UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NOS. 108 AND 107

TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92, RESPECTIVELY

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MEAG POWER SPVM, LLC

MEAG POWER SPVJ, LLC

MEAG POWER SPVP, LLC

CITY OF DALTON, GEORGIA

VOGTLE ELECTRIC GENERATING PLANT, UNITS 3 AND 4

DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated May 9, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17129A608), as supplemented by letter dated September 15, 2017, (ADAMS Accession No. ML17258B211) the Southern Nuclear Operating Company (SNC) requested that the Nuclear Regulatory Commission (NRC) amend Vogtle Electric Generating Plant (VEGP) Units 3 and 4, Combined License (COL) Numbers NPF-91 and NPF-92, respectively.

The license amendment request (LAR) 17-001 consists of changes to the licensing basis information to reflect design changes to the main control room emergency habitability system (VES) to address the main control room envelope (MCRE) temperature response. The changes are the following:

- The departure from approved AP1000 Design Control Document (DCD) Tier 2 information (text, tables, and figures) as incorporated into the Updated Final Safety Analysis Report (UFSAR) as plant-specific DCD information; and

- The departure from involved plant-specific Tier 1 information (and associated COL Appendix C information) and changes to plant-specific Technical Specifications (PS-TS) as incorporated in Appendix A of the COL, and associated PS-TS Bases document revisions were also provided for information.

Pursuant to 52.63(b)(1), Title 10 of the *Code of Federal Regulations* (10 CFR), SNC also requested an exemption from the provisions of 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," Section III.B, "Scope and Contents." The requested exemption would allow a departure from the corresponding portions of the certified information in Tier 1 of the generic DCD.[1] In order to modify the UFSAR, the plant-specific DCD (PS-DCD), Tier 1 information, the NRC must find the SNC's exemption request included in its submittal for the LAR to be acceptable. The staff's review of the exemption request, as well as the LAR, is included in this safety evaluation (SE).

In the September 15, 2017, letter, SNC provided additional information that supplemented the application. This information did not expand the scope of the application, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 18, 2017 (82 FR 32884).

2.0 REGULATORY EVALUATION

The NRC staff considered the following regulatory requirements in reviewing the LAR that included the proposed changes.

Appendix D, Section VIII.A.4 to 10 CFR Part 52 states that exemptions from Tier 1 information are governed by the requirements in 10 CFR 52.63(b)(1) and 10 CFR 52.98(f). It also states that the Commission will deny such a request if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design.

Appendix D, Section VIII.B.5.a allows an applicant or licensee who references this appendix to depart from Tier 2 information, without prior NRC approval, unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information, or the Technical Specifications (TS), or requires a license amendment under paragraphs B.5.b or B.5.c of the section.

10 CFR Part 52, Appendix D, VIII.C.6 states that after issuance of a license, "Changes to the plant-specific TS will be treated as license amendments under 10 CFR 50.90." 10 CFR 50.90 addresses the application for amendment of license, construction permit, or early site permit. The proposed LAR requires changes in the PS-TS, and therefore an LAR is required to be submitted for NRC approval.

10 CFR 52.63(b)(1) allows the licensee who references a design certification rule to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request if it determines that the exemption will comply with the requirements of 10 CFR 52.7, which, in turn, points to the requirements listed in 10 CFR 50.12 for specific exemptions, and the special circumstances present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of Appendix D, Section VIII.A.4 to 10 CFR Part 52, 10 CFR 50.12, 52.7, and 52.63(b)(1).

[1] While the licensee describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information to match the language of Section VIII.A.4 of 10 CFR Part 52, Appendix D, which specifically governs the granting of exemptions from Tier 1 information.

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL. These activities involve a change to COL Appendix C Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) information, with corresponding changes to the associated PS-DCD Tier 1 information. Therefore, NRC approval is required prior to making the plant specific proposed changes in this license amendment request.

10 CFR 50.36, "Technical specifications," imposes limits, operating conditions, and other requirements upon reactor facility operation for the public health and safety. The TS are derived from the analyses and evaluations in the safety analysis report. In general, TS must contain: (1) safety limits and limiting safety system settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

10 CFR 50.55a(h)(3), "Safety Systems," requires compliance with Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. Clause 5.1 of IEEE Std. 603-1991, "Single Failure Criterion," requires, in part, that safety systems shall perform all safety functions required for a design basis event in the presence of (1) any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures; (2) all failures caused by the single failure; and (3) all failures and spurious system actuations that cause or are caused by the design basis event requiring the safety functions. Clause 5.4 of IEEE Std. 603-1991, "Equipment Qualification," requires safety system equipment be qualified by type test, previous operating experience, or analysis, or any combination of these three methods, to substantiate that it will be capable of meeting, on a continuing basis, the performance requirements as specified in the design basis. This LAR includes changes to the protection and safety monitoring system (PMS) and VES by adding two safety-related, redundant main control room (MCR) load shed panels and associated component interface modules to automatically or manually de-energize non-essential, non-safety-related electrical loads in the MCRE to control heat loads within the MCRE to within design basis assumptions to limit the heat-up of the room. Therefore, the regulatory requirements in 10 CFR 50.55a(h)(3) are considered in the evaluation.

10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1, "Quality standards and records," and 10 CFR 50.55a, "Codes and standards," require that systems and components be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed. Regulations in 10 CFR 50.55a also incorporate by reference the applicable editions and addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code), which addresses pressure integrity of components, and the ASME Operation and Maintenance of Nuclear Power Plants, Division 1, (OM Code) for the inservice testing (IST) of pumps, valves, and dynamic restraints. Application of 10 CFR 50.55a and GDC 1 provides assurance that established standard practices of proven or demonstrated effectiveness are used to achieve a high likelihood that these safety functions will be performed and that the codes and standards applied are commensurate with the importance to safety of these functions.

GDC 2, "Design Bases for Protection against Natural Phenomena," in Appendix A to 10 CFR Part 50 requires that systems, structures, and components (SSCs) 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. The proposed change involves a discussion of seismic classification - an SSC's

requirement to withstand seismic events and maintain functionality and/or structural integrity; therefore, this criterion is considered in the evaluation.

GDC 4, “Environmental and Dynamic Effects Design Basis,” requires that SSCs can withstand the dynamic effects associated with missiles, pipe whipping, and discharging fluids, excluding dynamic effects associated with pipe ruptures, the probability of which is extremely low under conditions consistent with the design basis for the piping.

GDC 13, “Instrumentation and Control,” requires, in part, 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. This LAR includes changes to the post-accident monitoring system (PAMS) by adding MCR electrical load status as Type D Category 2 PAMS instrumentation. Therefore, this criterion is considered in the evaluation.

GDC 19, “Control room,” requires, in part, that a control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions. The control room shall be maintained to permit access and occupancy of the control room under accident conditions. The proposed changes involve a re-evaluation of the heat load in the control room, and operators and equipment must be able to perform adequately under the post-accident control room conditions; therefore, this criterion is considered in the evaluation.

In addition, some provisions of the following documents provide guidance associated with acceptance criteria to confirm that the above requirements are adequately addressed:

- NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (SRP) Section 3.2.1 (Revision 3, dated August 2016), “Seismic Classification” provides guidance to the staff in the review SSCs to ensure SSCs important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions.

