Attachment 2

Changes to Information and Documents Provided in March 9, 2018 License Amendment Request (LAR)

As noted in the cover letter to this LAR supplement, due to changes made to planned modification MP 16-0024 and from resolution of items identified during the NRC's September 2018 audit at Callaway, some of the information and documents provided in the original March 9, 2018 LAR (i.e., Ameren Missouri letter ULNRC-06401, "License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System' (LDCN 16-0013)," dated March 9, 2018) have been changed. Changes from the original LAR, along with descriptions and explanations of the changes, are identified in the enclosed pages of this attachment.

Change No. 1: Change to the proposed, initial surveillance frequency for Surveillance Requirements (SRs) 3.7.20.1 and 3.7.20.2.

In Attachments 1 and 2 of the LAR, the initial frequency proposed for new SRs 3.7.20.1 and 3.7.20.2 was identified as follows, on pages 4 and 34 of the Attachments:

Attachments 1 and 2 of LAR, page 4:

> The new SRs for proposed TS 3.7.20 are of a recurring/periodic nature and would thus be within the scope of the SFCP. The initial surveillance test interval for each of new SRs 3.7.20.1 and 3.7.20.2 would be specified as 18 months on a staggered test bases in Callaway's SFCP procedure. [Underline added.]

Attachments 1 and 2 of LAR, page 34:

> As noted previously, the Frequency for SR 3.7.20.1 would be specified as "In accordance with the Surveillance Frequency Control Program," consistent with nearly all of the periodically required SRs in the Callaway Technical Specifications. An initially specified frequency of once per 18 months on a staggered test bases for this surveillance under the SFCP at Callaway is consistent with many other, similar SRs and their frequencies (under the SFCP) for ESF components that receive actuation signals. [Underline added.]

The proposed surveillance frequency (or test interval) of "18 months on a staggered test basis" was initially considered with a focus on making the Frequency for SR 3.7.20.1 consistent with the frequency established for Engineered Safety Features Actuation System (ESFAS) testing required to satisfy a large number of SRs in the Technical Specifications. Upon further consideration of the test frequency for SRs 3.7.20.1 and 3.7.20.2, however, and as explained further in the Callaway response to Audit Item 34 in the audit items list contained in Attachment 1 of this submittal, it has been determined that the "staggered test basis" is not needed or appropriate for these SRs.

As explained in the Audit Item 34 response, in regard to SR 3.7.20.1, the scope of testing required per SR 3.7.20.1 is to be appropriately limited to the control room ventilation isolation system signal (CRVIS) for actuation of the Class 1E Electrical Equipment A/C trains. Testing of the actuation signals from the LOCA and shutdown sequencers is to be conducted as part of the scope of testing defined for SR 3.8.1.12 (under TS 3.8.1, "AC Sources – Operating"). (This approach is identical to how the scope of testing is defined for a very similar SR under TS 3.7.10 for the Control Room Emergency Ventilation System, i.e., for SR 3.7.10.3, as explained in the audit response.). On this basis, there is no need to tie the testing conducted for SR 3.7.20.1 to the ESFAS testing scheme for SR 3.8.1.12. An initial test frequency/interval of 18

months (with no staggered test basis) has thus been established for SR 3.7.20.1. The audit item response also explains why 18 months has been selected as an appropriate test frequency/interval for SR 3.7.20.2 as well, based on the nature of that test.

Also in regard to the scope of testing established for SR 3.7.20.1, as described above and in the Audit Item 34 response in Attachment 1, it has been determined that wording should be added to the Bases for proposed SR 3.7.20.1 to clearly define the required scope. The added wording would be similar to wording already contained in the Bases for SR 3.7.10.3 due to the similarity in the test scope and approach of that SR to that of SR 3.7.20.1, as noted above. This added wording is included in the changes being made to the proposed Bases for TS 3.7.20, as shown in Attachment 3 of this submittal.

Required Change: The reference to "18 months on a staggered test bases" in the above sections of the LAR is requested to be changed. The revised, specified frequency for new SRs 3.7.20.1 and 3.7.20.1 is simply "18 months."

Change No. 2: Change the Revision number for Calculation NAI-1719-004.

On page 14 in each of Attachments 1 and 2 of the LAR, the heat-up calculation performed in support of the LAR is identified as follows:

> 3.2 Single Cooling Train Operation Calculation
>
> Calculation NAI-1719-004, Revision 0, "Callaway Control Building with Control Room Loss of Class 1E A/C GOTHIC Room Heat Up With Installed Fans and Louvers," 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. The methodology utilized for this calculation, including important elements and assumptions associated with the methodology, as well as design inputs and overall results, are presented or described as follows.

