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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 189

TO COMBINED LICENSE NO. NPF-92

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, UNIT 4

DOCKET NO. 52-026

1.0 INTRODUCTION

By letter dated April 17, 2023 (Agencywide Documents Access and Management System Accession No. ML23107A278) the Southern Nuclear Operating Company, Inc (SNC), submitted for the Vogtle Electric Generating Plant (VEGP), Unit 4, a license amendment request (LAR), "Timing of Unit 4 Technical Specifications Effectiveness Prior to Initial Criticality (LAR-23-005)." The Nuclear Regulatory Commission (NRC or the Commission) staff accepted this LAR for review on May 21, 2023 (ML23121A256). On June 5, 2023, the NRC issued a Request for Additional Information (RAI) (ML23156A667) to which SNC responded, by letter dated June 9, 2023 (ML23160A194) and provided a supplement to the original April 17, 2023, submittal.

The purpose of the LAR is to temporarily limit the scope of the Combined License (COL) Appendix A, Technical Specifications (TS) that would become effective upon a Commission finding that all acceptance criteria in the COL are met under Title 10 of the Code of Federal Regulations (10 CFR) 52.103(g). These limitations would be implemented by temporary exceptions to the effectiveness of particular TS only during reactor operating Modes 4, "Safe Shutdown," 5, "Cold Shutdown," and 6, "Refueling" prior to initial criticality. The proposed LAR would also change the VEGP Unit 4 COL condition 2.D.(9) to list the particular TS that have temporary exceptions. In addition, the proposed LAR would also make a permanent change to TS limiting condition for operation (LCO) 3.0.7 to delineate the applicability of the temporarily excepted TS listed in the VEGP Unit 4 COL condition 2.D.(9).

The supplement dated June 9, 2023, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 19, 2023 (88 FR 32250).

2.0 DESCRIPTION OF CHANGES

The licensee proposed adding the following paragraph to TS LCO 3.0.7:

> *Additionally, for Unit 4 only, Combined License Condition 2.D(9) provides temporary exclusions for specified TS requirements prior to becoming permanently effective at initial criticality of the reactor core. Compliance with TS requirements that are excluded from becoming effective while operating in MODES 4, 5, and 6 in accordance with the COL Condition is optional.*

In addition, the licensee proposed modifying COL condition 2.D.(9) as follows (*text changes show in italics*):

(9) Technical Specifications

The technical specifications in Appendix A to this license (TS) become effective upon a Commission finding that the acceptance criteria in this license (ITAAC) are met in accordance with 10 CFR 52.103(g)*, with the following exceptions:*

(a) Prior to initial criticality of the reactor core while operating in plant operational Mode 5 (Cold Shutdown) or Mode 6 (Refueling) the following TS are temporarily excluded from becoming effective:

- *TS 3.3.8, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Table 3.3.8-1*
  - *Function 14, RCS Wide Range Pressure – Low*
  - *Function 15, Core Makeup Tank (CMT) Level - Low 3*
  - *Function 16, CMT Level - Low 6*
  - *Function 18, IRWST Lower Narrow Range Level - Low 3*
- *TS 3.3.9, "Engineered Safety Feature Actuation System (ESFAS) Manual Initiation," Table 3.3.9-1*
  - *Function 1, Safeguards Actuation - Manual Initiation*
  - *Function 6, ADS Stages 1, 2 & 3 Actuation - Manual Initiation*
  - *Function 7, ADS Stage 4 Actuation - Manual Initiation*
  - *Function 8, Passive Containment Cooling Actuation - Manual Initiation*
  - *Function 9, Passive Residual Heat Removal Heat Exchanger Actuation - Manual Initiation*
  - *Function 12, In-Containment Refueling Water Storage Tank (IRWST) Injection Line Valve Actuation - Manual Initiation*
  - *Function 13, IRWST Containment Recirculation Valve Actuation - Manual Initiation*
- *TS 3.3.10, "Engineered Safety Feature Actuation System (ESFAS) Reactor Coolant System (RCS) Hot Leg Level Instrumentation"*

