

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS
RELATED TO AMENDMENT NOS. 90 AND 89
TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92, RESPECTIVELY
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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 January 31, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17031A446), Southern Nuclear Operating Company (SNC or licensee) submitted license amendment request (LAR) 17-005 requesting U.S. Nuclear Regulatory Commission (NRC) approval for amendments to the Vogtle Electric Generating Plant (VEGP) Units 3 and 4 combined licenses (COLs) NPF-91 and NPF-92, respectively.

The requested amendment would include changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the Plant-Specific Design Control Document (DCD) Tier 2 information and corresponding changes to COL Appendix A, Technical Specifications (TS). Specifically, the proposed LAR 17-005 would:

- (1) Modify the engineered safety features (ESF) actuation logic to include automatic reset of the manual containment vacuum relief actuation, so that operator action is not required for containment isolation ESF actuation when containment pressure returns to normal; and
- (2) Interlock the containment vacuum relief valves such that the operators will not be able to manually actuate containment vacuum relief until the containment pressure falls below the Containment Pressure - Low setpoint in two-out-of-four divisions

The NRC staff issued an initial *Federal Register* notice of opportunity to request a hearing and a proposed No Significant Hazard Consideration Determination on March 28, 2017 (82 FR 15386).

2.0 REGULATORY EVALUATION

10 CFR Part 52, Appendix D, Section VIII.B.5.a allows a 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 TS, or requires a license amendment under 10 CFR Part 52, Paragraphs B.5.b or B.5.c of Section VIII. The Tier 2 changes proposed in this LAR involve modifications to the TS and, therefore, require prior NRC approval.

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 TS, and therefore an LAR is required to be submitted for NRC approval.

10 CFR 50, Appendix A, General Design Criterion (GDC) 20, "Protection system functions," requires that the protection system shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

10 CFR 50, Appendix A, GDC 54, "Piping systems penetrating containment," requires that piping systems penetrating primary reactor containment shall be provided with leak detection, isolation, and containment capabilities having redundancy, reliability, and performance capabilities which reflect the importance to safety of isolating these piping systems. Such piping systems shall be designed with a capability to test periodically the operability of the isolation valves and associated apparatus and to determine if valve leakage is within acceptable limits.

10 CFR 50, Appendix A, GDC 56, "Primary containment isolation," requires that each line that connects directly to the containment atmosphere and penetrates primary reactor containment be provided with containment isolation valves, as described in GDC 56.

10 CFR 50.34(f)(2)(xiv)(B) requires that each non-essential penetration (except instrument lines) shall have two isolation barriers in series.

10 CFR 50.36, "Technical specifications," impose 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. 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), "Protection and Safety Systems," requires compliance with Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. Clause 5.2 of IEEE Std. 603-1991, "Completion of Protective Action" requires, in part, that the safety systems shall be designed so that, once initiated automatically

or manually, the intended sequence of protective actions of the execute features shall continue until completion. This LAR proposed changes to the ESF actuation logic to include interlock of low containment pressure and automatic reset of the manual containment vacuum relief actuation, so that manual action is not required to allow the containment isolation when containment pressure returns above the low setpoint. Hence, the staff finds that the regulatory requirements in Clause 5.2 of IEEE Std. 603-1991 are relevant and applicable for the safety evaluation on the proposed changes in this LAR.

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL.

3.0 TECHNICAL EVALUATION

The proposed changes revise plant-specific UFSAR Tier 2 information, which involve changes to the COLs, Appendix A, plant-specific TS. The proposed changes revise the UFSAR to include the Containment Pressure – Low manual actuation interlock and automatic reset function for the containment vacuum relief valve manual initiation logic to eliminate the necessity for operator action to reset the actuation signal after initiating the manual function. The Containment Pressure – Low manual actuation interlock and automatic reset function is also proposed to be included in TS LCO 3.3.8, Engineered Safety Features Actuation System (ESFAS) Instrumentation.

