating"
- 3.8.8, "Inverters – Shutdown"
- 3.8.9, "Distribution Systems – Operating"
- 3.8.10, "Distribution Systems – Shutdown."

The Conditions and Required Actions proposed for new TS 3.7.20 are modeled after the Conditions and Required Actions of TS 3.7.10, "Control Room Emergency Ventilation System (CREVS)," and TS 3.7.11, "Control Room Air Conditioning System (CRACS)," due to the similarity of those systems to the Class 1E Electrical Equipment A/C trains.

New Condition A of TS 3.7.20 would be entered when one Class 1E Electrical Equipment A/C train is inoperable. Required Action A.1 would require the immediate initiation of mitigating actions detailed in the TS 3.7.20 ACTIONS Bases (see Attachment 2). The mitigating actions, to be verified complete within 8 hours per Required Action A.2, include the following:

- On the 2000 foot elevation of the control building, open doors 33023 and 33011. These fire doors connect the engineered safety feature (ESF) switchgear rooms 3301 and 3302 as depicted in Attachment 5. A continuous fire watch shall be established due to the breached fire barriers. These fire doors are also HALON boundary doors.

- On the 2016 foot elevation of the control building, open doors 34041, 34042, 34051, 34052, 34101, 34111, 34081, 34082, 34072, 34141, 34071 and 34131 as depicted in Attachment 5. These fire doors open the battery rooms and DC switchgear rooms to each other and to corridors on the 2016 foot elevation. An hourly fire watch shall be established. As discussed in procedure APA-ZZ-00750, "Hazard Barrier Program," an hourly fire watch is adequate as long as operable fire detection is available on one side of fire doors 34041, 34052, 34071, 34081, 34111, and 34131. If not, a continuous fire watch is required.

- Verify that transformers XNN05 (480/120 VAC instrument transformer in room 3408) and XNN06 (480/120 VAC instrument transformer in room 3404) are de-energized to reduce the heat loads in these rooms.

- Ensure the thermostat on the OPERABLE Class 1E Equipment A/C train is set below 80°F.

- Ensure at least one of the Class 1E Equipment A/C trains is OPERABLE and capable of operating at full capacity.

An inoperable Class 1E Equipment A/C train must be returned to OPERABLE status within 7 days per Required Action A.3. The 7-day Completion Time is based on the low probability of a design basis accident (DBA) or transient occurring during this time period and the ability of the remaining A/C train to provide the required cooling capability. The 7-day Completion Time is conservative with respect to the 30-day Completion Time for the Control Room A/C System (CRACS) in TS 3.7.11. It may be noted that CRACS also provides air conditioning for equipment such as the cabinets in the back area of the main control room, and is thus a similar support system in that regard. Since CRACS is also a support system for the Control Room Emergency Ventilation System (CREVS), the 7-day Completion Time for Required Action A.3 of new TS 3.7.20 was chosen to match that required by TS 3.7.10 Action A.1 for an inoperable CREVS train.

The proposed structure of the Required Actions and Completion Times of new TS 3.7.20 Condition A is similar to that of Condition B of TS 3.7.10, "Control Room Emergency Ventilation System," as approved by the NRC in Callaway License Amendment 190. (See Reference 7.1 and TSTF-448.) Amendment 190 dealt with the treatment of mitigating actions while an inoperable system is being returned to service.

The remaining Conditions B through E of new TS 3.7.20 are similar to Conditions B through E of TS 3.7.11, "Control Room Air Conditioning System (CRACS)." New Surveillance Requirements (SRs) 3.7.20.1 and 3.7.20.2 are similar to SR 3.7.10.3 and SR 3.7.11.1, respectively. An additional Required Action is added to Conditions C and D of new TS 3.7.20 to suspend positive reactivity additions to reflect Required Actions A.2.3 of TS 3.8.5, A.2.3 of TS 3.8.8, and A.2.3 of TS 3.8.10. In this manner there is no need to add directed cascades within the new support system TS 3.7.20 to the various supported system LCOs. TS 3.7.11 was emulated in the development of new TS 3.7.20 since it is the only other Callaway TS that addresses an air-conditioning system.

If the Required Action and associated Completion Time of Condition A of TS 3.7.20 is not met when the plant is in MODE 1, 2, 3, or 4, new Condition B requires a plant shutdown to MODE 3 within 6 hours and to MODE 5 within 36 hours. Condition B of new TS 3.7.20 is the same as Condition B of TS 3.7.11.

If the Required Action and associated Completion Time of Condition A of TS 3.7.20 is not met when the plant is in MODE 5 or 6, or during movement of irradiated fuel assemblies, new Condition C requires an immediate action to place the OPERABLE Class 1E Electrical Equipment A/C train in operation or to immediately suspend CORE ALTERATIONS, immediately suspend movement of irradiated fuel assemblies, and immediately suspend operations involving positive reactivity additions that could result in loss of the required SHUTDOWN MARGIN (SDM) or boron concentration. Condition C of new TS 3.7.20 is the same as Condition C of TS 3.7.11 with the exception noted above regarding the additional action to suspend positive reactivity additions.