- *TS 3.3.14, "Engineered Safety Feature Actuation System (ESFAS) In-containment Refueling Water Storage Tank (IRWST) and Spent Fuel Pool Level Instrumentation," Table 3.3.14-1*
  - *Function 1, Spent Fuel Pool Level - Low 2*
- *TS 3.3.19, "Diverse Actuation System (DAS) Manual Controls," Table 3.3.19-1*
  - *Function 2, Passive Residual Heat Removal Heat Exchanger (PRHR HX) control and In-Containment Refueling Water Storage Tank (IRWST) gutter control valves*
  - *Function 4, Automatic Depressurization System (ADS) stage 1 valves*
  - *Function 5, ADS stage 2 valves*
  - *Function 6, ADS stage 3 valves*
  - *Function 7, ADS stage 4 valves*
  - *Function 8, IRWST injection squib valves*
  - *Function 9, Containment recirculation valves*
  - *Function 10, Passive containment cooling drain valves*
  - *Function 11, Selected containment isolation valves*
- *TS 3.3.20, "Automatic Depressurization System (ADS) and In-containment Refueling Water Storage Tank (IRWST) Injection Blocking Device," Table 3.3.20-1*
  - *Function 2, ADS and IRWST Injection Block Switches for Manual Unblocking*
- *TS 3.4.12, "Automatic Depressurization System (ADS) - Shutdown, RCS Intact"*
- *TS 3.4.13, "Automatic Depressurization System (ADS) - Shutdown, RCS Open"*
- *TS 3.5.5, "Passive Residual Heat Removal Heat Exchanger (PRHR HX) - Shutdown, Reactor Coolant System (RCS) Intact"*
- *TS 3.5.7, "In-containment Refueling Water Storage Tank (IRWST) - Shutdown, MODE 5"*
- *TS 3.5.8, "In-containment Refueling Water Storage Tank (IRWST) - Shutdown, MODE 6"*
- *TS 3.6.7, "Containment Penetrations"*
- *TS 3.7.13, "Spent Fuel Pool Cooling System (SFS) Containment Isolation Valves"*

(b) Prior to initial criticality of the reactor core while operating in plant operational Mode 4 (Safe Shutdown) when any cold leg temperature is ≤ 275°F the following TS are temporarily excluded from becoming effective:

- *TS 3.3.8, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Table 3.3.8-1*
  - *Function 14, RCS Wide Range Pressure - Low*
  - *Function 15, Core Makeup Tank (CMT) Level - Low 3*
  - *Function 16, CMT Level - Low 6*
  - *Function 18, IRWST Lower Narrow Range Level - Low 3*
  - *Function 19, Reactor Coolant Pump Bearing Water Temperature - High 2*
- *TS 3.3.9, "Engineered Safety Feature Actuation System (ESFAS) Manual Initiation," Table 3.3.9-1*
  - *Function 3, Containment Isolation - Manual Initiation*

  - *Function 6, ADS Stages 1, 2 & 3 Actuation - Manual Initiation*
  - *Function 7, ADS Stage 4 Actuation - Manual Initiation*
  - *Function 8, Passive Containment Cooling Actuation - Manual Initiation*
  - *Function 12, In-Containment Refueling Water Storage Tank (IRWST) Injection Line Valve Actuation - Manual Initiation*
  - *Function 13, IRWST Containment Recirculation Valve Actuation - Manual Initiation*
- *TS 3.3.13, "Engineered Safety Feature Actuation System (ESFAS) Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization," Table 3.3.13-1*
  - *Function 1, Main Control Room Air Supply Iodine or Particulate Radiation - High 2*
- *TS 3.3.19, "Diverse Actuation System (DAS) Manual Controls," Table 3.3.19-1*
  - *Function 4, Automatic Depressurization System (ADS) stage 1 valves*
  - *Function 5, ADS stage 2 valves*
  - *Function 6, ADS stage 3 valves*
  - *Function 7, ADS stage 4 valves*
  - *Function 8, IRWST injection squib valves*
  - *Function 9, Containment recirculation valves*
  - *Function 10, Passive containment cooling drain valves*
  - *Function 11, Selected containment isolation valves*
- *TS 3.3.20, "Automatic Depressurization System (ADS) and In- containment Refueling Water Storage Tank (IRWST) Injection Blocking Device," Table 3.3.20-1*
  - *Function 2, ADS and IRWST Injection Block Switches for Manual Unblocking*
- *TS 3.4.11, "Automatic Depressurization System (ADS) - Operating"*
- *TS 3.5.1, "Accumulators"*
- *TS 3.5.6, "In-containment Refueling Water Storage Tank (IRWST) - Operating"*
- *TS 3.6.1, "Containment"*
- *TS 3.6.2, "Containment Air Locks"*
- *TS 3.6.3, "Containment Isolation Valves"*
- *TS 3.6.6, "Passive Containment Cooling System (PCS)"*
- *TS 3.6.8, "pH Adjustment"*
- *TS 3.7.4, "Secondary Specific Activity"*
- *TS 3.7.10, "Steam Generator (SG) Isolation Valves" only for PORV* [power-operated relief valve] *and PORV block valves (SG blowdown isolation valve not excluded)*