3.1 TECHNICAL EVALUATION FROM TECHNICAL SPECIFICATION PERSPECTIVES

The Containment Pressure – Low setpoint performs the following functions: it prevents the containment vacuum relief valves from being inadvertently manually opened above the setpoint, when not needed for vacuum relief and when the valves may be needed to prevent radioactivity release; and, it automatically resets the closing function when below the setpoint, when it might be needed for vacuum relief. The changes to the TS that deal with the Containment Pressure – Low automatic reset function for the containment vacuum relief valves manual initiation logic, allow the containment vacuum relief manual actuation to be automatically reset when the containment pressure rises above the Containment Pressure – Low setpoint, so that a containment isolation signal will close the containment vacuum relief valves when necessary. The Containment Pressure – Low signal ensures that the containment vacuum relief valves cannot be opened unless the Containment Pressure – Low setpoint has been reached. The result is that following initiation of containment vacuum relief actuation, the automatic initiation of containment isolation is made available to prevent a radiological release without relying on the operator to reset this latch. The specific changes to the TS are:

TS Table 3.3.8-1, Engineered Safeguards Actuation System Instrumentation has as a change, the addition of new Function 1.a. The table is revised to add the Containment Pressure – Low Function, the manual actuation interlock and automatic reset function, to reflect the ESF signal that prevents inadvertent manual opening of the containment vacuum relief valves, and provides automatic reset of the manual containment vacuum relief function to ensure the containment vacuum relief valves are allowed to close after they have been opened manually. The Applicability for this new Function is consistent with the Applicability for Function 1.b, Containment Pressure – Low 2; i.e., MODES 1, 2, 3, 4, and MODES 5 and 6 without an open containment air flow path \geq 6 inches in diameter (which is captured as Footnote (a)). This Table is appropriate for listing certain actuation functions credited in the mitigation of analyzed accidents; thereby satisfying 10 CFR 50.36(c)(2)(ii). The corresponding Actions for inoperability

of this Function, Condition P, are the same as for the containment vacuum relief actuation function on Containment Pressure – Low 2 (now Function 1.b).

TS Surveillance Requirement (SR) 3.3.8.4: Revised SR 3.3.8.4 to include a Note that exempts the Containment Pressure – Low (Function 1.a) from periodic Engineered Safety Features response time testing. SR 3.3.8.4 is modified by the proposed NOTE that states that the ESF response time testing does not apply to Function 1.a. The exception is appropriate because the Containment Pressure – Low signal provides an interlock function, and automatic reset, for the containment vacuum relief valves manual initiation function and does not directly actuate any ESF. As such, there is no response time required to meet the safety analyses.

The above TS changes are consistent with the other changes proposed to the UFSAR and with the content of the Standard TS which is prescribed by 10 CFR 50.36. The staff therefore finds the TS changes acceptable. The TS Bases are changed to be consistent with the TS.

3.2 TECHNICAL EVALUATION FROM INSTRUMENTATION AND CONTROL PERSEPECTIVES

The AP1000 instrumentation and control (I&C) system includes functions to sense plant process conditions and actuate ESF accordingly. The protection and safety monitoring system (PMS) is provided as part of the AP1000 I&C system to initiate ESF actuations when plant process conditions reach predetermined setpoints. Once associated logic conditions inside the PMS are met, the PMS produces the command signals to actuate appropriate ESF components.

As one of the ESF functions, the safety-related containment vacuum relief system is provided to mitigate a containment external pressure scenario and is part of the containment air filtration system. The containment vacuum relief component of the air filtration system uses six-inch supply lines and containment vacuum relief isolation valves. These vacuum relief isolation valves close automatically on a containment isolation signal in the absence of a containment vacuum relief actuation signal.

In the original logic design of the PMS for opening the containment vacuum relief isolation valves, an actuation signal is generated from either of the two conditions: (1) Low-2 containment pressure or (2) manual initiation. Condition 1 results from the two-out-of-four coincidence logic of containment pressure reaching the Low-2 setpoint in the PMS. Condition 2 consists of two manual control switches. Manual actuation of either of the two control switches will open the containment vacuum relief isolation valves.