New Condition D of TS 3.7.20 would be entered when two Class 1E Electrical Equipment A/C trains are inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies. Required Actions D.1, D.2, and D.3 would require the immediate suspension of CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of the required SDM or boron concentration. Condition D of new TS 3.7.20 is the same as Condition D of TS 3.7.11 with the exception noted above regarding the additional action to suspend positive reactivity additions.

New Condition E of TS 3.7.20 would be entered when two Class 1E Electrical Equipment A/C trains are inoperable in MODE 1, 2, 3, or 4. Required Action E.1 would require LCO 3.0.3 to be entered immediately. Condition E of new TS 3.7.20 is the same as Condition E of TS 3.7.11.

New SRs 3.7.20.1 and 3.7.20.2 would require that each Class 1E Electrical Equipment A/C train be verified to actuate on an actual or simulated actuation signal and have the capability to remove the assumed heat load. New SRs 3.7.20.1 and 3.7.20.2 are similar to SR 3.7.10.3 and SR 3.7.11.1, respectively.

## 2.2 Background

System Description

The Class 1E Electrical Equipment A/C trains provide a suitable environment for the Class 1E electrical equipment. These A/C trains provide temperature control for the Engineered Safety Features (ESF) switchgear room components, DC switchgear room components, and NK battery room components. The specific control building rooms supplied by the Class 1E Electrical Equipment A/C trains are:

| SGK05A | Room | SGK05B | Room |
|---|---|---|---|
| SWGR RM NO. 1 | 3408 | SWGR RM NO. 4 | 3404 |
| SWGR RM NO. 3 | 3414 | SWGR RM NO. 2 | 3410 |
| Battery RM NO. 1 | 3407 | Battery RM NO. 4 | 3405 |
| Battery RM NO. 3 | 3413 | Battery RM NO. 2 | 3411 |
| ESF SWGR RM NO. 1 | 3301 | ESF SWGR RM NO. 2 | 3302 |

Attachment 5 depicts the above control building room locations and includes excerpts from piping and instrument drawings (P&IDs) M-22GK03 and M-22GK04 which are contained in the FSAR as Figure 9.4-1 sheets 3 and 4.

The Class 1E Electrical Equipment A/C trains are independent trains each of which provides cooling of recirculated air in the rooms associated with that train. Each train consists of a pre-filter, self-contained refrigeration system (using normal service water or essential service water as a heat sink), centrifugal fans, instrumentation, and controls to provide for electrical equipment room temperature control.

The Class 1E Electrical Equipment A/C trains have emergency operation functions and also operate during normal unit operation. Each train is normally aligned to cool only the equipment associated with its emergency load group. The Class 1E Electrical Equipment A/C trains are operated in a continuous recirculation mode to maintain the ESF switchgear room, the battery rooms, and the DC switchgear rooms to a temperature of $\leq 90°F$ as discussed in FSAR Section 9.4.1.2.3 (page 9.4-10). However, a single train is capable of cooling the equipment of both its associated train and the opposite train while maintaining room temperatures of $\leq 137°F$ under the conditions discussed in Section 3.0 of this Evaluation. The 90°F design temperature limit is reduced to 87°F in FSAR Table 16.7-2 to allow for instrument error.

The design basis of the Class 1E Electrical Equipment A/C system is to maintain temperature in the Class 1E electrical equipment rooms to assure OPERABILITY of associated electrical equipment. The Class 1E Electrical Equipment A/C system is designed so that the single failure of an active component coincident with a DBA will not impair the ability of the supported systems powered by the electrical equipment to fulfill their safety functions.

During normal or emergency operations, each Class 1E Electrical Equipment A/C train maintains the temperature in its associated electrical equipment rooms at a temperature ≤ 90°F. Analyses have shown that one Class 1E Electrical Equipment A/C train is capable of cooling the electrical equipment in both redundant load groups provided the mitigating actions discussed above on page 3 are taken. The Class 1E Electrical Equipment A/C trains are designed in accordance with Seismic Category I requirements.

Need for Change

The OPERABILITY requirements imposed on the Class 1E Electrical Equipment A/C trains (including A/C units SGK05A and SGK05B) at Callaway are currently governed by FSAR Section 16.7.13, "Class 1E Electrical Equipment Air Conditioning (A/C)." (See Attachment 4.) With one Class 1E Electrical Equipment A/C train inoperable when the plant is in MODES 1 through 4, FSAR Section 16.7.13 allows up to a 7-day delay period, provided the aforementioned mitigating actions are taken, before declaring the supported Class 1E electrical equipment inoperable (in the area served by that A/C train) and entering the applicable Conditions and Required Actions of Technical Specifications 3.8.4, “DC Sources –Operating,” TS 3.8.7, “Inverters – Operating,” and TS 3.8.9, “Distribution Systems – Operating.”