(c) Prior to initial criticality of the reactor core while operating in plant operational Mode 4 (Safe Shutdown) with all four cold leg temperatures > 275°F the following TS are temporarily excluded from becoming effective:

- *TS 3.3.8, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Table 3.3.8-1*
  - *Function 3, Containment Radioactivity - High*
  - *Function 18, IRWST Lower Narrow Range Level - Low 3*
  - *Function 19, Reactor Coolant Pump Bearing Water Temperature - High 2*

- *TS 3.3.9, "Engineered Safety Feature Actuation System (ESFAS) Manual Initiation," Table 3.3.9-1*
  - *Function 3, Containment Isolation - Manual Initiation*
  - *Function 6, ADS Stages 1, 2 & 3 Actuation - Manual Initiation*
  - *Function 7, ADS Stage 4 Actuation - Manual Initiation*
  - *Function 8, Passive Containment Cooling Actuation - Manual Initiation*
  - *Function 13, IRWST Containment Recirculation Valve Actuation - Manual Initiation*
  - *Function 14, SG Power Operated Relief Valve and Block Valve Isolation - Manual Initiation*
- *TS 3.3.13, "Engineered Safety Feature Actuation System (ESFAS) Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization," Table 3.3.13-1*
  - *Function 1, Main Control Room Air Supply Iodine or Particulate Radiation - High 2*
- *TS 3.3.19, "Diverse Actuation System (DAS) Manual Controls," Table 3.3.19-1*
  - *Function 4, Automatic Depressurization System (ADS) stage 1 valves*
  - *Function 5, ADS stage 2 valves*
  - *Function 6, ADS stage 3 valves*
  - *Function 7, ADS stage 4 valves*
  - *Function 9, Containment recirculation valves*
  - *Function 10, Passive containment cooling drain valves*
  - *Function 11, Selected containment isolation valves*
- *TS 3.4.11, "Automatic Depressurization System (ADS) - Operating"*
- *TS 3.5.1, "Accumulators"*
- *TS 3.5.6, "In-containment Refueling Water Storage Tank (IRWST) - Operating" only for containment recirculation flow paths (injection flow paths not excluded)*
- *TS 3.6.1, "Containment"*
- *TS 3.6.2, "Containment Air Locks"*
- *TS 3.6.3, "Containment Isolation Valves"*
- *TS 3.6.6, "Passive Containment Cooling System (PCS)"*
- *TS 3.6.8, "pH Adjustment"*
- *TS 3.7.4, "Secondary Specific Activity"*
- *TS 3.7.10, "Steam Generator (SG) Isolation Valves" only for PORV and PORV block valves (SG blowdown isolation valve not excluded)*

The effect of the proposed revisions would be to not require the LCOs listed in COL condition 2.D.(9) to be met in the operating modes listed prior to the initial criticality of the core. Once the core has gone critical for the first time, then the listed LCOs would become permanently effective and be required to be met anytime the plant is operating in the LCO's specified mode of applicability.