The identified and described calculation was revised (from Revision 0 to Revision 1) subsequent to submittal of the LAR. (This calculation was approved in October 2018 but made available to the NRC during and after the September 2018 audit.) The revision was due to the changes made to modification MP 16-0024 (for installation of the supplemental cooling system), as described in the cover letter and in Attachment 1 (Audit Item 38) of this submittal.

Required Change: The reference to Revision 0 of the noted calculation should be considered changed such that Revision 1 is referenced instead.

Change No. 3: Updated results (temperature and hydrogen concentration information) from Revision 1 of the GOTHIC calculation.

In Attachments 1 and 2 of the LAR, in Section 3.2.3, "Results," (pages 17 through 23), a summary of results from the supporting GOTHIC (heat-up) calculation was presented, including a number of figures/graphs showing the maximum room temperatures and hydrogen concentrations reached for various analyzed conditions/cases.

As already noted (for Change No. 2), GOTHIC calculation NAI-1719-004, Revision 1, was approved in October 2018. Revision 1 of this document implements the new "up-and-over" ductwork design for the supply side of cross-tie fans CGK07A/B and relocates the transfer grills between Rooms 3404, 3405, 3407, and 3408 from the walls to the doors between these rooms. From the results of Revision 1 of the calculation, Table 4 in originally provided Section 3.2.3 should be updated with the revised temperatures. In addition, the maximum hydrogen concentration specified on page 18 of the LAR should be changed from 0.0221% to 0.0229%.

Required Change: The figures and graphs originally provided in Section 3.2.3 of Attachments 1 and 2 of LAR require revision, though the changes are discreet. To reflect these changes, all of Section 3.2.3 is repeated below with updated numbers and figures/graphs. Thus, Section 3.2.3 provided below should be regarded as superseding Section 3.2.3 in the original LAR.

(Note: Comments from NRC review of the GOTHIC calculation and its revision were addressed under Audit Item 42 included in the audit Items list provided in Attachment 1 of this submittal.)

3.2.3 Results

A results summary of the 30-day post-LOCA operation cases and the calculated maximum temperature for each room with either SGK05A train or SGK05B train out-of-service is shown in Table 4. This table combines the results for all cases to report the maximum room temperature for each room.

Table 4: Maximum Room Temperature Summary

Room	Room #	30-day Post-LOCA Temp (°F)	Max Post-LOCA Temp (°F)	Time to Max Post-LOCA Temp (Hours post-LOCA)
ESF Swgr Room 1	3301	99.85	100.45	168
ESF Swgr Room 2	3302	101.69	103.32	168
Battery Room 1	3407	98.59	98.59	701
Battery Room 2	3411	88.26	92.62	0.503
Battery Room 3	3413	87.75	92.53	0.503
Battery Room 4	3405	98.35	98.35	704
DC Swbd Room 1	3408	99.63	100.17	0.503
DC Swbd Room 2	3410	93.53	100.06	0.503
DC Swbd Room 3	3414	93.45	100.22	0.503
DC Swbd Room 4	3404	98.33	99.89	0.503
Lower Cable Sprd	3501	97.48	97.49	698
Upper Cable Sprd	3801	103.71	103.77	715

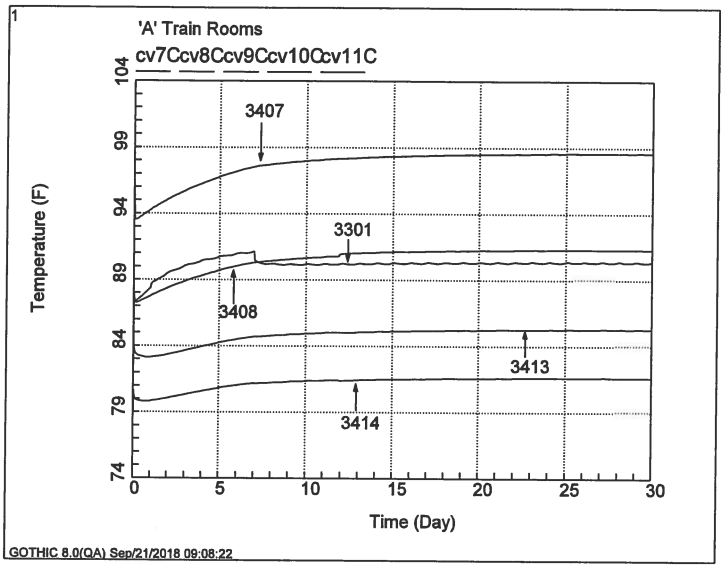
As can be seen from Table 4, all room temperatures remain below 104°F, which is the maximum room temperature listed in the design specifications for the Class 1E electrical equipment, and is the maximum post-accident room temperature listed in the Callaway Plant FSAR.