- SRP Section 3.9.6 (Revision 3, dated March 2007), “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints,” addresses the NRC staff review of the functional design and qualification provisions and IST programs for safety-related pumps, valves, and dynamic restraints.

- Regulatory Guide (RG) 1.29, “Seismic Design Classification,” describes an acceptable method of identification and classification of SSCs important to safety that should be designed to withstand the SSE. RG 1.29 states that systems and components required for safe shutdown, including their foundations and supports, are designated as seismic Category I and should be designed to withstand the effects of the SSE and remain functional.

3.0 TECHNICAL EVALUATION

3.1 EVALUATION OF EXEMPTION

The regulations in Section III.B of Appendix D to 10 CFR Part 52 require a holder of a COL referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in Tier 1 of the generic AP1000

DCD. Exemptions from Tier 1 information are governed by the change process in Section VIII.A.4 of Appendix D of 10 CFR Part 52. Because the SNC has identified changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information resulting in the need for a departure, an exemption from the certified design information within plant-specific Tier 1 material is required to implement the LAR.

The Tier 1 information for which a plant-specific departure and exemption was requested relates to the changes to reflect design changes to the VES to address the MCRE temperature response. The result of this exemption would be that the licensee could implement modifications to Tier 1 information to the UFSAR as well as departures from PS-DCD Tier information, and COL Appendix C. Pursuant to the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, design certification rule is requested for the involved Tier 1 information described and justified in LAR 17-001. This exemption is a permanent exemption limited in scope to the particular Tier 1 information specified.

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, Section VIII.A.4 of Appendix D to 10 CFR Part 52 provides that the Commission will deny a request for an exemption from Tier 1 if it finds that the requested change will result in a significant decrease in the level of safety otherwise provided by the design. Pursuant to 10 CFR 52.63(b)(1), the Commission may grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 52.7, which, in turn, references 10 CFR 50.12, are met and that the special circumstances, which are defined by 10 CFR 50.12(a)(2), outweigh any potential decrease in safety due to reduced standardization.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. As 10 CFR 52.7 further states, the Commission's consideration will be governed by 10 CFR 50.12, "Specific exemptions," which states that an exemption may be granted when: (1) the exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security; and (2) special circumstances are present. Specifically, 10 CFR 50.12(a)(2) lists six circumstances for which an exemption may be granted. It is necessary for one of these bases to be present in order for the NRC to consider granting an exemption request. The licensee stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subparagraph defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." The staff's analysis of these findings is presented below:

3.1.1 Authorized By Law

The requested exemption would allow SNC to implement a revision to Tier 1, Section 2.2.5, Tables 2.2.5-1, 2.2.5-4, 2.2.5-5, 2.5.2-3 and 2.5.2-4 in the PS-DCD. This exemption is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to this plant-specific Tier 1 information, and corresponding changes to Appendix C, or any other Tier 1 information would be subject to the exemption process specified in Section VIII.A.4 of Appendix D to 10 CFR Part 52 and the requirements of 10 CFR 52.63(b)(1). As stated above, 10 CFR Part 52, Appendix D, Section VIII.A.4 allows the NRC to grant exemptions from one or more elements of the Tier 1 information. The NRC staff has determined that granting of SNC's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended,

or the Commission's regulations. Therefore, as required by 10 CFR 50.12(a)(1), the exemption is authorized by law.

3.1.2 No Undue Risk to Public Health and Safety

The underlying purpose of Appendix D to 10 CFR 52 is to ensure that a licensee will construct and operate the plant based on the approved information found in the DCD incorporated by reference into a plant's licensing basis. The changes proposed by SNC will not impact the ability of other systems or equipment to perform their design function. Because they will not alter the operation of any plant equipment or systems, these changes do not present an undue risk from existing equipment or systems. These changes do not add any new system interfaces to the current plant design. The description changes do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they modify or remove any design or operational controls or safeguards intended to mitigate any existing on-site hazards. Furthermore, the proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures. Accordingly, these changes do not present an undue risk from any new equipment or systems. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that there is no undue risk to public health and safety.

3.1.3 Consistent with Common Defense and Security

The proposed exemption would allow changes to reflect design changes to the VES to address the MCRE temperature response in the PS-DCD Tier 1, thereby departing from the AP1000 certified (Tier 1) design information. The changes do not alter or impede the design, function, or operation of any plant SSCs associated with the facility's physical or cyber security and, therefore, do not affect any plant equipment that is necessary to maintain a safe and secure plant status. In addition, the changes have no impact on plant security or safeguards. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the common defense and security is not impacted by this exemption.

3.1.4 Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2), are present, in part, whenever application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the Tier 1 information is to ensure that a licensee will safely construct and operate a plant based on the certified information found in the AP1000 DCD, which was incorporated by reference into the VEGP Units 3 and 4 licensing basis. The proposed changes would reflect VES design changes for an automatic and manual, Class 1E, electrical load shed of non-essential non-safety-related equipment within MCRE enhancing the accuracy of details in Tier 1 ITAAC table. The changes do not impact the ability of any SSCs to perform their safety functions or negatively impact safety.

Special circumstances are present in the particular circumstances discussed in LAR 17-001 because the application of the specified Tier 1 information is not necessary to achieve the underlying purpose of the rule. The proposed changes do not affect any function or feature used for the prevention and mitigation of accidents or their safety analyses, and no safety-related SSC or function is negatively affected. This exemption request and associated revisions to the Tier 1 information and corresponding changes to Appendix C demonstrate that the

applicable regulatory requirements will continue to be met. The changes will ensure that MCRE temperature will remain within an acceptable range as intended by the Tier 1 information.

Therefore, for the above reasons, the staff finds that the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information exist.

3.1.5 Special Circumstances Outweigh Reduced Standardization

This exemption would allow the implementation of changes to Tier 1 information in the PS-DCD and corresponding changes to Appendix C that are being proposed in the LAR. The justification provided in LAR 17-001, the exemption request, and the associated licensing basis mark-ups demonstrate that there is a limited change from the standard information provided in the generic AP1000 DCD, and that the implementation of the information in generic AP1000 DCD is not necessary to achieve the underlying purpose of the rule. The design functions of the system associated with this request will continue to be maintained because the associated revisions to the Tier 1 information support the design function of the VES. Consequently, the safety impact that may result from any reduction in standardization is minimized, because the proposed design change does not result in a reduction in the level of safety. The changes will provide the latest information from the final design of the VES system. Based on the foregoing reasons, as required by 10 CFR Part 52.63(b)(1), the staff finds that the special circumstances outweigh any decrease in safety that may result from the reduction of standardization of the AP1000 design.

3.1.6 No Significant Reduction In Safety

This exemption would allow the implementation of changes to reflect design changes to the VES to address the main control room envelope temperature response in the PS-DCD. The exemption request proposes to depart from the certified design by allowing changes to Section 2.2.5, Tables 2.2.5-1, 2.2.5-4, 2.2.5-5, 2.5.2-3 and 2.5.2-4 in Tier 1 of the PS-DCD. The proposed changes will not adversely affect the ability of the VES to perform its design functions, and the level of safety provided by the current systems and equipment therein is unchanged. Therefore, based on the foregoing reasons and as required by 10 CFR 52.7, 10 CFR 52.98(f), and 10 CFR Part 52, Appendix D, Section VIII.A.4, the staff finds that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design.