3.0 REGULATORY EVALUATION

The staff considered the following regulatory requirements in reviewing the LAR:

10 CFR 52.98(f) provides that any modification to, addition to, or deletion from the terms and conditions of a COL is a proposed license amendment. The licensee proposes a change to a

COL license condition and to COL Appendix A TS information. Therefore, NRC approval in the form of a license amendment is required prior to making these plant-specific proposed changes.

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 a license, including a combined license. The proposed LAR requires changes in the TS, and therefore an LAR is required to be submitted for NRC approval.

Section 182a. of the Atomic Energy Act of 1954, as amended (AEA), requires applicants for nuclear power plant operating licenses to include TS as part of the application and requires the TS to be included in the license. The NRC's requirements related to the content of the TS are contained in 10 CFR 50.36, which requires that the TS include items in the following specific categories: (1) safety limits, limiting safety systems settings, and limiting control settings; (2) LCOs; (3) surveillance requirements (SR); (4) design features; and (5) administrative controls. The rule does not specify the specific requirements to be included in a plant's TS. The regulation also states, in part, that "[a] summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications."

The regulation at 10 CFR 50.36(b) requires:

> Each license authorizing operation of a … utilization facility … will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 ["Contents of applications; technical information"]. The Commission may include such additional technical specifications as the Commission finds appropriate.

As stated in 10 CFR 50.36(c)(2)(i), the "Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications."

The staff also considered the following general design criterion (GDC) from Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities": GDC 34, "Residual Heat Removal," which requires the plant design to include a system to remove residual heat. The system safety function shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded.

4.0 TECHNICAL EVALUATION

In the LAR, the licensee proposed exceptions to certain TS while operating in Modes 4, 5, and 6 prior to initial criticality. The applicant notes that the current COL condition 2.D.(9) makes all the TS requirements effective upon a Commission finding that the acceptance criteria in this license (ITAAC) are met in accordance with 10 CFR 52.103(g). However, the current TS requirements were developed considering availability of the lowest functional capability of key systems and are based on the most conservative (or worst case) assumptions with maximum fission product inventory, maximum decay heat, and maximum approved operating power. Prior to the initial

criticality—when there is no decay heat or core power and no inventory of fission products in the core—safe operation of the facility can be assured with reduced functional capability and performance levels of various systems, thereby allowing the relaxation of some TS requirements.

The purpose of the proposed temporary exceptions to the effectiveness of certain TS is to allow flexibility to address unplanned contingencies during the startup test phase. Furthermore, the applicant notes that implementing the full scope of current TS LCOs would impose unnecessary hardships to efficiently conducting any repairs and efficiently completing startup testing. The applicant expects that the proposed updates would avoid or minimize the need for emergency or exigent LAR requests.

The proposed exceptions do not exclude requirements related to core reactivity (i.e., TS 3.1.1 that requires maintaining the reactor core covered with borated water to keep the adequate shutdown margin), isolation of boron dilution sources (TS 3.4.8 and TS 3.9.2), protection of reactor vessel integrity, protections for maintaining the containment vessel from exceeding its design pressure, or the requirements for unirradiated fuel assembly storage.

SNC is not proposing to change the TS, listed in Section 2.0 above, that are proposed to be excluded prior to initial criticality for VEGP Unit 4. Instead, SNC proposed a change to the VEGP Unit 4 TS LCO 3.0.7 to delineate the applicability of the temporarily excepted TS listed in the proposed VEGP Unit 4 COL condition 2.D.(9)

The effect of the proposed changes is to delay the requirement to meet the LCOs listed in COL condition 2.D.(9) for the operating modes specified in Condition 2.D.(9) until initial criticality is achieved. The licensee did not request, and this license amendment does not authorize, any changes to the approved design of VEGP Unit 4.

4.1 Evaluation of Changes

The staff evaluated the proposed changes to determine if:

1. The licensee's proposed changes are compliant with all applicable regulatory requirements
2. Operating the plant in accordance with the proposed changes provides reasonable assurance of adequate protection of public health and safety
3. The core remains covered with borated water and maintains adequate shutdown margin (SDM) in accordance with TS 3.1.1, "SDM."