Calculation NAI-1719-004 also demonstrated that post-accident hydrogen concentrations will remain well below the 2% limit currently described in the Callaway FSAR. The maximum calculated concentration for any room within the Control Building was 0.0229%.

The following figures provide the calculated post-accident room temperatures and hydrogen concentrations as a function of time:

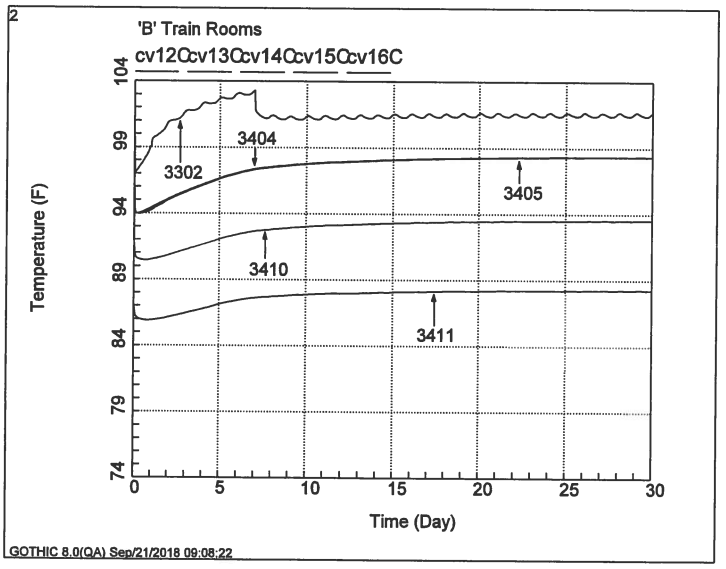
A Train Room Temperatures, SGK05A in Operation

NAI-1719-004_R1 Case 1
Oct/09/2018 08:13:25
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 1.GTH



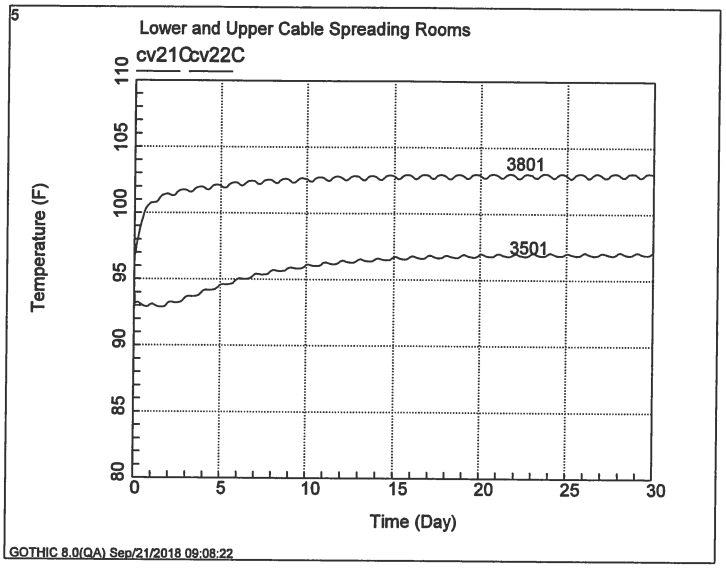
B Train Room Temperatures, SGK05A in Operation

NAI-1719-004_R1 Case 1
Oct/09/2018 08:13:25
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 1.GTH