3.2 TECHNICAL EVALUATION OF PROPOSED CHANGES

3.2.1 Proposed Changes

The proposed changes affect the COL concerning the safety-related VES. Because of design finalization and completion of calculations for MCRE temperature response, the following design changes to the VES are requested:

1. Load Shed Capability

An automatic and manual, Class 1E, electrical load shed of nonessential nonsafety-related equipment within the MCRE is added. The automatic electrical load shed is actuated from the existing VES actuation signals (i.e., whenever alternating current (ac) power is not available for more than 10 minutes or high-2 radioactivity is detected in the MCRE air supply).

2. Main Control Room Habitability

a. Wet Bulb Globe Temperature (WBGT) Index

The temperature acceptance criterion in the MCR following a Design Basis Accident (DBA) is changed from effective temperature of 85 °F (29 °C) as called out in MIL-STD-1472E, "Department of Defense Design Criteria Standard: Human Engineering," to the WBGT Index of 90°F (32 °C) based on the recommendations of NUREG-0700, "Human-System Interface Design Review Guidelines."

b. Surveillance Requirements (SRs)

The TS are revised to provide specified initial temperature conditions for the required rooms in the MCRE and adjacent rooms, to specify a measurement for the moisture content of the air in the VES air storage tanks, to verify load shed function actuates on receipt of actual or simulated signal, and to clarify verification of main air delivery valve actuation on receipt of actual or simulated signal.

c. Instrument Valve Changes

A description of the requirements for maintaining habitability of the MCRE beyond 72 hours following a DBA is added to the design and licensing basis, to change the designation of existing safety-related temporary instrument valves to active valves required for providing clean, breathable replenishment air to the VES beyond 72 hours following a DBA. These temporary instrument valves allow the use of a portable, breathable air supply to meet the continued ventilation and pressurization requirements of the MCRE after the 72-hour supply of breathable quality air in the VES air storage tanks is exhausted. This is only necessary if: 1) the breathable quality air compressor in the compressed and instrument air system (CAS) is not available to replenish the VES air storage tanks; 2) the nuclear island nonradioactive ventilation system (VBS) is not available; and 3) the MCR ancillary fans are not available.

3.2.2 Evaluation of Proposed Changes

To perform the technical review of the proposed changes, the NRC staff considered sections of the VEGP Units 3 and 4 UFSAR, as well as portions of the AP1000 DCD, Revision 19, NUREG–1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design (NUREG-1793)" and its supplements, and the Final Safety Evaluation Report (FSER) for the VEGP Units 3 and 4 COL application, documenting the staff's technical evaluation of those aspects of the AP1000 DCD and VEGP Units 3 and 4 COL application, respectively. The staff reviewed the licensee's proposed change to evaluate the impact on the overall safety of the plant. The following sections describe the staff's review.

3.2.2.1 Evaluation of Instrumentation and Control Changes

After the AP1000 MCR design was finalized and its updated calculations were completed, SNC found that the AP1000 MCR heat loads, with and without ac power available, have increased. To compensate for the increases in heat loads, SNC proposed design changes to the VES and PMS in this LAR to control the heat-up of the MCRE following VES actuation to meet the licensing basis requirements for equipment qualification and human factors engineering in the MCRE. The final AP1000 MCR design and its updated calculation show that the MCRE temperature would exceed the equipment qualification limit for some safety-related components

within 72 hours following VES actuation, and also exceed the equipment qualification limit for Class 1E instrumentation and control (I&C) equipment in the MCRE at some time after 72 hours following VES actuation if no changes are made.

In order to address the above heat-up issue, the I&C related changes proposed by the licensee in this LAR include two new safety-related redundant MCR load shed panels containing Class 1E equipment in the VES to automatically or manually de-energize non-essential nonsafety-related electrical loads in the MCRE to reduce heat loads within the MCRE to within design basis assumptions to limit the heat-up of the room. The above electrical loads are proposed to be separated into Stage 1 and Stage 2 to maximize the availability of the nonsafety-related wall panel information system, which will be de-energized with other Stage 2 loads. New component interface modules (CIMs) are also proposed as associated I&C changes in PMS Divisions A and C in this LAR to de-energize loads powered by the two MCR load shed panels. Another I&C related change proposed in this LAR is to add MCR electrical load status as Type D Category 2 instrumentation to the PAMS.

The staff evaluated whether the above I&C related changes meet the relevant regulatory requirements in 10 CFR 50.55a(h)(3) and GDC 13. For the two new MCR load shed panels, the automatic electrical load shed is actuated from the existing VES actuation signals (i.e., whenever ac power is not available for more than 10 minutes or high-2 radioactivity is detected in the MCRE air supply). The staff noticed that each of the two redundant MCR load shed panels contains redundant load shed relays and timers actuated by two independent PMS divisions. Actuation of either division can de-energize the loads specified in this LAR. The associated new CIMs in PMS Divisions A and C proposed in this LAR are provided to de-energize loads powered by the two MCR load shed panels. Either PMS division is capable of separately and independently actuating the timers and relays in both of the two MCR load shed panels. Each panel de-energizes non-essential nonsafety-related electrical loads from both Stage 1 and Stage 2 as mentioned above. Timers that control the Stage 1 and Stage 2 load de-energization are internal to each MCR load shed panel and actuate relays to de-energize the loads. Stage 1 loads are de-energized by both panels immediately after the timers in each panel receive the PMS VES system actuation signal. Stage 2 loads are de-energized by both panels within 180 minutes after the timers in each panel receive the PMS VES system actuation signal. The staff finds that the above design of the two MCR load shed panels and related CIMs meet the single failure criterion as required in Clause 5.1 of IEEE Std. 603-1991.

The staff evaluated if the proposed changes would have any impact on the qualification program for the safety-related I&C equipment in the MCR. The licensee stated in the LAR that without the proposed changes, the MCRE temperature would exceed the equipment qualification limit for some safety-related components both within and after 72 hours following VES actuation. However, the staff considered that, if the proposed changes in this LAR are implemented, the heat loads within the MCRE following VES actuation can be decreased to within the current design basis assumptions. Therefore, the staff finds that the changes proposed in this LAR do not have adverse impact on the qualification of the safety-related equipment in the MCR and the regulatory requirements in Clause 5.4 of IEEE Std. 603-1991 on equipment qualification are still met.

The staff evaluated if changes proposed in this LAR to add the MCR electrical load status as Type D Category 2 PAMS instrumentation to the PAMS meet regulatory requirements in GDC 13 on I&C in the MCR. The staff noticed that the parameters in UFSAR Table 7.5-1 are revised in this LAR to include the status of the MCR load shed panels. The additional parameter added to the PAMS provides the capability to the MCR operators to monitor the status of the de-

energization of the MCR loads following a DBA in order to take manual actions if necessary to maintain continued habitability of the MCRE. Therefore, the staff finds that proposed change in this LAR to add the status of the MCR load shed panels as PAMS parameters meets the requirement in GDC 13 to assure adequate safety by allowing for monitoring for the need to take manual actions.

3.2.2.2 Evaluation of Main Control Room Temperature

The current licensing basis provides for a safety-related VES that maintains the MCR envelope, including the occupants and equipment contained within, within acceptable limits, as stated in Tier 1 Section 2.2.5. PS Tier 1 Table 2.2.5-4 and UFSAR Tier 2 Table 6.4-3 contain MCR heat loads as set forth during the certification process. However, as stated by SNC in the LAR, design finalization revealed that the calculated heat loads within the MCR have increased. To maintain conditions in the control room within limits for reliable human performance and maintain equipment within qualified limits, SNC proposed changes to the calculated heat loads resulting from the new actual heat loads and load shed scheme discussed above, changes to the acceptance criteria for conditions resulting in no restrictions to stay times for operators, as well as TS surveillance changes discussed below in Section 3.2.2.4 of the SE in order to ensure the temperatures are within the analyses. Additionally, SNC changed the classification of the VES instrument valves and proposed TS changes to provide assurance that the VES will operate as intended.

Accordingly, the licensee proposed changes to COL Appendix C and PS Tier 1 Table 2.2.5-4 and UFSAR Tier 2 Table 6.4-3 to update the heat load values in the control room based on the new load shedding scheme and expectation of the as installed heat loads, including operators. This change resulted in corresponding changes to the analyses demonstrating acceptable conditions within the MCR envelope. Related to these changes, SNC revised UFSAR Tier 2 Figure 3D.5-1 and UFSAR Tier 2 Section 6.4.2.2 to reflect the new acceptance criteria for temperatures and humidity values in the MCR. Further changes to UFSAR Tier 2 Sections 6.4.3.2, 6.4.4, 6.4.5.1, 6.4.5.3, 6.4.8, 9.4.1.1.2, 9.4.1.2.3.1, and Table 14.3-7 were made for consistency with the aforementioned changes.

Additionally, SNC proposed changes to UFSAR Tier 2 Sections 6.4.5.4 and 9.3.1.1.2 in order to more appropriately reflect the acceptance criteria for the VES air quality to preclude freezing of the valves. The proposed changes related to the analyses heat load changes and temperature acceptance criteria are evaluated below.

3.2.2.2.1 Impact of Acceptance Criteria Changes

As part of the LAR, SNC proposed to change the acceptance criteria for acceptable conditions for control room habitability from the effective temperature of 85 °F (29 °C) in the certified AP1000 design to a maximum average wet bulb globe temperature of less than 90 °F (32 °C) in the UFSAR. The WBGT is defined as 0.7 times the natural WBGT of the air plus 0.3 times the dry bulb temperature of the air. NUREG-0700, Table 12.6, “Ranges of WBGT for Different Ranges of Stay Times,” was used by the licensee as the basis for stay time limits. In accordance with NUREG-0700 Table 12.6, at 90 °F (32 °C) WBGT or less under control room working conditions (low-activity levels, normal work clothing), there is no stay time limit. The temperature ranges in NUREG- 0700 Table 12.6 are intended to minimize performance decrements and potential harm to workers because of excessive heat. These temperature

ranges are ceiling values (i.e., they assume that protective practices, such as acclimatization, training, and a cool place to rest, are in place).

The staff finds the change in licensing basis for the acceptance criteria for acceptable conditions for control room habitability from MIL-STD-1472E to NUREG-0700 to be acceptable and confirmed that the change was incorporated into the UFSAR as part of the LAR. Both documents establish stay time limits above 90-degree F (32.2-degree C) WBGT with NUREG-0700 providing a more detailed set of limitations based on temperature, clothing, and work activity. NUREG-0700 is also the established NRC-approved standard for human factors guidance. The staff finds the change of acceptance criteria for control room habitability from the effective temperature of 85 °F (29 °C) in the certified AP1000 design to a WBGT of less than 90 °F (32 °C) in the VEGP UFSAR to be acceptable. The new limit, as did the old limit, maintains an unlimited stay time in the MCR and provides reasonable assurance that operator performance will not be affected by the MCR environment.

The staff views an unlimited stay time as an appropriate method for meeting the GDC 19 requirement to permit operators to occupy the control room under accident conditions. The other aspect required by GDC 19 for this LAR, adequate protection for equipment, is addressed via maintaining MCR conditions under those specified in the revised UFSAR Tier 2 Figure 3D.5-1, "Typical Abnormal Environmental Test Profile: Main Control Room." The staff's review of SNC's analyses justifying those limits for reliable human performance and equipment qualification, following the limiting DBA conditions, is addressed in the next two sections.

3.2.2.2.2 First 72 hours - VES system Provides Air to MCR

As discussed earlier, the heat loading values in PS Tier 1 Table 2.2.5-4 and UFSAR Tier 2 Table 6.4-3, have been changed to correspond with the new load shedding design and revised heat loads expected in the MCR for the limiting DBA with ac power still available. As part of the evaluation for the Levy Nuclear Plant (Levy) COL (ADAMS Accession No. ML16068A418), the staff audited the GOTHIC calculations supporting the temperature evaluation, and the revised heat loads including the new timing resulting from the load shed were reflected in the GOTHIC analyses. The GOTHIC model was found by the staff to conservatively reflect the MCR conditions during the course of the Levy SE review. As part of this LAR, SNC provided supplemental information in a letter dated September 15, 2017, stating that the GOTHIC calculation was the same as that used by the Levy COL licensee, with the exceptions of the site-specific heat loads and temperature boundary conditions for some areas in the model. The SNC noted that the site-specific heat loads used in the model are bounding with respect to the expected plant equipment, including equipment to be added as a result of emergency preparedness commitments. Additionally, as part of the supplement, SNC provided the calculated temperature profiles for the licensing basis case, as well as a collection of sensitivity studies. These sensitivity studies investigated the effect of varying the heat load profiles based on different equipment availability, as well as a variation on the post-72 hour conditions. The staff reviewed these temperature profiles and determined that they adequately reflect the cases described in the LAR and agree well with those previously reviewed by the staff and submitted by the Levy COL licensee.

The temperature and relative humidity (RH) values calculated during the 72 hours following a DBA with ac power available equate to a maximum average WBGT index for the control room of less than 90 °F (32 °C). As discussed above, the 90 °F (32 °C) WBGT index is the design limit for minimizing performance decrements and potential harm, and preserving well-being and effectiveness of the control room staff for an unlimited duration. As a result of the proposed

load shed, non-Class 1E MCR heat loads are de-energized by automatic actions of the PMS within 3 hours after VES is actuated, and the 24-hour battery heat loads are terminated or exhausted at 24 hours to maintain the assumed heat load values, which then maintain the occupied zone of the MCR and the zones containing qualified safety-related equipment within the temperature constraints at 72 hours following VES actuation, as stated in the revised UFSAR Section 6.4.3.2. The "occupied zone" is considered to be the area between the raised floor and 7 feet (2.13 m) above the floor, which encompasses the reactor operators and senior reactor operator consoles. In the event that power to the VBS is unavailable for more than 72 hours, MCR habitability is maintained by operating one of the two MCR ancillary fans to supply outside air to the MCR. Discussion of the post-72-hour conditions can be found in Section 3.2.2.2.3 below.

Related to the above, SNC revised the TS to include new surveillance requirements (and changes to the associated technical specifications bases) for the rooms surrounding the MCR, as well as the I&C rooms (Rooms 12301, 12302, 12304, and 12305 in the LAR) and direct current (dc) equipment rooms (Rooms 12201, 12203, 12205, and 12207 in the LAR), to verify the average temperature is less than 85 °F (29 °C). These values are conservative with respect to the values used in SNC's analysis and are discussed further below in Section 3.2.2.4 of this SE.