The NRC staff conducted a detailed review of the proposed TS exceptions and supporting technical justifications presented in the LAR. The exceptions are proposed for plant operation prior to initial criticality during Modes 4 through 6 and are grouped into the following three categories:

- Exceptions when operating in Mode 5 and Mode 6.
- Exceptions when operating in Mode 4 (Safe Shutdown) with any cold leg temperature ≤ 275 °F.
- Exceptions when operating in Mode 4 (Safe Shutdown) with all four cold leg temperatures > 275 °F.

The NRC staff performed an audit of several supporting calculations that were made available by the SNC as described in “Summary Report of Regulatory Audit,” (ML23166A033). These calculations provided analyses of various accident scenarios in plant operations Modes 4 through 6. The calculations described methodologies, initial and boundary conditions, and important conservative assumptions and overall technical bases for the determinations made in LAR-23-005. One of the calculations involved estimation of maximum inventory that could be lost by depressurization and flashing if there is a breach in the reactor coolant pressure boundary in Mode 4. This simple thermodynamic analysis conservatively assumed all the stored energy in RCS fluid and structures as well as stored fluid energy from the SG secondary side is available for flashing. In addition, conservatively bounding Mode 4 initial conditions were used in this estimate. In the absence of core decay heat prior to initial criticality, the results of this calculation showed that the remaining liquid volume in the RCS would be higher than the volume of borated water in the reactor vessel needed to keep the core covered. The analysis also noted that the liquid volumetric capacity of even one CMT is higher than the reactor vessel volume below the elevation of hot leg nozzle. The results of this calculation confirmed the technical basis used by the applicant for the evaluation of TS exceptions proposed in LAR-23-005 during Modes 4 through 6 prior to initial criticality.

4.1.1 Mode 5 and Mode 6 Exceptions

The staff reviewed the proposed TS exceptions, listed in Section 2.0 of the SE. The proposed TS exceptions may be sorted into two categories: main TS exceptions and supporting TS exceptions. The functions of the main system and component TS proposed for exception during Modes 5 and 6, prior to initial criticality, are:

- TS 3.5.7 and TS 3.5.8: makeup from IRWST injection or containment recirculation not needed to keep the core covered,
- TS 3.4.12 and TS 3.4.13: ADS operability not required as there is no need of passive IRWST injection,
- TS 3.6.7 and TS 3.7.13: IRWST support functions not required as there is no need of IRWST injection or recirculation, and
- TS 3.5.5: decay heat removal function of PRHR HX not required due to lack of core decay power.

The staff also reviewed the supporting TS Section 3.3, Instrumentation and Control (I&C) Functions, that support the main system and component functions, listed above.

The applicant evaluated several scenarios during Modes 5 and 6 to show the acceptability of the above TS exceptions. Average reactor coolant temperature in Modes 5 and 6 is lower than the coolant boiling point (≤ 200 °F). The NRC staff review agrees that in Mode 5 with RCS vented and Mode 6 the evaporative losses in the RCS would not be sufficient to uncover the core due to subcooled conditions and lack of core decay heat.

In Mode 5 with RCS not vented, there is a potential for heat addition to the RCS from reactor coolant pumps (RCPs) and/or pressurizer heaters. The LAR evaluation was reviewed by the NRC staff and showed that the availability of the Pressurizer Water Level – Low 2 actuation

signal (TS 3.3.8), the CMT requirements of TS 3.5.3, and the availability of Normal Heat Removal System (RNS) suction relief valves (TS 3.4.14) are adequate to maintain the reactor core covered with borated water and to provide continued compliance with the required SDM in TS 3.1.1. The staff evaluated the request and reviewed the calculations supporting the request. The staff evaluated the proposed change against the relevant accident scenarios and found that the Pressurizer Water Level – Low 2 actuation signal, TS 3.5.3, and TS 3.4.14 are applicable in this mode prior to initial criticality. The NRC staff review confirmed that the Pressurizer Water Level – Low 2 actuation signal, TS 3.5.3, and TS 3.4.14 are not included in the TS exclusions proposed in LAR-23-005.