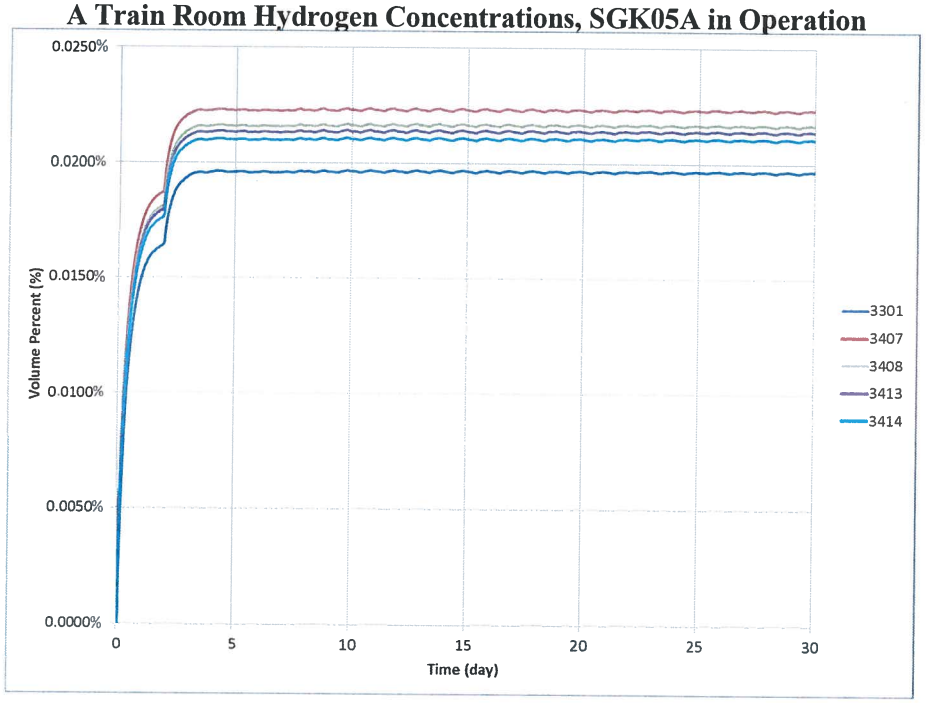


Cable Spreading Room Temperatures, SGK05A in Operation

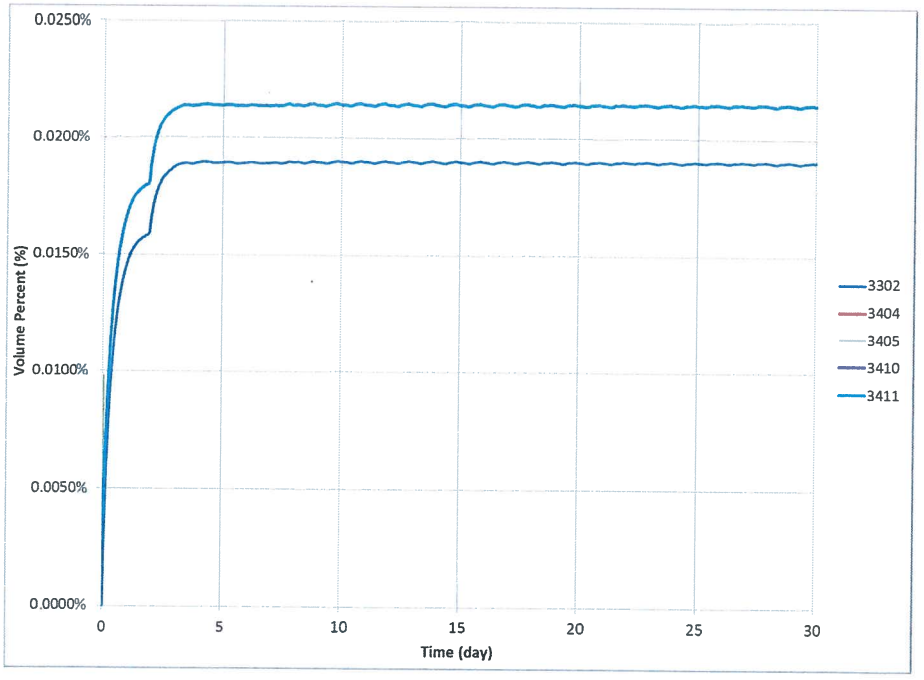
NAI-1719-004_R1 Case 1
Oct/09/2018 08:13:26
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 1.GTH