During the first 72 hours, the safety-related VES system supplies air to the MCR, and therefore the humidity in the control room (and associated wet bulb temperature) is a function of the initial moisture in the room, any moisture input from heat loads in the room (e.g., the operators), and any moisture stored in the VES bottles. In the certified design as referenced by the licensee, given a potential scenario where the VES moisture content was sufficiently high, the potential existed to cause freezing at the VES regulator because of the Joule-Thomson effect. The air stored in the VES bottles is at high pressure. It is expanded through a pressure regulator before being supplied to the MCR. During the expansion process, the air cools below the freezing point for water. At higher moisture contents (a higher dew point or wet bulb temperature), moisture could condense out of the air and form ice on the regulator, potentially inhibiting the expected flow of air from the VES system to the MCR. In addition, a higher moisture content input from the VES bottled air could result in humidity values in the MCR that may challenge the human performance acceptance criteria outlined above.

As part of the resolution for this issue, the SNC endorsed a response to a request for additional information (RAI) asked by the staff as part of the Levy review. The RAI response (ADAMS Accession No. ML15358A014) proposed UFSAR and TS surveillance changes specifying the VES bottles will be supplied as ANSI/CGA-7.1 – Quality Level E with a pressure dew point temperature not to exceed 40 °F at 3,400 psig (4.4 °C at 23.5 MPa) or greater, and providing a justification for the change. Adding a VES moisture specification to the licensing basis that requires a relatively low-pressure dew point (i.e., dry air) in VES prevents moisture from affecting proper operation of VES components, such as the pressure regulator. SNC made corresponding changes to TS Surveillance Request 3.7.6.5, UFSAR Tier 2 Sections 6.4.5.3 and 9.3.1.1.2 as part of this LAR. As stated above, these changes help preclude freezing in VES components by limiting moisture content and serve to increase safety, and are therefore acceptable.

SNC has stated that the bounding initial limit for relative humidity in the MCR varies between 5 and 95 percent with a corresponding dry bulb temperature between 75 and 95 °F (23.9 to 35.0 °C). SNC proposed to change this value in UFSAR Tier 2 Table 3D.5-4. In concert with the limiting maximum safety wet bulb temperature (86.1°F / 30.0 °C) as imposed by the existing

licensing basis in UFSAR Table 2.0-201 and DCD Tier 2 Table 2-1, which is incorporated by reference, these values serve to set an acceptable upper bound on the humidity level allowed. Together with the dry bulb temperatures reflected in the GOTHIC analyses discussed above, these values set limits such that the control room environment remains within acceptable parameters (a WBGT of less than 90 °F (32 °C) and temperature conditions under those set forth in UFSAR Figure 3D.5-1). The staff reviewed the analyses and finds that SNC demonstrated that the control room remains within the defined acceptance criteria for the first 72 hours of the transient.

3.2.2.2.3 Post 72 hours - Ancillary Fans Ventilate MCR.

After 72 hours with no offsite support, the bottled air in the VES system will be depleted. As stated in UFSAR Section 9.4.1.2.3.1, if no nonsafety system recovery has taken place, one of two ancillary fans is placed in operation to blow approximately 1,500 (cfm) of outside air through the MCR envelope such that the maximum average WBGT index for the control room is less than 90 °F (32 °C). Likewise, outside air is supplied to Division B and C I&C rooms in order to maintain the ambient temperature below the qualification temperature of the equipment. Beyond 7 days, if VBS is still not operable, offsite support is available to extend habitability system operations. As such, the post-72-hour analyses are performed for a four-day period beginning at 72 hours and ending at 7 days after the onset of the transient.

Operation of the ancillary fans results in conditions in the MCR closely resembling ambient outdoor air conditions. As part of the LAR, the SNC performed MCR habitability analyses in GOTHIC using a diurnal outdoor air input, with a maximum of 101 °F (38.3 °C) and a minimum of 86 °F (30 °C) for the dry bulb temperature. The 101 °F (38.3 °C) maximum corresponds to the maximum normal site temperature. The staff has previously evaluated the applicability of these values to the VEGP site and found them acceptable, and further discussion of the staff evaluation is located in Section 2.3 of the VEGP FSER (ADAMS Accession No. ML12271A045).

As discussed above in Section 3.2.2.2.2 of this SE, SNC has stated that the bounding initial limit for relative humidity in the MCR varies between 5 and 95 percent with a corresponding dry bulb temperature between 75 and 95 °F (23.9 to 35.0 °C). For external ambient air, the limiting maximum safety wet bulb temperature is 86.1°F (30.0 °C).

Using the temperature data discussed above, SNC's analysis demonstrated that the MCR remained below a WBGT index of 90 °F (32 °C) for the entirety of the transient out to 7 days. The staff reviewed the temperature input values and assumptions in SNC's analysis and performed its own analysis to confirm the acceptability of the temperature inputs, due to relatively the wide range of viable inputs. The staff analysis initially consisted of reviewing data from National Weather Service stations near the VEGP site. As part of its review, the staff identified the worst consecutive 4-day period with respect to the WBGT index, and compared this data set to SNC's inputs and assumptions. The staff found that there are periods where the dry bulb temperature may exceed the assumed values for short periods of time. This is expected considering the value represents a maximum normal temperature and corresponds to the 1 percent seasonal exceedance temperature (or 0.4 percent annual exceedance temperature). However, the licensee's analysis conservatively bounds the staff calculated WBGT index recorded near the site. Additionally, in the staff's analysis, the staff found that the wet bulb temperatures for the entirety of the 4-day period that resulted in the worst WBGT index were bounded by the SNC's assumptions.

The staff also identified the worst 1-hour period with respect to the WBGT index that was recorded at National Weather Service stations near the VEGP site. The staff compared this data to the SNC's MCR habitability inputs and assumptions. Using the worst 1-hour data, the staff found that the SNC's peak conditions bound the staff calculated peak WBGT index recorded near the site. The staff recognizes that the use of a WBGT index as an appropriate metric to assess MCR habitability consists of a calculation that combines the dry bulb and wet bulb temperatures using appropriate scaling factors. In the staff's review of the worst recorded 1-hour WBGT index, an individual temperature input that contributed to calculating the WBGT index (the dry bulb temperature) exceeded the assumed value in the SNC's analysis. However, when the wet bulb temperature was combined with the coincident dry bulb temperature to form the calculated WBGT index, the staff found that the WBGT index was bounded by SNC's analysis.

Humidity in the control room after 72 hours is primarily a function of the initial humidity of the control room at 72 hours combined with the moisture content of the outside ambient air, as an ancillary fan operates to blow approximately 1,500 cfm of air through the MCR and I&C rooms. UFSAR Section 9.4.1.2.3.1 was revised to state the fans are expected to maintain the environment in the MCR near the site maximum normal temperature, below a maximum average WBGT of 90 °F (32 °C). Operators inside the control room represent a substantially smaller contribution to the ambient humidity as compared to the case prior to 72 hours, given the flow rate through the MCR from the fans. As stated earlier, SNC uses conservative values for the temperature and moisture content of the air.