The applicant also noted in the LAR that it does not propose to exclude the requirement of TS 3.4.8, “Minimum RCS Flow,” in Mode 5 to isolate all unborated water sources from the RCS to prevent inadvertent boron dilution unless a reactor coolant pump is in operation (with core flow ≥ 3000 gpm). Similarly, the applicant does not propose to exclude the requirement of TS 3.9.2, “Unborated Water Source Flow Paths,” in Mode 6 that requires all unborated water source flow paths to be secured in the closed position. Furthermore, the source range nuclear instrumentation to detect any increase in the neutron flux due to potential boron dilution will be available (as required by TS 3.3.2 and 3.9.3). This provides assurance that there are adequate indications and controls available to prevent boron dilution in Mode 5 and Mode 6.

Based on the evaluation above, the functions of the main system and component TS requested for exception are not necessary in Mode 5 and Mode 6 prior to initial criticality and the proposed changes are therefore acceptable.

The staff reviewed the supporting I&C TS exceptions and for the reasons discussed above for the main system and component TS exceptions, the TS Section 3.3 supporting functions are also not needed. Therefore, the staff concluded that the supporting I&C TS exceptions prior to initial criticality are acceptable.

4.1.2 Mode 4 Exceptions

In Mode 4 of plant operation, different TS LCOs are applicable depending on the RCS cold leg temperatures. The LAR proposed different TS exclusions depending on whether any one cold leg temperature ≤ 275 °F (when the Normal Residual Heat Removal System (RNS) is aligned and open to the RCS) or all four cold leg temperatures are > 275°F (when the RNS is isolated).

The staff reviewed the proposed TS exceptions, listed in Section 2.0 of the SE. The proposed TS exceptions may be sorted into two categories: main TS exceptions and supporting TS exceptions. The functions of the main system and component TS proposed for exception during Mode 4, prior to initial criticality, are:

- TS 3.4.11: ADS not needed to depressurize system when any cold leg temperature is ≤ 275 °F as there is no need of IRWST passive injection. ADS is also not needed when all four cold leg temperatures are > 275 °F as the events that need IRWST makeup capability in Mode 4 are depressurization events,
- TS 3.5.1: Accumulator inventory not needed to keep the core covered as the inventory from CMT and In-containment Refueling Water Storage Tank (IRWST) injection (only

needed when all four cold leg temperatures are > 275 °F) are adequate to keep the core covered,
- TS 3.5.6: IRWST injection and containment recirculation are not needed when any cold leg temperature is ≤ 275 °F. However, when temperatures in all four cold legs is > 275 °F, only containment recirculation flow paths are excluded,
- TS 3.6.6: PCS is not required to mitigate consequences of steam line break (SLB) or loss-of-coolant accident (LOCA) due to absence of core decay heat and availability of adequate SDM with TS 3.1.1, and
- TS 3.7.10: PORV and PORV block valves isolation function to minimize radiological releases following a SG tube rupture is not required as there are no fission products in core prior to initial criticality.

The staff also reviewed the supporting TS Section 3.3, I&C functions that support the main system and component functions listed above.

The NRC staff reviewed technical justifications in the LAR and audited the supporting calculations to evaluate the acceptability of the proposed TS exclusions and to confirm the minimum TS operability requirements needed to keep the core covered with borated water under different accident scenarios in Mode 4.

The supporting calculations included a simplified thermodynamic analysis and evaluations of various accident scenarios including LOCA, SLB, and loss of RNS cooling in Mode 4. The simplified thermodynamic calculation, as discussed earlier, was based on conservatively bounding initial conditions for Mode 4 and showed that the coolant volume remaining after the calculation of maximum amount of coolant loss by flashing is still greater than the reactor vessel volume below hot leg elevation. This analysis provided confidence that the inventory of single CMT, if available, is adequate to keep the core covered.

The analyses of LOCA events during Mode 4 with cold leg temperatures > 275 °F assumed the availability of the following systems and signals:

- Two CMTs available as required by TS 3.5.2,
- CMT actuation signals based on Low-2 pressurizer level and manual actuation as required by TS 3.3.4, 3.3.5, and 3.3.9,
- PRHR available as per TS 3.5.4 (actuation based on CMT actuation),
- IRWST injection available as required by TS 3.5.6 with two injection flow paths, and
- ADS actuation signal as the IRWST actuation depends on ADS actuation signals as per TS 3.3.9 and TS 3.3.19.

For the large break LOCAs with unirradiated fuel, the analyses found that two CMTs and IRWST injection provided adequate long-term supply of borated inventory and adequate core coverage without the need of ADS for depressurization, accumulator inventory, PCS cooling or sump recirculation. For the small break LOCAs, the lack of core decay heat combined with the cooling provided by CMT recirculation and PRHR heat removal provided sufficient depressurization so that the IRWST can inject and keep the core covered without the need for ADS depressurization, accumulators, PCS cooling or sump recirculation.

The SLB event in Mode 4 with cold leg temperatures > 275 °F was considered to evaluate the margin to containment design pressure and existing environment qualification envelope. The

generation of a High-2 containment pressure signal (TS 3.3.8, Function 2) would result in closure of the main steam isolation valve (MSIV) (TS 3.7.2), main feedwater (MFW) isolation (TS 3.7.3), and actuation of PRHR HX (TS 3.5.4 and 3.5.5). The only SLB mitigation function proposed for exclusion in the LAR that is credited in the Updated Final Safety Analysis Report (UFSAR) bounding charging line break (CLB) analysis is PCS (TS 3.6.6). However, with no decay heat in the core and the availability of PRHR HX, the RCS temperature is expected to decrease rapidly. Consequently, this event would remain bounded by the UFSAR CLB analysis which is based on more conservative Modes 1 and 2 conditions.

A LOCA is not postulated for Mode 4 when cold leg temperature is ≤ 275 °F due to low RCS pressure and temperature. For this mode, a loss of RNS cooling event has been analyzed with the only source of heat in the RCS coming from the running of RCPs and pressurizer heaters. The RCS depressurization for this event occurs due to loss of inventory through the two RNS suction relief valves that are required by TS 3.4.14, “Low Temperature Overpressure Protection (LTOP).” Eventually the loss of inventory actuates CMT recirculation based on the low pressurizer level signal which also trips the pressurizer heaters and RCPs. With no LOCA postulated for Mode 4 with RNS cooling, one CMT was considered to be adequate to provide the core coverage. In summary, the following systems and signals were credited in Mode 4 when any cold leg temperature ≤ 275 °F:

- One CMT available as required by TS 3.5.3
- RNS suction relief valves as required by TS 3.4.14
- CMT actuation signals based on Low pressurizer level by TS 3.3.8
- PRHR available as per TS 3.5.4 (actuation based on CMT actuation)

Based on the evaluation above, the functions of the main system and component TS requested for exception are not necessary in Mode 4 prior to initial criticality and the proposed changes are therefore acceptable.

The staff reviewed the supporting I&C TS exceptions and for the reasons discussed above for the main system and component TS function exceptions, the TS Section 3.3 supporting functions are also not needed. Therefore, the staff concluded that the supporting I&C TS exceptions prior to initial criticality are acceptable.

4.1.3 Technical Specifications

As stated in 10 CFR 50.36(b), “The technical specifications will be derived from the analyses and evaluation included in the safety analysis report.” According to 10 CFR 50.36(c)(2), an LCO is “the lowest functional capability or performance levels of equipment required for safe operation of the facility.” As described above, the staff reviewed the licensee’s UFSAR and the licensee’s evaluations and supporting calculations in the audit to determine if the safety analyses supported the licensee’s assertion that the listed TS do not need to be operable in Mode 4, Mode 5, and Mode 6, prior to initial criticality of the new fuel in the core. In Modes 4, 5, and 6, prior to initial criticality, since there is no fission products inventory, no decay heat is generated in the core. The licensee’s evaluations and UFSAR showed that it is reasonable that the LCOs listed in the proposed COL condition 2.D.(9) do not need to be met prior to initial criticality of the reactor core.

In Section 3, “Technical Evaluation,” of the Enclosure to the LAR, the licensee states:

> The term “initial criticality” is a commonly used term in the nuclear industry to refer to the time at which the reactor is first made critical. A reactor achieves criticality (and is said to be critical) when each fission event releases a sufficient number of neutrons to sustain an ongoing series of reactions. Initial criticality is an important milestone in the construction and commissioning of a nuclear power plant. Initial criticality is referred to repeatedly throughout the licensing basis documents, including the Combined License and Updated Final Safety Analysis Report (UFSAR), and its meaning is unambiguous, as there is a single defined point at which the reactor reaches criticality.

The staff reviewed VEGP Unit 4 UFSAR Section 14.2.7, “Initial Fuel Loading and Initial Criticality,” where the staff noted the UFSAR states that “initial criticality” follows “initial core load.” The staff agrees that the term “initial criticality” defines a specific time when the reactor is first made critical. Once initial criticality is achieved, the temporary exceptions will no longer be applicable and the TS listed in TS condition 2.D.(9) will be permanently effective and be required to be met anytime the plant is operating in the LCO’s specified mode of applicability. Therefore, the staff concludes that LCO 3.0.7 reasonably defines the time period where the listed LCOs are not required to be met and the point in time at which they become permanently effective and must be met whenever the plant is operated in the LCO’s mode of applicability.

Therefore, the TS continues to meet 10 CFR 50.36 because it continues to define “the lowest functional capability or performance levels of equipment required for safe operation of the facility.”

4.2 Summary

In LAR 23-005, SNC proposed to make changes that would affect the VEGP Unit 4, COL condition 2.D.(9) and Appendix A, TS 3.0.7, by temporarily delaying the effectiveness of certain TS requirements prior to initial criticality of the new fuel in the core. The NRC staff concluded that the proposed TS changes satisfy the requirements of 10 CFR 50.36(c)(2)(i) because the LCO defines the lowest functional capability or performance levels of equipment required for safe operation of the facility and with these proposed changes they will continue to meet the requirements. The staff also concluded that compliance with GDC 34 will not be affected because no decay heat will be generated prior to initial criticality. In addition, facility operations in accordance with the LCO can be conducted without endangering the health and safety of the public. Therefore, the staff concludes that the licensee’s proposed changes are acceptable because:

1. The proposed changes are consistent with applicable regulatory requirements (i.e., 10 CFR 50.36 and GDC 34 requirements continue to be met).
2. The proposed changes are consistent with the UFSAR analyses for Vogtle 4.
3. Operating the plant in accordance with the proposed TS changes provides reasonable assurance of adequate protection of public health and safety.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b) the Georgia State official was notified of the proposed issuance of the amendment. In accordance with the Commission’s regulations in 10 CFR 50.91(b), on June 30, 2023, the Commission consulted the State official. The State of Georgia had no comment.

6.0 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, and that 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 (88 FR 32250; May 19, 2023), and there has been no public comment on such finding. 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.

7.0 CONCLUSION

The staff has concluded, based on the considerations discussed in Section 4.0 that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by the proposed changes, (2) the changes are 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.

8.0 REFERENCES

1. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Unit 4, “Timing of Unit 4 Technical Specifications Effectiveness Prior to Initial Criticality (LAR-23-005),” April 17, 2023 (ML23107A278).

2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Unit 4, “Response to Request for Additional Information Regarding License Amendment Request: Timing of Unit 4 Technical Specifications Effectiveness Prior to Initial Criticality (LAR-23-005S1)” June 9, 2023, (ML23160A194).

3. Combined License NPF-92 for Vogtle Electric Generating Plant, Unit 4, Appendix A, “Vogtle Electric Generating Plant Units 3 and 4 Technical Specifications,” Southern Nuclear Operating Company, February 10, 2012 (ML14100A135).

4. Vogtle Electric Generating Plant Units 3 and 4, Updated Final Safety Analysis Report, Revision 11, June 15, 2022 (ML22179A145).