A Train Room Hydrogen Concentrations, SGK05A in Operation

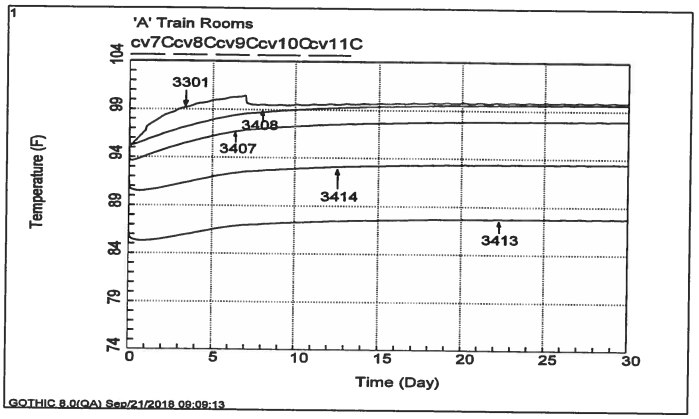


B Train Room Hydrogen Concentrations, SGK05A in Operation



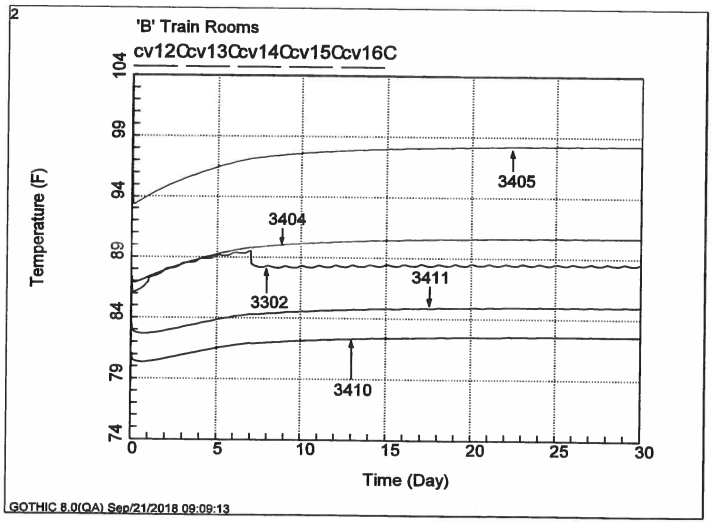
A Train Room Temperatures, SGK05B in Operation

NAI-1719-004_R1 Case 2
Oct/09/2018 08:19:57
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 2.GTH



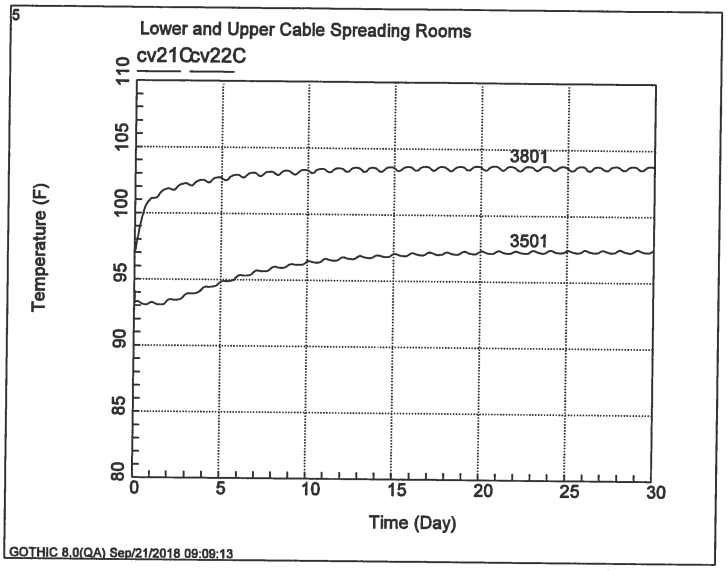
B Train Room Temperatures, SGK05B in Operation

NAI-1719-004_R1 Case 2
Oct/09/2018 08:19:58
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 2.GTH