FSAR Section 16.7.13 currently contains the following requirements:

- A Note that establishes the adequacy of either essential service water (ESW) or normal service water to supply SGK05A and SGK05B.
- Mitigating actions (described previously) and a 7-day Completion Time if one Class 1E Electrical Equipment A/C train is inoperable.
- Cascading instructions to supported system TS LCOs 3.8.4, 3.8.7, and 3.8.9 (when the plant is in MODES 1 through 4) if the mitigating actions or 7-day restoration Completion Time are not met.
- Entry into an LCO 3.0.3 equivalent default Action if both Class 1E Electrical Equipment A/C trains are inoperable.
- A Surveillance Requirement that requires area temperature monitoring once per 12 hours for ESF switchgear rooms 3301 and 3302 which is retained under FSAR Section 16.7.4.1.1.

This amendment is needed to address three issues regarding the requirements specified in FSAR Section 16.7.13 when one of the two Class 1E Electrical Equipment A/C trains (SGK05A or SGK05B) is declared inoperable:

- TS 1.1 OPERABILITY definition requirements imposed on non-TS support systems

- Application of LCO 3.0.6 and the Safety Function Determination Program

- Temporary waiver of the single failure criterion while operating under a TS Condition.

OPERABILITY Definition

The Class 1E Electrical Equipment A/C trains are a support system for supported equipment covered by individual TS LCOs. Therefore, the OPERABILITY of the supported electrical equipment is directly tied to the OPERABILITY of the support system, i.e., the Class 1E Electrical Equipment A/C trains, based on the TS 1.1 definition of OPERABILITY which says:

> "A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s)."

This definition ties support system OPERABILITY to supported system OPERABILITY, except as provided per TS LCO 3.0.6. (See LCO 3.0.6 discussion below.)

The issue to be resolved by the requested amendment concerns a non-TS support system that supports several electrical systems which have specific LCOs in the Technical Specifications. In most support system-to-supported system associations (with each system typically having two redundant subsystems or trains), the 'A' train support subsystem is associated only with the 'A' train supported system, and the 'B' train support system is associated only with the 'B' train supported system.

In the case of the Class 1E Electrical Equipment A/C trains the situation is not as straightforward. If mitigating actions are taken, such as opening the doors between rooms housing separate electrical equipment trains, analysis shows that one Class 1E Electrical Equipment A/C train can support both trains of Class 1E electrical equipment for normal operation and for accident conditions. Therefore, in this case, a non-TS support subsystem may have an inoperable train (i.e., one inoperable Class 1E Electrical Equipment A/C train), yet neither supported train is deprived of adequate cooling, assuming no additional single failure. (See Single Failure Criterion discussion below.) This situation was addressed by the NRC in a letter to the Perry Plant (Reference 6.2) which merits special consideration and is applicable to Callaway in regard to the Class 1E Electrical Equipment A/C trains.

Perry's design provides two redundant A/C trains that provide cooling of the air space in a pump house with two redundant essential service water trains separated by concrete walls but situated within the same overall air space. Either A/C train can handle the full heat loads associated with both service water trains in operation. This situation is similar to Callaway's situation with the Class 1E Electrical Equipment A/C trains. That is, although SGK05A and SGK05B at Callaway were originally designed such that each would service only the loads associated with its respective train, calculations have demonstrated that either train alone can serve both trains of Class 1E electrical equipment (with the doors between the two areas of equipment trains open). Therefore, the Callaway design satisfies the second paragraph excerpted below from the Perry Letter since either Class 1E Electrical Equipment A/C train can serve both trains of electrical equipment. Page 2 of the attachment to the Perry Letter includes the following paragraphs:

> "In most designs, the non-TS support system has two subsystems, each supporting just one TS train of safety equipment. The duration of the maintenance activity is limited by the Required Action Completion Times of the supported TS system(s). In this case, because the outage time of the non-TS support system is limited by the supported system TSs, the plant is temporarily allowed to depart from the single-failure design criterion, but the licensee may not rely solely on the TS limitations. As noted above, the licensee must still assess and manage risk in accordance with (a)(4).
>
> In some designs, the non-TS support system has two redundant 100-percent capacity subsystems, each capable of supporting both TS trains. Loss of one support subsystem does not result in a loss of support for either train of TS equipment. Both TS trains remain operable, despite a loss of support function redundancy, because the TS definition of operability does not require a TS subsystem's necessary support function to meet the single-failure design criterion. Thus, no TS limits the duration of the non-TS support subsystem outage, even though the single-failure design requirement of the supported TS systems is not met. However, by assessing and managing risk in accordance with (a)(4), the licensee can determine an appropriate duration for the maintenance activity. Use of administrative controls to implement such a risk-informed limitation is an acceptable basis for also allowing a temporary departure from the design-basis configuration during such maintenance. Although not expected, were a licensee to determine that its risk assessment would permit the support subsystem to be inoperable for more than 90 days, then the licensee would have to evaluate the maintenance configuration as a change to the facility under 10 CFR 50.59, including consideration of the single-failure design criterion."

Although the Perry Letter supports the current use of the provisions in FSAR 16.7.13, it is recognized that Callaway's configuration (with respect to the two Class 1E Electrical Equipment A/C trains and the two trains of electrical equipment supported by those A/C trains) is comparable to the configuration addressed by the Perry Letter only after the

doors separating the two Class 1E electrical equipment trains are opened.