Finally, SNC revised UFSAR Tier 2 Figure 3D.5-1 to reflect the post-72-hour limits for equipment qualification to 110 °F (43.3 °C) with 35 percent RH at this temperature. This change results in different acceptance criteria for equipment qualification and human performance after 72 hours. In the supplemental response, SNC submitted a set of analyses demonstrating that even in conditions where 101 °F (38.3 °C) outside air was input to the control room for the period between 72 hours and 7 days, the limits in UFSAR Figure 3D.5-1 were not exceeded. As such, based on the above discussion, the staff finds the proposed change to the UFSAR acceptable, as SNC's analysis provides reasonable assurance that the requirements associated with GDC 2 (with respect to natural phenomena, including ambient conditions) and GDC 4 are met. The calculated dry bulb temperature in the control room in this analysis was lower than the equipment qualification curve in UFSAR Figure 3D.5-1, demonstrating further margin as compared to the diurnal temperature analysis discussed above.

UFSAR Sections 6.4.2.2, 6.4.3.2, 9.4.1.1.2, and 9.4.1.2.3.1 have been revised to reflect that, post-72 hours, the ventilation system is designed to maintain the MCR below the limits associated with reliable human performance, as discussed earlier in Section 3.2.2.2.1 of this SE, and the equipment qualification limits in UFSAR Tier 2 Figure 3D.5-1, based on operation at the site maximum normal temperature. SNC's calculation showed that the WBGT remains below the 90 °F (32.2 °C) index associated with unlimited stay times for the operators. Additionally, the temperatures remain within the bounds for equipment qualification specified in UFSAR Figure 3D.5-1, Sheet 2 of 3. Based on the above review, the conservatism used by SNC, and the staff's confirmatory analysis, the staff has reasonable assurance that SNC's control room temperature calculation is acceptable and maintains the control room in a safe condition for the duration of the transient, and therefore meets NRC regulations as specified in GDC 19.

3.2.2.3 Seismic and Structural Requirements

The following changes are discussed in this section:

1. UFSAR Tier 2 Table 3.7.3-1 is revised to add the new MCR Load Shed Panels, VES-EP-01 and VES-EP-02, being located in Rooms 12300 and 12412, respectively. UFSAR Table 3.7.3-1 identifies the rooms outside containment containing safety-related systems or equipment that are reviewed for potential adverse seismic interactions to demonstrate that SSCs are not prevented from performing their required safe shutdown functions.

2. UFSAR Tier 2 Table 3I.6-2 is revised to add the new MCR Load Shed Panels to the list of potential high frequency sensitive AP1000 safety-related electrical and electro mechanical equipment.

3. UFSAR Tier 2 Tables 3.9-12, 3.9-16, and 3.11-1 are revised to change the designation of existing safety-related temporary instrument valves VES-PL-V018 VES-PL-V019 (Temporary Instrument Isolation Valve A and B, respectively) to active valves required for providing clean, breathable replenishment air to the VES for maintaining habitability of the MCRE beyond 72 hours following a DBA.

The current licensing basis, UFSAR Subsection 3.2.1, provides that seismic Category I SSCs are designed to withstand the appropriate seismic loads, as discussed in UFSAR Subsection 3.7 “Seismic Design.” The proposed VES-EP-01 and VES-EP-02 panels are designed to be safety-related, seismic Category I. Therefore, the design of these panels to seismic Category I requirements meets the GDC 2 requirements.

UFSAR Subsection 3I.6.4, “Electrical and Electro-Mechanical Equipment Evaluation” requires that electrical equipment that may be sensitive to the high frequency input be evaluated. This equipment includes those cabinet-mounted equipment, field sensors, and appurtenant that may be sensitive to high frequency seismic inputs. The proposed new MCR Load Shed Panels, VES-EP-01 and VES-EP-02, are designed to be safety-related, seismic Category I, and to meet the UFSAR Subsection 3I.6.4 requirements. The staff finds that new MCR Load Shed Panels are designed to the appropriate standards and requirements, and are acceptable and maintain the existing safety standard of the VES. In addition the staff reviewed the following changes.

1. In existing licensing basis, DCD Appendix 3I describes the methodology and criteria used in the evaluation to confirm that the high frequency input is not damaging to equipment and structures qualified by analysis for the AP1000 Certified Seismic Design Response Spectra.

   The new MCR Load Shed Panels shall meet the requirements in UFSAR Appendix 3I by being designed to not be adversely affected by high frequency seismic response as described in UFSAR Subsection 3I.6.4. The staff finds that new addition MCR Load Shed Panels are acceptable and the changes have no decrease in existing safety standard of the VES.

2. The proposed revisions to Tables 3.9-12, 3.9-16, and 11-1 in LAR-17-001 include the designation of existing safety-related temporary instrument valves VES-PL-V018 and VES-PL-V019 (Temporary Instrument Isolation Valve A and B, respectively) as active valves required for providing clean, breathable replenishment air to the VES for maintaining habitability of the MCRE beyond 72 hours following a DBA. The proposed changes included

the two valves designed as ASME Section III, Class 3, safety-related and seismic Category I.

In LAR-17-001, the SNC proposes to include Valves VES-PL-V018 and V019 in Table 2.2.5-1 in COL Appendix C to specify that the valves are within the scope of ASME BPV Code, Section III, and will be constructed to seismic Category I requirements. The SNC also proposes in LAR-17-001 to identify VES-PL-V018 and V019 in UFSAR Tier 2, Table 3.9-12 as active ASME BPV Code Class 3 valves. The staff finds that the construction of these valves to the ASME BPV Code Class 3 requirements and to seismic Category I requirements to be acceptable as consistent with the applicable GDC 1 and GDC 2 and 10 CFR 50.55a requirements in the NRC regulations.

In LAR-17-001, the proposed revision to Table 2.2.5-1 in COL Appendix C indicates that Valves VES-PL-V018 and V019 are not remotely operated valves, and that they do not include a safety-related display. In LAR-17-001, SNC proposes to specify Valves VES-PL-V018 and V019 in UFSAR Tier 2, Table 3.9-16 as active ASME OM Code Category B manual valves in the VEGP Units 3 and 4 IST program with safety functions of maintain close, transfer open, and maintain open. The IST type and frequency are specified in the proposed revision to UFSAR Table 3.9-16 as exercise full stroke every two years.

The ASME OM Code requires in paragraph ISTC-3540, “Manual Valves,” that manual valves shall be exercised every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. Paragraph ISTC-3540 also requires the valve to exhibit the required change of obturator position. The staff finds that the proposed specification of exercising every 2 years for Valves VES-PL-V018 and V019 in UFSAR Table 3.9-16 to be consistent with the ASME OM Code as incorporated by referenced in 10 CFR 50.55a. In finalizing its IST program at VEGP Units 3 and 4 prior to plant startup, the licensee will be expected to confirm that the conditions in the area surrounding Valves VES-PL-V018 and V019 do not reveal the need for testing more frequently than every 2 years.

Paragraph ISTC-3700, “Position Verification Testing,” in the ASME OM Code requires valves with remote position indication to be tested every 2 years to verify that their operation is accurately indicated. The proposed revision to Tier 1 Table 2.2.5-1 in LAR-17-001 indicates that Valves VES-PL-V018 and V019 do not include a safety display. Therefore, the staff finds that the absence of remote position indication testing for Valves VES-PL-V018 and V019 in the proposed revision to UFSAR Table 3.9-16 to be acceptable.

The ASME OM Code includes leakage testing requirements for Category A valves, where seat leakage is limited to a specific maximum amount. In LAR-17-001, the licensee proposes to categorize Valves VES-PL-V018 and V019 as OM Code Category B valves for which seat leakage is inconsequential for the fulfillment of their required function. Therefore, the staff finds that the absence of ASME OM Code leakage testing requirements for Valves VES-PL-V018 and V019 in the proposed revision to UFSAR Table 3.9-16 to be acceptable.

Based on the above evaluation, the staff finds the proposed Appendix C and UFSAR changes related to Valves VES-PL-V018 and V019 neither adversely affect the ability to meet the design functions of the VES, or involve a significant decrease in the level of safety provided by the VES.

3.2.2.4 Evaluation of TS changes

The following TS and Bases changes are proposed. The proposed changes, discussed in Technical Evaluation Section 3.0, to the MCR design stem from the updated Auxiliary Building Heat-up Analysis.

The following TS changes are related load shed capability to maintain heat loads within the MCRE within design basis assumptions to limit the heat-up of the room.

- TS 3.3.13 Action A.2 is revised to add the electrical load de-energization function. The control room electrical load de-energization function is added to the description of the original Control Room Isolation and Air Supply Initiation Function throughout.
- TS 3.3.16 limiting conditions for operation (LCO) Note is revised to add the new MCR electrical load de-energization function to the description of the original "Main Control Room Isolation and Air Supply Initiation" function.
- LCO, Actions, and Surveillance Requirements for TS 3.7.6 are revised as follows:

    - New Action B is added to address one PMS Division in one or more MCR Load Shed Panel(s) inoperable, requiring restoration to operable status within 7 days.
    - Action E (relettered as Action F) is revised to add the new Action B and relettered Action E to the list of required actions and associated completion times not met in MODE 1, 2, 3, or 4, or to the conditions that are exceptions to VES being inoperable in MODE 1, 2, 3, or 4, that would require shutdown of the plant.
    - Action F (relettered as Action G) is revised to add the new action B and relettered Action E to the list of required actions and associated completion times not met during movement of irradiated fuel, or to the conditions that are exceptions to VES being inoperable during movement of irradiated fuel, that would require suspension of movement of irradiated fuel assemblies.
    - New Surveillance Requirement 3.7.6.12 is added to require verification that the MCR load shed function actuates upon receipt of an actual or simulated actuation signal every 24 months.

- Bases 3.3.8, Bases 3.3.13, and Bases 3.3.16 are revised to add the new MCR electrical load de-energization function to the description of the original "Control Room Isolation, Air Supply Initiation and Electrical Load De-energization" function. The title of Bases 3.3.13 is revised to match the proposed TS title.
- The Background and LCO sections of Bases 3.7.6 are revised to add discussion of the air temperature assumptions of the required rooms around and in the MCRE, in the updated Auxiliary Building heat-up analysis, and to describe the new MCR electrical load de-energization function. This includes a description of the new PMS components and the Stage 1 and Stage 2 electrical load shed functional logic.
- The Bases for new Action B of 3.7.6 clarify that the Condition is only met if the unaffected divisions of one or both panel(s) remain capable of providing 100 percent of the load shed function, which justifies the Completion Time of 7 days. Otherwise, Action E (relettered as Action F) or Action F (relettered as Action G) would be required to be entered.
- The Bases for Surveillance Requirement 3.7.6.11 (now renumbered as SR 3.7.6.10) are revised to point to relettered Condition E (previously Condition C).
- The Bases for new Surveillance Requirement 3.7.6.13 clarify that the ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function and justify the Frequency of 24 months based on the need to perform this Surveillance

under the conditions that apply during a plant outage to minimize the potential for adversely affecting MCR operations.

3.2.2.4.1 Temperature and Dew Point Surveillance Changes

The heat-up of the MCRE is dependent upon the initial average air temperature of the Class 1E I&C equipment rooms, the Class 1E dc equipment rooms, and other rooms that surround the MCRE, in addition to the initial MCRE average air temperature of ≤ 75°F. To limit the heat-up of the room by the surrounding passive heat sinks, the design basis assumptions are revised in the Auxiliary Building heat-up analysis. As a result, the following TS changes are proposed:

- LCO 3.7.6 and Surveillance Requirements:
    - Action C is revised to address thermal mass of the required heat sinks. Required Action C.1 requires restoration of the heat sink air temperature if it is not within limits, in 24 hours. Required Action C.2 requires maintenance of the thermal mass, once the air temperature is restored, for 4 days in order to restore the heat sinks to full capacity.
    - Surveillance Requirement 3.7.6.1 is combined with new Surveillance Requirement 3.7.6.2. This surveillance requirement requires verification of the thermal mass of required heat sinks. A method of performing this verification is to maintain the ambient air temperature of the MCRE (<75°F). The proposed change makes SR 3.7.6.1 redundant, so it was deleted. The subsequent SRs are renumbered to reflect the deletion, including:
        - SR 3.7.6.2 is renumbered as SR 3.7.6.1
        - SR 3.7.6.4 is renumbered as SR 3.7.6.3
        - SR 3.7.6.5 is renumbered as SR 3.7.6.4
        - SR 3.7.6.7 is renumbered as SR 3.7.6.6
        - SR 3.7.6.8 is renumbered as SR 3.7.6.7
        - SR 3.7.6.9 is renumbered as SR 3.7.6.8
        - SR 3.7.6.10 is renumbered as SR 3.7.6.9
        - SR 3.7.6.11 is renumbered as SR 3.7.6.10
        - SR 3.7.6.12 is renumbered as SR 3.7.6.11
    - Surveillance Requirement 3.7.6.3 (now renumbered as SR 3.7.6.2) is changed to require verification of the thermal mass of the heat sink locations of the MCRE, and the required rooms and room-pairs adjacent to, below, and above the MCRE are within limits. The requirements that were originally in SR 3.7.6.3 have been added to SR 3.7.6.13.
    - Surveillance Requirement 3.7.6.6 (now renumbered as SR 3.7.6.5) is revised to reflect the pressure dew point of ≤ 40°F (4.4 °C) at ≥ 3400 psig (23.5 MPa) to document the air quality requirements related to moisture in the air to support the safety analyses required VES moisture content.

- The LCO section of Bases 3.7.6 is revised to add discussion of the air temperature assumptions of the required rooms around and in the MCRE, in the updated Auxiliary Building heat-up analysis.

- The Bases for Action C.1 of 3.7.6 justify the Completion Time of 24 hours based on engineering judgment, considering the low probability of an accident that would require VES

actuation under the worst case temperature conditions, and providing sufficient time to correct the deficiency in the non-safety VBS before shutting down. The bases for Action C.2 require additional time, 4 days, after the thermal mass been restored (Action C.1 required restoration of air temperature) before the Condition can be exited. This is because when Action C.1 has been entered, the passive heat sinks (thermal mass) are absorbing heat and will require time to "soak" at required restored temperatures prior to being declared operable. Four days is a sufficient amount of time to restore the thermal mass to full capacity.

- The Bases for Surveillance Requirement 3.7.6.1 are revised to describe renumbered SR 3.7.6.1 (previously SR 3.7.6.2). As described previously, equivalent requirements for the return air temperature, which is assumed in the VES thermal analysis. SR 3.7.6.1 has been added to SR 3.7.6.2 (renumbered SR 3.7.6.3). The proposed change makes SR 3.7.6.1 redundant, so it was deleted. The subsequent SR bases are renumbered to reflect the deletion, including:

    - Bases for SR 3.7.6.2 is renumbered as Bases for SR 3.7.6.1
    - Bases for SR 3.7.6.4 is renumbered as Bases for SR 3.7.6.3
    - Bases for SR 3.7.6.5 is renumbered as Bases for SR 3.7.6.4
    - Bases for SR 3.7.6.7 is renumbered as Bases for SR 3.7.6.6
    - Bases for SR 3.7.6.8 is renumbered as Bases for SR 3.7.6.7
    - Bases for SR 3.7.6.9 is renumbered as Bases for SR 3.7.6.8
    - Bases for SR 3.7.6.10 is renumbered as Bases for SR 3.7.6.9

- The Bases for new Surveillance Requirement 3.7.6.3 (now renumbered as SR 3.7.6.2) are revised to require verification that the thermal mass of the required heat sinks is within limit(s) every 24 hours. One method of doing this (as described in the Bases) is to maintain the ambient air temperature below the limit for the MCRE (i.e., ≤ 75°F), the required rooms (i.e., ≤ 85°F (29 °C), and adjacent required room-pairs (i.e., ≤85 ºF (29 °C)).

- The Bases for Surveillance Requirement 3.7.6.6 (now renumbered as SR 3.7.6.5) are revised to reflect the pressure dew point of ≤ 40°F (4.4 °C) at ≥ 3400 psig (23.5 MPa) to document the air quality requirements related to moisture in the air to support the safety analyses required VES moisture content.

- The Bases Figure B 3.7.6-1 header is updated to point to Required Action E.1 (relettered Action D).

3.2.2.4.2 Instrument Valve TS Changes

SNC states that VES design function to support continued operation of the VES beyond 72 hours following a DBA is met by designating the existing safety-related temporary instrument valves as active valves for providing clean, breathable replenishment air to the VES. As a result, the following TS changes are proposed:

- New Surveillance Requirement 3.7.6.13 is added to require verification of actuation of the main VES air delivery isolation valves upon receipt of an actuation signal. This surveillance is performed every 24 months.

- The Bases for new Surveillance Requirement 3.7.6.13 are added to reflect the requirement to verify the main VES air delivery isolation valves are operable and actuate upon receipt of a signal.

- The proposed TS changes are made to align the TS with the UFSAR changes to the MCR VES in order to meet GDCs 2, 4, and 19. The TS changes serve the following purposes: 1) the TS now reflect the addition of the Electrical Load De-energization equipment that are required to be operable to reduce heat loads when necessary, including associated surveillances that verifies equipment de-energizes and actuates appropriately; 2) the TS now require that the temperature, humidity and heat sink limits are met for the safe operation of equipment and personnel in the control room; and 3) the TS changes ensure that the environment in the control room permits equipment in the control room to meet DBA and other design functional requirements. The TS changes are consistent with other structures, systems, and components in the TS and meet the requirements of 10 CFR 50.36. Based on the above evaluation, the NRC staff finds the proposed TS revisions acceptable. In addition, the NRC staff found proposed Bases changes consistent with the proposed TS revisions.

3.2.2.5 Summary

The NRC staff has reviewed the licensee's analysis provided in LAR 17-001, dated May 9, 2017 and finds that:

(1) The proposed changes do not adversely affect the existing safety standard of VES and approved systems.

(2) The proposed changes provided additional clarity to existing documentation.

Based on these findings, the staff concludes that there is reasonable assurance that the requirements of GDCs 1, 2, 4, 13, and 19, and 10 CFR 50.55a continue to be met with the changes described in LAR 17-001. Therefore, the staff finds the proposed changes provided in LAR 17-001 to be acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b), on January 15, 2018, the Georgia State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "*Standards for Protection Against Radiation*." The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite. Also, there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (82 FR 32884, published on July 18, 2017). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

Because the exemption is necessary to allow the changes proposed in the license amendment, and because the exemption does not authorize any activities other than those proposed in the license amendment, the environmental consideration for the exemption is identical to that of the license amendment. Accordingly, the exemption meets the eligibility criteria 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 needs to be prepared in connection with the issuance of the exemption.

6.0 CONCLUSION

The staff has determined that pursuant to Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) presents special circumstances, (5) does not reduce the level of safety at the licensee's facility, and (6) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. Therefore, the staff grants the licensee an exemption from the Tier 1 information requested by the licensee.

The staff has concluded, based on the considerations discussed in Section 3.2 that: (1) the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Therefore, the staff finds the changes proposed in this license amendment acceptable.

Levy, Units 1 and 2 - Revised Response to Request for Additional Information Letter No. 132 Related to Standard Review Plan Section 9.4.1, "Control Room Area Ventilation System, for Combined License Application," December 22, 2015 (ADAMS Accession No. ML15358A014).

7.0 REFERENCES

1. Request for License Amendment LAR 17-001: Vogtle Electric Generating Plant, Units 3 and 4, Request for License Amendment and Exemption RE: Main Control Room Emergency Habitability System (VES) Changes to Satisfy Post-Actuation Performance Requirements, May 5, 2017, (ADAMS Accession No. ML17129A608).

2. Request for License Amendment LAR 17-001S1: Vogtle, Units 3 and 4, Request for License Amendment and Exemption RE: Main Control Room Emergency Habitability System (VES) Changes to Satisfy Post-Actuation Performance Requirements, September 15, 2017, (ADAMS Accession No. ML17258B211).

3. Levy Nuclear Plant Units 1 and 2 Final Safety Evaluation Report, Chapter 21, "Design Changes Proposed in Accordance with ISG-11" May 31, 2016 (ADAMS Accession No. ML16068A418).

4. AP1000 Design Control Document, Revision 19, June 13, 2011, (ADAMS Accession No. ML11171A500).

5. Vogtle Electric Generating Plant, Updated Final Safety Analysis Report, Revision 5, June 24, 2011, (ADAMS Accession No. ML11180A100).

6. Vogtle Electric Generating Plant, NUREG-2124, Vol 1, "Final Safety Evaluation Report Related to the Combined Licenses for Vogtle Electric Generating Plant, Units 3 and 4," September 30, 2012, (ADAMS Accession No. ML12271A045).

7. NUREG-0700, "Human-System Interface Design Review Guidelines." May 31, 2002 (ADAMS Accession No. ML021700373).

8. NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP) Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," March 2007, (ADAMS Accession No. ML070720041).

9. NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP) Section 3.2.1, "Seismic Classification" August 10, 2016 (ADAMS Accession No. ML16084A812).

10. NUREG-1793, Volume 1, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design," September, 2004, (ADAMS Accession No. ML043450344).

11. NUREG-1793, Supplement 1, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design," December 31, 2005, (ADAMS Accession No. ML060330557).

12. NUREG-1793, Volume 1, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design," August 5, 2011, (ADAMS Accession No. ML11293A120).

13. Regulatory Guide 1.29, "Seismic Design Classification," July 2016, (ADAMS Accession No. ML16118A148).

14. MIL-STD-1472E, "Department Of Defense Design Criteria Standard: Human Engineering" October 31, 1996.

15. IEEE 603-1991, "IEEE Standard - Criteria for Safety Systems for Nuclear Power Generating Stations," June 27, 1991.

16. Revised Response to Request for Additional Information Letter No. 132 Related to Standard Review Plan Section 9.4.1, Control Room Area Ventilation System, for the Levy Nuclear Plant, Units 1 and 2, Combined License Application, December 22, 2015 (ADAMS Accession No. ML15358A014).