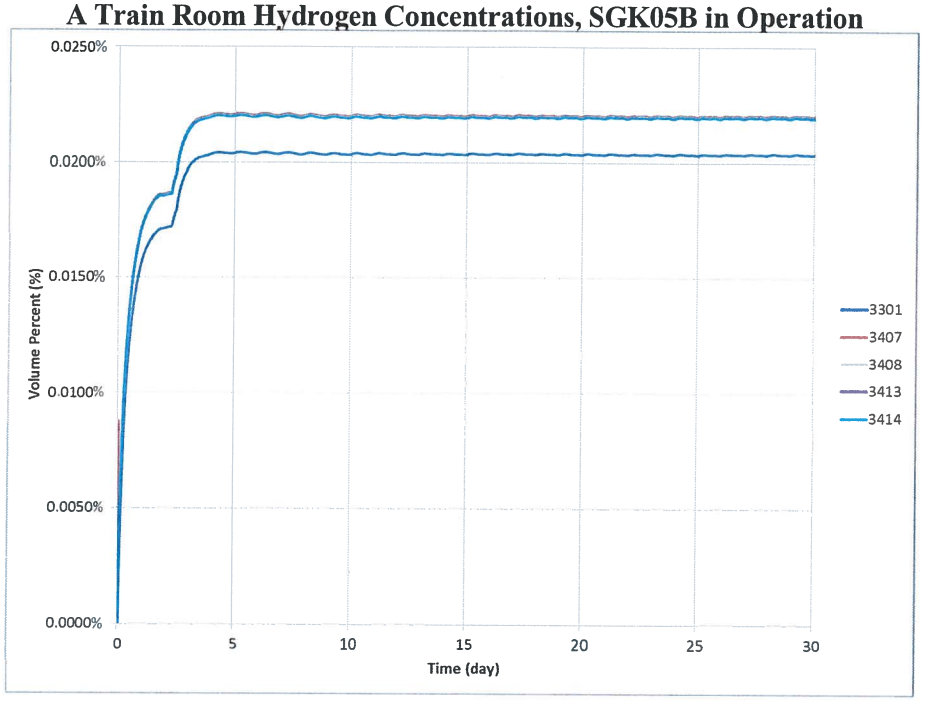


Cable Spreading Room Temperatures, SGK05B in Operation

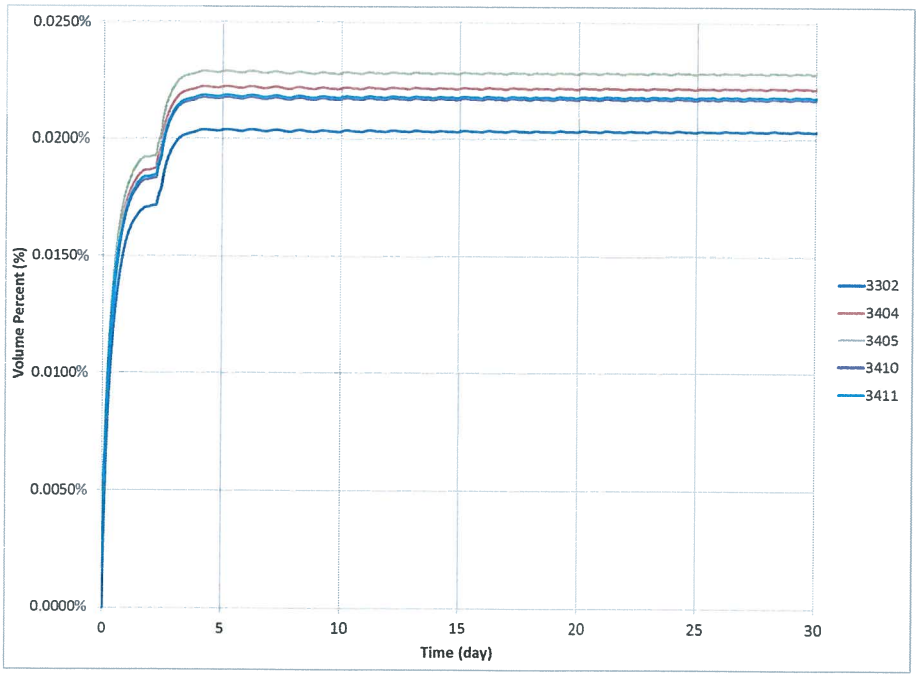
NAI-1719-004_R1 Case 2
Oct/09/2018 08:19:58
GOTHIC Version 8.0(QA) - Jan 2012
File: C:\Projects\NAI-1719-004_R1 Case 2.GTH



A Train Room Hydrogen Concentrations, SGK05B in Operation



B Train Room Hydrogen Concentrations, SGK05B in Operation



Change No. 4: Change to description of modification MP 16-0024.

On pages 24 through 28 in each of Attachments 1 and 2 of the LAR, a description of the plant modification for installing the supplemental cooling system at Callaway, i.e., modification MP 16-0024, was provided. The following description for the changes being made on the 2016' Elevation was specifically provided on page 24:

Plant Modification MP 16-0024

As indicated above, a supplemental cooling/ventilation system will be installed in the plant to enhance the capability of either Class 1E electrical equipment A/.C train to cool the areas/rooms for both trains of Class 1E electrical equipment. This will be achieved by installing recirculation fans and ducts to enhance the circulation of cooling air for electrical equipment areas/rooms on both the 2000' and 2016' elevations, as further described below.

2016' Elevation

- Two recirculation fans (with isolation dampers) and ten wall or door penetrations (with fire dampers) will be installed in the battery and switchboard rooms. One fan and two isolation dampers will be aligned with each SGK05 cooling train, i.e., 'A' and 'B'. Recirculation fans will be placed in corridor No. 2 and will discharge into separate/individual ducts with isolation dampers for each fan. See Figures 3 and 4. The remainder of the circulating air flow path/loop travels from room to room through a series of wall and door penetrations equipped with fire dampers. See Figure 5. A return duct between Battery Rooms 1 and 4 carries the warm air back to Battery Room 1 or 4 (depending on which SGK05 train is functioning) where there is a return duct for the functional SGK05 cooling train.

As noted previously, changes to plant modification MP 16-0024 were made subsequent to submittal of the LAR. These changes were discussed during the September 2018 audit. The main change to the planned modification (to be completed in the forthcoming refueling outage at Callaway) is a relocation of the fans and associated ductwork on the 2016' elevation of the Control Building. The change was required mainly to allow some of the installation to be done online.

Required Change: The change to modification MP 16-0024 requires revision of the original LAR-provided description of the modification. Using the originally provided description, the revised description should read as follows.

2016' Elevation

- Two recirculation fans (with isolation dampers), two wall and two ceiling penetrations (with fire dampers) and six door penetrations (i.e., grills) will be installed in the battery and switchboard rooms. One fan and two isolation dampers will be aligned with each SGK05 cooling train, i.e., 'A' train and 'B' train. Recirculation fans will be placed in Battery Rooms 2 and 3 and will discharge into a common duct for each fan. See Figures 3 and 4 [revised figures for which are provided in Attachment 6 of this submittal]. The remainder of the circulating airflow path/loop travels from room to room through a series of door penetrations and wall penetrations equipped with fire dampers. See Figure 5 [a revised figure for which is also provided in Attachment 6 of this submittal]. A return duct between Battery Rooms 1 and 4 carries the warm air back to Battery Room 1 or 4 (depending on which SGK05 train is functioning) where there is a return duct for the functional SGK05 cooling train.

Change No. 5: Incorporation of required operator actions into EOP ES-0.1 and clarification regarding the hand switch description for starting the fans.

When needed in the event of having one Class 1E Electrical Equipment A/C train inoperable, the needed supplemental cooling system train must be manually started, as described in the LAR. However, as an electrical load, the supplemental cooling system is designed to be shed by the load sequencer. In the event that a Class 1E Electrical Equipment A/C train is inoperable at the onset of a LOCA coincident with a loss of offsite power, manual action is needed and credited to restart the supplemental cooling system within or at a time of 30 minutes following the initiation of such an accident/event.

The following description was provided on pages 29 and 30 in each of Attachments 1 and 2 of the LAR:

> Credited Manual Operator Actions
>
> As an electrical load, the supplemental cooling system to be installed at Callaway will be shed from the safety-grade electrical buses upon loss of offsite power, and will not be automatically restarted. For the case when operation of the supplemental cooling system is desired or needed due to the inoperability of a Class 1E electrical equipment A/C train during or at the onset of an event/accident involving a loss of offsite power, calculation NAI-1719-004 credits manual operator action to restart the supplemental cooling system at a time of 30 minutes following the initiation of such an accident/event.
>
> Procedural direction to perform this credited manual operator action will be specified in Emergency Operating Procedure (EOP) Attachment A, "Automatic Action Verification." Attachment A is initiated at Step 5 of EOP E-0, "Reactor Trip or Safety Injection." The train of supplemental cooling that requires restart following initiation of an accident sequence and the loss of offsite power will be restarted by pressing two hand switches, which will be located on the 2000' level of the Control Building. Performance of this credited action will require no specialized tools or equipment. In addition, post-accident pressures, temperatures and radiation levels in the Control Building are compatible with performance of the credited action. [Underline added.]
>
> The necessity of restarting the supplemental cooling system will be identified by plant status control. Specifically, if the plant has entered Condition A of proposed new Technical Specification 3.7.20 prior to the initiation of an accident sequence involving the loss of offsite power (i.e., prior to entry into Emergency Operating Procedure E-0), the need to restart the supplemental cooling system will be identified, and the action for restarting the system will be procedurally guided,

following the load shed for such an event. Callaway Operations personnel are trained on revisions to the Emergency Operating Procedures.