When the plant is operating in MODES 1 through 4, the applicable TS LCOs for the supported systems (TS 3.8.4, TS 3.8.7, and TS 3.8.9) contain Conditions and Required Actions with very short Completion Times. Required Action A.1 of TS 3.8.4 and Required Action C.1 of TS 3.8.9 have 2-hour Completion Times for one inoperable DC electrical power subsystem and one inoperable DC electrical power distribution subsystem, respectively. Each DC electrical power subsystem, or train, contains two 125 VDC buses with each bus energized from its battery and a battery charger or swing charger. Each DC electrical power distribution subsystem, or train, contains two 125 VDC buses with each bus energized to the proper voltage from either its battery or a battery charger. Required Action A.1 of TS 3.8.9 has an 8-hour Completion Time for one inoperable AC power electrical distribution subsystem with each subsystem, or train, consisting of one 4.16 kV bus and two 480 VAC load centers as listed in TS Bases Table B 3.8.9-1. Required Action B.1 of TS 3.8.9 has a 2-hour Completion Time for one inoperable AC vital bus subsystem with each subsystem, or train, consisting of two 120 VAC AC vital buses as listed in TS Bases Table B 3.8.9-1.

Of more pressing concern from a plant shutdown perspective is the fact that the Conditions and Required Actions of TS 3.8.7 only address having one inverter inoperable rather than one inverter subsystem or train. Since one inoperable Class 1E electrical equipment A/C train renders the supported train of affected electrical equipment inoperable (i.e., two inverters among other affected equipment), LCO 3.0.3 would be required to be entered in light of the limitations of the Conditions and Required Actions of TS 3.8.7. LCO 3.0.3 requires action to be taken within 1 hour to place the plant in MODE 3 within 7 hours, in MODE 4 within 13 hours, and in MODE 5 within 37 hours. Therefore, absent a support system TS LCO to declare not met when one Class 1E electrical equipment A/C train is declared inoperable, the control room staff must currently enter LCO 3.0.3 any time a Class 1E electrical equipment A/C train is discovered to be inoperable or declared inoperable for maintenance.

Once the mitigating actions are implemented (doors opened, etc.), a single Class 1E electrical equipment A/C train can service the loads of both supported system trains and LCO 3.0.3 is exited. The basis for exiting LCO 3.0.3 is an application of Reference 7.2, previously discussed above. Although experience has shown that entry into LCO 3.0.3 for this reason would be only for a short time, as it is limited only by the length of time it takes an operator to open the noted doors between the Class 1E electrical equipment areas, this situation is not desirable from a long-term perspective. This amendment application addresses the unintended consequences discussed above.

TS LCO 3.0.6

The provisions of TS LCO 3.0.6 allow the following relaxation, sometimes referred to as an allowance to not "cascade":

> "When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.15, 'Safety Function Determination Program (SFDP).' If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.
>
> When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2."

Implicit within this allowance is the understanding that the support system is covered by its own LCO within the Technical Specifications. That is not currently the case for the Class 1E Electrical Equipment A/C trains. In other words, FSAR Section 16.7.13 can not be applied as the sole remedy for an inoperability involving this support system since TS LCO 3.0.6 does not apply to FSAR Section 16.7.13. Adding new TS 3.7.20 for the support system function performed by the Class 1E Electrical Equipment A/C trains allows LCO 3.0.6 to be applied such that a support system inoperability is dealt with within the Conditions and Required Actions of TS 3.7.20.

There is a caveat to applying LCO 3.0.6 in this situation – there is no requirement to declare the supported system LCO not met as long as the "supported system LCO is not met solely due to a support system LCO not being met." In order to assure that the inoperability of one Class 1E Electrical Equipment A/C train does not lead to electrical equipment failure in that train, thereby limiting the inoperability solely within new TS 3.7.20, Required Actions A.1 and A.2 of new TS 3.7.20 provide mitigating actions to assure that both supported trains of electrical equipment remain OPERABLE during normal operation or accident conditions.

Single Failure Criterion

Previous NRC guidance regarding the temporary relaxation of the single failure criterion when a Technical Specification LCO is not met (NRC Generic Letter 80-30 and NRC staff letter dated March 30, 2006 (ADAMS Accession Number ML060890244)) indicates that such temporary relaxations apply only when operating pursuant to a Condition and associated Required Action(s) of the Technical Specifications (i.e., Appendix A of the

Callaway Operating License). Therefore, consistent with the NRC's position, it is inappropriate to allow the temporary relaxation of the single failure criterion when in an "Action" specified in FSAR Chapter 16 since it is not within the scope of the Technical Specifications.

Conclusion

It has been determined that the best long-term solution is to include the Class 1E Electrical Equipment A/C trains in the scope of the Technical Specifications. A license amendment is herewith submitted to incorporate a new Technical Specification specifically for the Class 1E Electrical Equipment A/C trains.