As reflected on the revised Figure 7.2-1, Sheet 19 of 21 and also in the modified Subsection 7.3.1.2.26 of UFSAR in the submittal of this LAR, the proposed changes to the PMS logic design for the containment vacuum relief isolation valves include the Containment Pressure – Low interlock logic and an automatic reset function for the manual opening initiation logic. Specifically the above Condition 2 is proposed to be changed to “manual Initiation coincident with Containment Pressure – Low”. Manual containment vacuum relief valve actuation for Condition 2 is interlocked in the revised logic to prevent actuation until the Containment Pressure – Low setpoint is reached in any two of the four divisions in the PMS. After manual containment vacuum relief actuation is initiated, the opening actuation signal is automatically reset when the containment pressure exceeds the low setpoint in any three out of the four divisions in the PMS. In the revised logic design, one “NOT” logic gate is applied after the two-out-of-four coincidence logic is used for the containment low pressure. So, the containment

pressure sensors in three out of the four divisions in the PMS need to exceed the low setpoint for triggering the automatic reset function.

The staff finds that the proposed changes to the PMS logic design for containment vacuum relief isolation valves will allow the containment isolation signal to automatically actuate containment isolation to its completion and prevent a radiological release without relying on a manual action to reset the latch from the manual vacuum relief actuation. The original logic design in the PMS depends on a couple of other conditions to make sure that the containment isolation protective function will go to completion automatically. The proposed changes to the PMS logic design are added to ensure that the containment vacuum relief isolation valves will be automatically closed when three of the four containment pressure sensors are above the low setpoint. Hence, the staff finds that the revised PMS logic design of the AP1000 I&C system as described in the LAR comply with Clause 5.2 of IEEE Std. 603-1991 regarding the completion of protective action. The staff also finds that the proposed changes to the PMS logic in the LAR for the containment vacuum relief isolation valves meet the regulatory requirements in 10 CFR 50, Appendix A, GDC 20, which requires the PMS protection system to sense process conditions and then automatically to initiate the operation of systems and components important to safety.

In addition, the staff finds that the changes proposed in the LAR are made to the PMS software logic design only for containment vacuum relief isolation valves, and hence the proposed changes do not adversely affect any function or feature used for the prevention and mitigation of accidents or their safety analyses. The changes proposed in this LAR do not introduce any new failure mode, malfunction, or sequence of new events, which could adversely affect a radioactive material barrier or safety-related equipment. The staff finds that the PMS logic changes proposed do not adversely involve nor interface with any structure, system, component (SSC) accident initiator or initiating sequence of events associated with the accidents assessed in the plant-specific DCD or UFSAR.

Therefore, from the I&C perspectives the staff finds with reasonable assurance that the changes to the PMS logic design proposed in this LAR for containment vacuum relief isolation valves meet relevant regulatory requirements in 10 CFR 50.55a(h), its endorsed IEEE Std. 603-1991, and 10 CFR 50, Appendix A, GDC 20. Hence the staff finds that from the I&C perspectives the proposed changes in this LAR are acceptable.

3.3 TECHNICAL EVALUATION FROM CONTAINMENT AND VENTILATION PERSPECTIVES

The licensee proposed to include automatic reset for the manual containment vacuum relief actuation. The applicable regulations for containment and ventilation aspects of the applicant's proposed design changes are detailed in NUREG-0800 Section 6.2.4, "Containment Isolation System," and NUREG-0800 Section 9.4.3, "Auxiliary and Radwaste Area Ventilation System."

The staff reviewed the proposed design for compliance with GDC 56, which states requirements for containment isolation valves provided for each line that connects directly to the containment atmosphere and penetrates primary reactor containment. 10 CFR 50.34(f)(2)(xiv)(B) requires that each non-essential penetration (except instrument lines) shall have two isolation barriers in serials. The present vacuum relief design consists of two lines, which connect directly with the containment atmosphere and penetrate the primary containment. In order to comply with the requirement of GDC 56 each vacuum relief device is equipped with a check valve inside containment and a motor operated butterfly valve outside containment. The inboard and

outboard isolation valves also comply with the 10CFR 50.34(f)(2)(xiv)(B) redundancy requirement.