The credited 30-minute time to complete the restart of the supplemental cooling system is achievable. This is based on previous timing exercises involving Emergency Operating Procedure Attachment A, and plant walkdowns of the transit pathway from the Operations Technician Staging Area to the proposed location of the restart hand switches.

While investigating one of the audit items from the September 2018 audit, it was confirmed that the path for operator actions described above, in which EOPs Appendix A and E-0 are utilized, was appropriate for when a safety injection (SI) signal is present (such as for a LOCA). However, it was identified that there are events or accidents involving a loss of offsite power for which there would be no SI, and thus the path through E-0 would not be applicable. It was recognized that for the situation in which there is no SI, appropriate operator actions consistent with those described in the LAR can be identified in EOP ES-0.1, "Reactor Trip Response." A revision to ES-01 is thus being made to ensure that the noted operator actions for starting/re-starting a supplemental cooling train would be taken. The assumed time to complete the restart of the supplemental cooling system via this EOP path is bounded by the SI case described above, as further explained below.

In addition, in regard to the above description, one clarification is needed. The train of supplemental cooling that requires restart following initiation of an accident sequence and the loss of offsite power will be restarted by turning one hand switch instead of pressing two hand switches. This change was made to simplify the manual operator action such that only one switch is required to start the supplemental cooling system.

Required Change: The only change to what is described in the LAR in regard to operator actions related to the execution of EOP Attachment A and E-0, as identified above, is that the operator is required to turn one hand switch to restart the system. In addition, the following information is provided as a supplement to the LAR-provided information in light of the credit given to the operator actions for starting/re-starting the supplemental cooling system after a load shed, with no SI involved.

The manual operator actions described in the original LAR are for the scenario in the E-0 procedure where there is a safety injection (SI) required. For the case where no safety injection is required, the operator would transition to ES-0.1, "Reactor Trip Response." In continuous action step 2 ("check status of AC

buses") of ES-0.1, an action is being added to ensure the supplemental cooling train needed to compensate for the Class 1E Electrical Equipment A/C train that was out of service at the onset of the event has been restarted. The assumed time to complete the restart of the supplemental cooling train for this case would be well within the time used for the SI case (described in the LAR) since Attachment A of procedure E-0 would not be required to be implemented (requiring approximately an 8-minute duration) as it is when an SI is occurring.

Change No. 6: Change to description of differences between Callaway LAR and Wolf Creek LAR.

In Section 3.5 (pages 35 and 36) of each of Attachments 1 and 2 of the LAR, the main differences between the Callaway LAR and the Wolf Creek LAR were identified, as follows (taken directly form the LAR):

3.5 Differences from WCNOC LAR

Provided below is a discussion of the significant differences from the Callaway Plant LAR.

- SR 3.7.20.1 and SR 3.7.20.2 specify a Frequency of "18 months" for WCGS, as opposed to "In accordance with the Surveillance Frequency Control Program" for the Callaway Plant.

- The ESF switchgear rooms on Control Building 2000 level and the DC switchboard rooms on 2016 level are protected by halon injection systems in case of a fire in these areas for WCGS. The Callaway Plant has previously removed the halon injection systems in these rooms.

- Ameren Missouri will revise the Callaway Emergency Operating Procedures to provide instructions for restarting the supplemental cooling system for the case when operation of the supplemental cooling system is desired or needed due to the inoperability of a Class 1E electrical equipment A/C train during or at the onset of an event/accident involving a loss of offsite power.

- The power supply breakers for the supplemental cooling system will be maintained open when the system is not in use. This will reduce the probability of spurious actuations.

- Ameren Missouri is proposing the additional TS change for TS 5.5.11 to reflect the noted supporting modification to the control room pressurization filter train heaters.

Required Change: The only change needed to this description is for the second "bullet" in the list. The description below is a change to that particular, described difference, in order to clarify that for Callaway, halon protection was only removed from rooms on the 2016 elevation. Both plants have halon protection on the 2000 level, so there is no need to address that level in describing the differences between the two plants.

> At WCGS, the DC switchboard rooms on 2016 level are protected by halon injection systems in case of a fire in these areas. The Callaway Plant has previously removed the halon injection systems in these rooms on the 2016 elevation.