## 3.0 TECHNICAL EVALUATION

The justification for this amendment is based on two complementary bases – a calculation of the limiting temperatures reached in the affected equipment rooms (with one Class 1E Electrical Equipment A/C trains inoperable) and an engineering assessment of the relative ability of the supported equipment to operate under those conditions.

Room Temperature Rise Calculation

GOTHIC version 7.2a(QA) was used for this analysis. Attachment 7 of this Evaluation discusses the use of that version of GOTHIC. The maximum room temperatures listed in Table 1 below assume worst case ESFAS loading, one Class 1E electrical equipment A/C train inoperable, a 30-day event duration, and compensatory measures completed (doors opened) at 12 hours after event initiation (the event can be any transient or accident that actuates all of the ESFAS loads in these rooms which is more limiting than the loading experienced during normal operation).

Table 1 – Maximum Room Temperatures

| Room Number | Room Description | SGK05A Operating | SGK05B Operating |
|---|---|---|---|
| 'A' Train | | | |
| 3408 | DC SWGR Room No. 1 | 98.2°F | 136.3°F |
| 3414 | DC SWGR Room No. 3 | 89.1°F | 121.0°F |
| 3407 | Battery Room No. 1 | 96.8°F | 115.0°F |
| 3413 | Battery Room No. 3 | 94.5°F | 111.1°F |
| 3301* | ESF SWGR Room No. 1 | < 115°F | < 115°F |
| 'B' Train | | | |
| 3404 | DC SWGR Room No. 4 | 135.6°F | 98.7°F |
| 3410 | DC SWGR Room No. 2 | 121.6°F | 88.6°F |
| 3405 | Battery Room No. 4 | 116.4°F | 97.2°F |
| 3411 | Battery Room No. 2 | 111.4°F | 94.6°F |
| 3302* | ESF SWGR Room No. 2 | < 115°F | < 115°F |

* The ESF switchgear room temperatures were not calculated by GOTHIC. The listed temperatures reflect maximum values taken from hand calculations and FORTRAN runs (Calculation GK-19 Revision 0) which assumed all doors between rooms are closed with no air flow between rooms, both SGK05A and SGK05B are inoperable, and offsite power has been lost such that normal ventilation is also unavailable. Per that calculation, temperature in the limiting ESF switchgear room 3301 reaches 114°F at 1.5 hours and remains < 115°F through 24 hours. Temperatures in the ESF switchgear rooms do not challenge the equipment in those rooms.

When considering the heat loads in the Class 1E electrical equipment rooms, the worst case ESFAS heat loads are generated following a postulated event that results in a Safety Injection Signal, such as a LOCA. Accident analysis assumptions do not require postulating the simultaneous occurrence of a LOCA (or other event requiring Safety Injection) and a separate hazard such as fire or flooding. The mechanical and electrical equipment rooms, 3415 and 3416, which house SGK05A/B are normally maintained at or below 90°F by SGK03 (Radiation Protection Access Control A/C Unit). However, SGK03 is non-safety related and may not be available after an accident. In this case the temperature in rooms 3415 and 3416 has been calculated to remain less than 104°F (Calculation GK-25 Revision 0).

Equipment Survival

Callaway design specifications confirm that Class 1E equipment located in the above rooms, and SGK05A/B located in rooms 3415 and 3416, is capable of operating at temperatures up to 104°F. For the rooms that exceed 104°F in the above table, the information in Table 2 below provides temperature limits (based on the operational requirements of the most limiting Class 1E electrical equipment contained therein) for which a reasonable assurance of satisfactory operation exists for the supported Class 1E electrical equipment based on accelerated aging performed during qualification testing or based on an analysis of critical materials. These temperature limits cover the required time that the supported electrical equipment must perform its function for any accident or transient with a single operating Class 1E Electrical Equipment A/C train and all ESFAS actuated loads in operation.

| Table 2 – Equipment Survivability Temperatures (°F) | | | |
|---|---|---|---|
| Room Number | Room Description | Major Class 1E Equipment | Survival Temperature |
| 'A' Train | | | |
| 3408 | DC SWGR Room No. 1 | NK01 125 VDC bus, NK21 125 VDC battery charger, NK41 and NK51 125 VDC distribution panels, NK51A emergency lighting panel, NN01 120V vital AC bus, NN11 7.5 kVA inverter, XNN05 alt. feed to 120 VAC buses NN01 and NN03, NK71 swing battery charger transfer switch | 70°C (158°F) Limiting component – inverter capacitors |
| 3414 | DC SWGR Room No. 3 | NK03 125 VDC bus, NK23 125 VDC battery charger, NK43 125 VDC distribution panel, NN03 120V vital AC bus, NN13 7.5 kVA inverter, NK73 swing battery charger transfer switch | 70°C (158°F) Limiting component – inverter capacitors |
| 3407 | Battery Room No. 1 | NK11 125 VDC battery | 71°C (160°F) |
| 3413 | Battery Room No. 3 | NK13 125 VDC battery | 71°C (160°F) |
| 3301 | ESF SWGR Room No. 1 | NB01 4.16 kVAC bus, XNG01 and XNG03 load center transformers, NG01 and NG03 480 VAC load centers, NG01A 480 VAC motor control center, NK25 125 VDC swing battery charger, XNG01A 480 to 120 VAC transformer feeding MCC distribution panel, NK75 DC transfer switch, NK77 AC power source transfer switch, RP139 auxiliary relay rack, GS01A H2 recombiner power supply | 64°C (147°F) Limiting component – MCC circuit breakers* |
| 'B' Train | | | |
| 3404 | DC SWGR Room No. 4 | NK04 125 VDC bus, NK24 125 VDC battery charger, NK44 and NK54 125 VDC distribution panels, NN04 120V vital AC bus, NN14 7.5 kVA inverter, XNN06 alt. feed to 120 VAC buses NN02 and NN04, NK74 swing battery charger transfer switch | 70°C (158°F) Limiting component – inverter capacitors |
| 3410 | DC SWGR Room No. 2 | NK02 125 VDC bus, NK22 125 VDC battery charger, NK42 125 VDC distribution panel, NN02 120V vital AC bus, NN12 7.5 kVA inverter, NK72 swing battery charger transfer switch | 70°C (158°F) Limiting component – inverter capacitors |
| 3405 | Battery Room No. 4 | NK14 125 VDC battery | 71°C (160°F) |
| 3411 | Battery Room No. 2 | NK12 125 VDC battery | 71°C (160°F) |

| Table 2 – Equipment Survivability Temperatures (°F) | | | |
|---|---|---|---|
| Room Number | Room Description | Major Class 1E Equipment | Survival Temperature |
| 'B' Train | | | |
| 3302 | ESF SWGR Room No. 2 | NB02 4.16 kVAC bus, XNG02 and XNG04 load center transformers, NG02 and NG04 480 VAC load centers, NG02A 480 VAC motor control center, NK26 125 VDC swing battery charger, XNG02A 480 to 120 VAC transformer feeding MCC distribution panel, NK76 DC transfer switch, NK78 AC power source transfer switch, RP140 auxiliary relay rack, RP334 and RP335 auxiliary termination racks; GDHS0011, GDHS0011A, GDHS0061 ESW pump room and UHS cooling tower supply fan switches; RP147A and RP147B termination area racks; SB148A and SB148B isolation cabinets; GS01B hydrogen (H2) recombiner power supply | 64°C (147°F) Limiting component – MCC circuit breakers* |

* The hydrogen recombiner power supplies in ESF switchgear rooms 3301 and 3302 were thermally aged at 135°F (57°C) for 10 days which exceeds the calculated temperature of 115°F for those rooms. These power supplies would be listed as the limiting components in rooms 3301 and 3302 except for the fact that the hydrogen recombiners no longer perform a specified safety function and have been removed from the Callaway Technical Specifications per Revision 1 of NRC-approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-447, "Elimination of Hydrogen Recombiners and Change to Hydrogen and Oxygen Monitors." TSTF-447 reflected the revision to 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors," that became effective on October 16, 2003.

This evaluation considered the length of time during which the equipment may be subjected to elevated temperatures while it is assumed to be used or available in response to assumed demands, as well as the number of times such elevated temperature conditions may occur per unit of time (i.e., frequency of occurrence). This information makes use of best estimates of equipment survivability. The equipment in each of the 10 rooms identified in Table 1 will perform its specified safety function at temperatures up to or exceeding 137°F for the required time duration.

Proposed Technical Specifications

Section 2.1 of this Evaluation provides a detailed listing of the requested TS changes.

Proposed TS 3.7.20 includes an LCO statement that requires the OPERABILITY of both Class 1E Electrical Equipment A/C trains. The proposed LCO Applicability (MODES 1 through 6, and during the movement of irradiated fuel assemblies in any MODE or with the core completely offloaded) is consistent with the fact that the electrical equipment supported by the Class 1E Electrical Equipment A/C trains is required to mitigate postulated accidents and transients that could challenge the reactor fuel design limits, the reactor coolant pressure boundary, or containment integrity. The LCO Applicability is thus consistent with the LCO Applicabilities of the Technical Specifications that address the supported electrical equipment

TS 3.7.20 also provides Conditions and Required Actions when one or both Class 1E Electrical Equipment A/C trains are inoperable.

The Required Actions of new Condition A with one train inoperable during any portion of the LCO Applicability require mitigating actions and a 7-day restoration time. If the Required Action and associated Completion Time of Condition A cannot be met with the plant in MODES 1 through 4 (i.e., if the mitigating actions could not be completed in the allowed time or if one inoperable Class 1E Electrical Equipment A/C train could not be restored to OPERABLE status within the 7-day Completion Time), Condition B would require a plant shutdown to MODE 3 within 6 hours and to MODE 5 within 36 hours.

If both trains are inoperable with the plant in MODES 1 through 4, LCO 3.0.3 would be entered immediately under proposed Condition E.

If the Required Action and associated Completion Time of Condition A cannot be met with the plant in MODE 5, MODE 6, or during the movement of irradiated fuel assemblies, Condition C would require starting the remaining train or placing the plant in a safe configuration as discussed in Section 2.1 of this Evaluation.

If both Class 1E Electrical Equipment A/C trains are inoperable with the plant in MODE 5, MODE 6, or during the movement of irradiated fuel assemblies, Condition D would require placing the plant in a safe configuration as discussed in Section 2.1 of this Evaluation.

As discussed above, with one Class 1E Electrical Equipment A/C train inoperable, the remaining OPERABLE Class 1E Electrical Equipment A/C train is capable of cooling both trains of supported electrical equipment in the affected rooms when the mitigating actions are taken. However, with only one Class 1E Electrical Equipment A/C train OPERABLE, the system design basis for single-failure protection is not met. Therefore, operation in this condition is proposed to be limited in duration. A 7-day Completion Time has been proposed for restoring an inoperable Class 1E Electrical Equipment A/C

train to OPERABLE status. This time period is justified based on the low probability of an accident or transient event occurring over the 7-day period that requires the mitigating function of the supported electrical equipment.

When one Class 1E Electrical Equipment A/C train is aligned to cool both trains of supported electrical equipment, the vulnerability to a single failure is similar to that encountered when the Control Room Air Conditioning System covered by TS 3.7.11 has one train inoperable. The corresponding Completion Time (per TS 3.7.11) to restore an inoperable Control Room Air Conditioning System train is 30 days in MODES 1 through 4. However, a 7-day Completion Time is proposed for TS 3.7.20 because the mitigating actions of new Condition A would place the plant in a configuration that impacts physical separation criteria for the electrical load groups.

Opening doors between rooms of the redundant load groups is justified in view of the potential hazards in these Class 1E electrical equipment rooms. Although the rooms are located in the Control Building which is designed to withstand the effects of earthquakes, tornadoes, floods, external missiles, and other natural phenomena, the major hazard requiring physical separation of the rooms is a fire. The rooms contain no high energy lines or sources of internally generated missiles. Flooding from moderate energy pipe breaks in these areas is mitigated by floor drains and drain-off via stairwells, and the doors between redundant load groups are not credited as waterproof barriers for internal flooding events. In consideration of the potential hazard presented by fire, the administrative controls for fire barrier impairments require stationing fire watches in these areas when the doors are open, thus reducing the risk associated with fire.

An additional mitigating action requires securing transformer XNN05 (480/120-VAC instrument transformer alternate supply to 120 VAC buses NN01 and NN03, fed from MCC NG01A) and transformer XNN06 (480/120-VAC instrument transformer alternate supply to 120 VAC buses NN02 and NN04, fed from MCC NG02A). These transformers are shown on FSAR Figure 8.3-6 and are located in rooms 3408 and 3404, respectively. To reduce the potential heat loading, these transformers can be de-energized in the event that one of the Class 1E Electrical Equipment A/C trains is not operating. De-energizing transformers XNN05 and XNN06 is acceptable because these are generally only used during plant outages and are each only an alternate feed within two redundant systems. Two independent trains of vital AC electrical equipment would remain OPERABLE with these transformers de-energized.

The additional mitigating actions of Required Actions A.1 and A.2 assure that the initial conditions of the temperature rise calculations are met. Area temperature monitoring requirements of FSAR Section 16.7.4 also assure that the initial conditions of the temperature rise calculations are met. In addition, FSAR Section 16.7.4 requires the corrective action program to be engaged in order to determine actions necessary if temperature limits are exceeded.

New Surveillance Requirements (SRs) 3.7.20.1 and 3.7.20.2 will verify that each Class 1E Electrical Equipment A/C train has the capability to actuate on an actual or simulated actuation signal and has the capability to remove the assumed heat load. New SRs 3.7.20.1 and 3.7.20.2 are similar to SR 3.7.10.3 for the Control Room Emergency Ventilation System and SR 3.7.11.1 for the Control Room Air Conditioning System, respectively.

## 4.0 REGULATORY SAFETY ANALYSIS

### 4.1 Applicable Regulatory Requirements / Criteria

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include Technical Specifications (TSs) as part of the license. The TSs ensure the operational capability of structures, systems, and components that are required to protect the health and safety of the public. The U.S. Nuclear Regulatory Commission's (NRC's) requirements related to the content of the TSs are contained in Section 50.36 of Title 10 of the *Code of Federal Regulations* (10 CFR 50.36) which requires that the TSs include items in the following specific categories: (1) safety limits, limiting safety systems settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements per 10 CFR 50.36(c)(3); (4) design features; and (5) administrative controls.

This amendment application is related to the second and third categories above and represents a more restrictive change since a new LCO and new Surveillance Requirement are being added to the Callaway Technical Specifications.

The following regulatory requirements and guidance documents also apply to the Class 1E Electrical Equipment A/C System:

- GDC 2 requires that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without the loss of the capability to perform their safety functions.

- GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and to be compatible with, the environmental conditions associated with the normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, discharging fluids that may result from equipment failures, and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that

the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

- GDC 17 requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components (SSCs) that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

- GDC 18 requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

- 10 CFR 50.63, "Loss of all alternating current power," requires that each light-water cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout (SBO).

The following regulatory requirements and guidance documents apply to the electrical equipment supported by the Class 1E Electrical Equipment A/C System:

- GDC 13 requires that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems.

- GDC 20 requires that the protection system(s) shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

- GDC 21 requires that the protection system(s) shall be designed for high functional reliability and testability.

- GDC 22 through GDC 25 and GDC 29 require various design attributes for the protection system(s), including independence, safe failure modes, separation from control systems, requirements for reactivity control malfunctions, and protection

against anticipated operational occurrences.

- Regulatory Guide 1.22 discusses an acceptable method of satisfying GDC-20 and GDC-21 regarding the periodic testing of protection system actuation functions. These periodic tests should duplicate, as closely as practicable, the performance that is required of the actuation devices in the event of an accident.

- 10 CFR 50.55a(h) requires that the protection systems meet IEEE 279-1971. Section 4.2 of IEEE 279-1971 discusses the general functional requirement for protection systems to assure they satisfy the single failure criterion.

There will be no design changes to the Class 1E Electrical Equipment A/C System such that compliance with any of the above regulatory requirements would come into question.

## 4.2 No Significant Hazards Consideration (NSHC) Determination

This section addresses the standards of 10 CFR 50.92 as well as the applicable regulatory requirements and acceptance criteria.

The proposed amendment would add new Technical Specification (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 Condition 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 a Surveillance Requirement (with a specified Frequency) to periodically demonstrate that the LCO is met for the Class 1E Electrical Equipment A/C System trains at Callaway Plant.

Ameren Missouri has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," Part 50.92(c), as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

There are no design changes associated with the proposed change. All design, material, and construction standards that were applicable prior to this amendment request will continue to be applicable.

The proposed change will not affect accident initiators or precursors or adversely alter the design assumptions, conditions, and configuration of the facility or the manner in which the plant is operated and maintained with respect to such initiators or precursors.

The proposed change adds additional controls to the Technical Specifications but does not physically alter safety-related systems or affect the way in which safety-related systems perform their functions per the intended plant design. The Limiting Condition for Operation of proposed TS 3.7.20 will require both Class 1E Electrical Equipment A/C trains to be OPERABLE consistent with the plant design and the assumptions of the accident analysis. The proposed change does not involve a physical change to the Class 1E Electrical Equipment A/C trains, nor does it change the safety function of the A/C trains or the electrical equipment supported by those A/C trains.
As such, the proposed change will not alter or prevent the capability of structures, systems, and components (SSCs) to perform their intended functions for mitigating the consequences of an accident and meeting applicable acceptance limits.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

With respect to any new or different kind of accident, there are no proposed design changes nor are there any changes in the method by which any safety-related plant SSC performs its specified safety function. The proposed change will not affect the normal method of plant operation or change any operating parameters. No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures will be introduced as a result of this amendment.

The proposed amendment will not alter the design or performance of the 7300 Process Protection System, Nuclear Instrumentation System, Solid State Protection System, BOP ESFAS, MSFIS, or LSELS used in the plant protection systems.

The proposed change adds requirements to the Technical Specifications that were previously specified in the FSAR. The change does not involve a physical modification of the plant. There are no alterations to the parameters within which the plant is normally operated. No changes are being proposed to the procedures relied upon to mitigate a design basis event. The change does not have a detrimental impact on the manner in which plant equipment operates or responds to an actuation signal.

The proposed change does not, therefore, create the possibility of a new or different accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

There will be no effect on those plant systems necessary to assure the accomplishment of protection functions associated with reactor operation or the reactor coolant system. There will be no impact on the overpower limit, departure from nucleate boiling ratio (DNBR) limits, heat flux hot channel factor ($F_Q$), nuclear enthalpy rise hot channel factor ($F\Delta H$), loss of coolant accident peak cladding temperature (LOCA PCT), peak local power density, or any other limit and associated margin of safety. Required shutdown margins in the COLR will not be changed.

The proposed change does not eliminate any surveillances or alter the frequency of surveillances required by the Technical Specifications. The proposed change would add a new Technical Specification for assuring the satisfactory performance of the Class 1E Electrical Equipment A/C System.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluation, Ameren Missouri concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

### 4.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

## 5.0 ENVIRONMENTAL CONSIDERATION

Ameren Missouri has evaluated the proposed amendment and has determined that the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

## 6.0 REFERENCES

6.1 Callaway License Amendment No. 190, "Callaway Plant, Unit 1 – Issuance of Amendment Re: Application to Revise Technical Specifications Regarding Control Room Envelope Habitability in Accordance with TSTF-448, Revision 3, TAC NO. MD8006," dated January 27, 2009 (ADAMS Accession Number ML090020064).

6.2 NRC Letter from Douglas V. Pickett to Guy G. Campbell (FirstEnergy Nuclear Operating Company), "Application of Generic Letter 80-30 Guidance to an Inoperable Non-Technical Specification Support Subsystem," dated April 5, 2002 (ADAMS Accession Number ML020950074).