One operation scenario is causing a concern. Operator could open the two vacuum relief valves (VFS-PL-V800A/B) should containment vacuum challenge the containment structure. Due to the present control logic design, operator needs to manually reset the latch of the containment relief actuation after the containment pressure is back to normal range. Reset of the latch is required to allow the two vacuum relief valves to close automatically by containment isolation signal during high containment radiation event. The two containment vacuum relief isolation valves function as containment isolation valves and must be closed to limit radiological releases to the atmosphere. Without manually resetting the latch, the inside containment purge discharge isolation valve (VFS-PL-V009) becomes the only available isolation valve.

Without the proposed modification, a single failure involving a containment purge discharge inboard isolation valve (VFS-PL-V009) failing open could create a path for radiological release to the atmosphere unless the operator resets the latch of the containment relief valves in a timely manner.

The proposed change will include an automatic reset for the containment relief actuation. Because there is one automatic isolation valve inside containment and one automatic isolation valve outside containment, the staff believes that the new design complies with the redundancy requirement of GDC 56 and 10 CFR 50.34(f)(2)(xiv)(B).

After the modification, the automatic reset will occur when containment pressure is above the Containment Pressure – Low setpoint. The Containment Pressure – Low signal also has the effect of interlocking containment vacuum relief actuation such that operators will not be able to manually actuate containment vacuum relief until the containment pressure indicating a vacuum condition falls below the Containment Pressure – Low setpoint. The result is that following initiation of containment vacuum relief actuation, the automatic initiation of containment isolation is made available to prevent a radiological release without relying on the operator to reset this latch.

Therefore, the staff finds with reasonable assurance that the changes to the containment vacuum relief system logic proposed in this LAR meets the applicable regulations for containment and ventilation aspects outlined in NUREG-0800 Section 6.2.4 and NUREG-0800 Section 9.4.3. Hence the staff finds that from the containment and ventilation perspectives the proposed changes in this LAR are acceptable.

3.4 SUMMARY OF THE TECHNICAL EVALUATION

Based on the technical evaluations above, the staff finds that the proposed changes to the plant-specific UFSAR Tier 2 information, which involve changes to the COLs, Appendix A, plant-specific TS included in the LAR and the supporting analysis provided in the LAR, the staff concludes that there is reasonable assurance that the requirements of 10 CFR Part 50, Appendix A, GDC 20, 54 and 56, 10 CFR 50.34(f)(2)(xiv)(B), 10 CFR 50.55a(h), 10 CFR 52 Appendix D, 10 CFR 50.36, and 10 CFR 52.98 will continue to be met. Therefore, the staff finds the proposed changes to be acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), 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 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 (*Federal Register*, 82 FR 15386, dated March 28, 2017). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Under 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

Based on the technical evaluation presented in Section 3.0 above, the staff has concluded that the changes to (1) modify the ESF logic to automatically reset the manual containment vacuum relief actuation, so that operator action is not required when containment pressure returns to normal, and (2) add logic so that containment vacuum relief cannot be manually actuated without low containment pressure, do not change any analysis methodology, assumptions, or the design itself, and that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) 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 NRC staff finds the changes proposed in this LAR are acceptable.

7.0 REFERENCES

1. Request for License Amendment – Engineered Safety Features Actuation Changes for Containment Vacuum Relief (LAR-17-005) letter from Southern Nuclear Operating Company dated January 31, 2017 (ADAMS Accession No. ML17031A446).
2. Vogtle Units 3 and 4 Updated Final Safety Analysis Report, Revision 6 and Tier 1, Revision 5 dated March 12, 2017 (ADAMS Accession No. ML17172A218).
3. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).
4. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
5. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).

6. Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations."
7. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition."