



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

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS  
RELATED TO AMENDMENT NOS. 128 AND 127  
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 December 15, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17349A924), as supplemented by letter dated April 6, 2018 (ADAMS Accession No. ML18096A718), Southern Nuclear Operating Company (SNC) submitted license amendment request (LAR) 17-040 requesting U.S. Nuclear Regulatory Commission (NRC) approval for amendments to Combined License (COL) Nos. NPF-91 and NPF-92 for the Vogtle Electric Generating Plant (VEGP), Units 3 and 4, respectively, regarding consistency changes to Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).

The requested amendment (LAR 17-040) would revise the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (PS-DCD) Tier 2\* and Tier 2 information and involves related changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information. Specifically, the proposed amendment involves consistency changes to ITAAC to clarify the thickness of the Nuclear Island (NI) Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building, and to clarify floor thicknesses in the Annex Building.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 52.63(b)(1), 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." This exemption

request will allow a departure from the corresponding portions of the certified information in Tier 1 of the generic DCD.<sup>1</sup> In order to modify the UFSAR (the PS-DCD) Tier 1 information, the NRC must find 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.

The supplement dated April 6, 2018, 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 March 6, 2018 (83 FR 9555).

## 2.0 REGULATORY EVALUATION

The proposed changes in LAR 17-040 to the ITAACs to clarify and revise structural wall and floor thicknesses are required to comply with applicable and designated portions of American Concrete Institute (ACI) Standard ACI 349-01, "Code Requirements for Nuclear Safety Related Structures," American Institute of Steel Construction (AISC) Standard AISC N690-1994, "Specification for the Design, Fabrication and Erection of Steel Safety Related Structures for Nuclear Facilities"; and supplementary requirements as described in Section 3.8.4.5, "Structural Criteria," of the UFSAR Tier 1 Information is defined in 10 CFR Part 52, Appendix D, Section II.D.

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

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

10 CFR Part 52, 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, or requires a license amendment under paragraphs B.5.b or B.5.c of the section.

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 10 CFR 50.12, 52.7, and 52.63(b)(1).

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<sup>1</sup> While SNC 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 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 Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 1, "Quality standards and records," provides, in part, that structures, systems, and components (SSCs) important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of safety functions to be performed.

GDC 2, "Design bases for protection against natural phenomena," provides, in part, that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.

GDC 4, "Environmental and dynamic effects design basis," provides, in part, that SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-cooling accidents.

10 CFR Part 50, Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," requires that nuclear power plants shall be designed so that, if safe-shutdown earthquake (SSE) ground motion occurs, certain SSCs will remain functional and within applicable stress, strain, and deformation limits. The required safety functions of SSCs must be assured during and after the vibratory ground motion associated with the SSE ground motion through design, testing, or qualification methods.

10 CFR Part 20, Subpart C, Section 20.1201(a), Occupational dose limits for adults, requires the licensee control occupational dose to individual adults, except for planned special exposures under 20.1206, to the more limiting of the annual limits prescribed therein.

### 3.0 TECHNICAL EVALUATION

#### 3.1 TECHNICAL EVALUATION OF PROPOSED CHANGES

##### 3.1.1 PROPOSED CHANGES

The LAR consists of changes related to consistency and clarification changes to the NI Basemat thickness, Auxiliary Building walls, and the Annex Building floor thickness.

##### NI Basemat

ITAAC in COL Appendix C Section 3.3 require verification that the NI Basemat minimum concrete thickness below the Shield Building from elevation 60'-6" to the containment vessel is 6'-0". The containment vessel is partially embedded in the NI Basemat. The containment internal structures (CIS) basemat is the reinforced concrete structure filling the bottom head of

the containment vessel. The UFSAR Subsection 3.8.3.1.2 states that the CIS basemat extends from the bottom of the containment vessel head at elevation 66'-6" up to the bottom of the structural modules. The UFSAR Figure 3.8.5-3, shows the thickness of the containment vessel bottom head (CVBH) as 1-5/8". The NI Basemat and the CIS basemat are illustrated on Sheets 8 and 9 of UFSAR Figure 3.7.2-12.

It is not apparent from the descriptions of the NI Basemat and UFSAR Figure 3.7.2-12 that the thickness of the NI Basemat below the center of the CVBH includes the thickness of the CVBH. The elevation 66'-6" is the elevation at the inside surface of the containment vessel at the intersection of column lines N and 7 (containment vessel center axis), therefore, the as-designed concrete thickness in that location would be 5'-10 3/8", which does not meet the 6'-0" ITAAC requirement in COL Appendix C Table 3.3-1.

SNC clarified in the LAR that the 6-foot-thick basemat includes the thickness of the CVBH and proposed changes to (1) revise Tier 2\* information in UFSAR Figure 3.7.2-12 to show the 66'-6" elevation of the NI Basemat that is at the inside surface of the containment vessel and includes the 1-5/8" thickness of the CVBH and (2) revise COL Appendix C (and associated plant-specific Tier 1) Table 3.3-1 to note the six-foot thick NI Basemat thickness includes the thickness of the CVBH.

#### Auxiliary Building

The primary function of the Auxiliary Building is to provide protection and separation for the seismic Category I mechanical and electrical equipment located outside the containment building. The Auxiliary Building also provides shielding for the radioactive equipment and piping that is housed within the building. SNC identified in the LAR that thicknesses of two walls in the radiologically controlled area of the Auxiliary Building between the Spent Resin Tank Room and the Waste Disposal Container Area do not conform to the thicknesses in COL Appendix C Table 3.3-1.

SNC proposed changes to the Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 10) to show the dimensions of the N-S Shield Wall between the Spent Resin Tank Room and the Waste Disposal Container Area in greater detail. In UFSAR Figure 3.7.2-12 (Sheet 10), the difference between the wall thickness above and below elevation 109'-3" is visually observed but the wall thickness dimensions are not shown.

SNC's proposed change to Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 10) is to add dimensions to the N-S Shield wall. The N-S Shield Wall below the cover for the Waste Disposal Container Area is shown with a thickness of 3'-0". The N-S Shield Wall above the cover for the Waste Disposal Container Area is shown with a thickness of 2'-9".

This change to Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 10) also involves a change to COL Appendix C Table 3.3-1 to reflect the more detailed dimension information. The N-S Shield Wall 2'-9" east of column line L-2 extending 12'-9" from column line 1 north (east wall of the Spent Resin Tank Room/west wall of the Waste Disposal Container Area as depicted on UFSAR Figure 1.2-7 and COL Appendix C Figure 3.3-6) is required to have a thickness of 2'-9" from elevation 100'-0" to elevation 125'-0" per COL Appendix C Table 3.3-1.

In addition, a change is proposed for the E-W Shield Wall intersecting the previously discussed N-S Shield Wall to reconcile the column line description for this wall with the dimensions of the N-S Shield Wall.

#### Annex Building: Floors

The wall and floor thicknesses of the NI Buildings, Turbine Building, and Annex Building are defined in COL Appendix C Table 3.3-1. The structural design and analysis of the floors in the Annex Building differs from that of the floors in the Auxiliary Building with respect to the consideration of the metal decking in concrete floor design. For analyses of the Auxiliary Building floors, SNC considered metal decking only as a hold in-place deck for wet concrete but its strength is not credited in the floor design. However, the Annex building floor design credits the metal decking for strength. The Annex Building, in UFSAR Figure 3.7.2-19, reflects the thickness of the reinforced concrete floor from the bottom of the metal decking to the top of the concrete. The Auxiliary Building, in UFSAR Figure 3.7.2-12, reflects the thickness of the reinforced concrete floor from the top of the metal decking to the top of the concrete. This difference in the design of the two buildings is reflected in the way the Annex Building key dimension figures in UFSAR Figure 3.7.2-19 differ from the Auxiliary Building key dimension figures in UFSAR Figure 3.7.2-12. This nuance is not evident in the UFSAR or the respective ITAAC table and is a source of confusion in the interpretation of the concrete thickness ITAAC for the Annex Building floors.

In this LAR, SNC proposed to add a note in COL Appendix C Table 3.3-1 for the concrete thicknesses of the Annex Building floors to clarify that the concrete thickness for each floor reflects the thickness of the floor including the depth of the metal decking, where applicable. The proposed change for the Annex Building revises COL Appendix C information in Table 3.3-1 to describe that the concrete thickness for several of the Annex Building floors in the table includes the metal decking, where applicable.

#### Annex Building: Control Support Area (CSA) Floor

The ITAAC described in COL Appendix C Table 3.3-6 requires inspection of the as-built concrete thicknesses of the Annex Building at elevation 117'-6" between column lines 9 to 13 and E to I.1 to confirm the thickness of the concrete is 0'-8" as defined in COL Appendix C Table 3.3-1. The concrete slab in these kitchen and restroom areas is poured to 6 inches, which leaves 2 inches to allow the floor to be finished with mortar and tile. Due to the 2-inch depression allowance for mortar and tile, the ITAAC concrete thickness would not be met in the kitchen and restroom areas of the CSA.

The proposed change for the Annex Building revises Tier 2 information in UFSAR Figure 3.7.2-19 to show that the concrete for the floor in the kitchen and restroom areas on the 117'-6" elevation of the Annex Building is thinner than the indicated 8-inch slab for the surrounding areas. This change to Tier 2 information involves a change to COL Appendix C Table 3.3-1 to reflect the floor thickness in the kitchen and restroom areas.

#### 3.1.2 EVALUATION OF THE PROPOSED CHANGES

The staff reviewed SNC's proposed changes to evaluate the impact of the proposed UFSAR changes to the design of the NI Basemat, Auxiliary Building walls, and the Annex Building floors

on the overall safety of the plant and conformance with GDC 1 and 2. To perform the technical review of the proposed changes, the 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" and its supplements.

During the review, the staff applied the acceptance criteria in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.8.4 "Other Seismic Category I Structures," and Section 3.8.5, "Foundations," as well as applicable portions of ACI 349-01, "Code Requirements for Nuclear Safety Related Concrete Structures." The staff's technical evaluation of the LAR focused on verifying whether the proposed changes are consistent with the applicable portions of the concrete structures design code ACI 349-01 and are carried out using the analysis and design methods prescribed in the UFSAR. For determining the adequacy of the proposed UFSAR changes, the staff focused its review on the potential effects of the change on the design loads, the design and analysis procedures, load combinations, and the required steel reinforcement in the NI Basemat, Auxiliary Building walls, and the Annex Building floors.

### Evaluation of NI Basemat

The staff reviewed the proposed changes (1) to revise Tier 2\* information in UFSAR Figure 3.7.2-12 to show that the 66'-6" elevation of the NI Basemat is at the inside surface of the containment vessel and (2) to add a note to COL Appendix C Table 3.3-1 to show that the six-foot thick NI Basemat thickness includes the thickness of the containment vessel.

In reviewing the basis of the proposed changes, the staff requested SNC (1) to provide additional information regarding the basis for calculating the affected area of the CVBH where concrete thickness is less than 6'-0", (2) to clarify the basemat concrete thickness (5'-10 3/8" or 6'-0") used in the structural and seismic analyses models for the CIS, the NI Basemat, or the Auxiliary and Shield Building, (3) to quantify the effect of additional 1-5/8" thick concrete on the mass and stiffness properties in the seismic analysis model, (4) to provide the maximum stress in the basemat at the affected location and the corresponding governing design loads and load combinations, and (5) to provide the ratios of the provided reinforcement to the required reinforcement.

SNC provided the requested information in Enclosures 6 and 7 of the Supplement 1 to the LAR. In reviewing the supplemental information, the staff finds that SNC's calculation of the area of the concrete that is less than 6'-0" is based on the theoretical shape of the ellipsoidal bottom head. By using the formula for an ellipse, the area of the CVBH where the bottom head makes up part of the 6'-0" thick basemat is determined to be an area of approximately 5'-6" radius (11 feet in diameter). The staff finds the approach to calculate the affected area where concrete is less than 6'-0" is reasonable.

SNC stated that the minimum thickness of 6'-0" for the basemat is used in the structural and seismic analysis models of CIS and that the use of a minimum concrete thickness of 6'-0" in the model is consistent with the supporting licensing basis design calculations. SNC further stated that the use of a minimum 6'-0" concrete thickness in the CIS model is consistent with the current modelling method, in which shell elements are used to represent the CVBH and share nodes with the solid elements representing concrete. The staff finds that the design basis basemat thickness of 6'-0" used in the seismic model is unchanged.

In response to the staff's request for clarification questions regarding the effect of additional 1-5/8" thick concrete on the mass and stiffness properties used in the seismic analysis model, SNC stated that the region where the containment vessel forms part of the 6'-0" thickness of the basemat is approximately 5'-6" in radius. The cross-sectional area of this region is approximately 95 ft<sup>2</sup>. The cross-sectional area of the containment vessel, with its radius of approximately 65'-0", is approximately 13,273 ft<sup>2</sup>. For comparison, the region of interest, the embedded CVBH, is 0.7 percent of the total cross-sectional area of the NI Basemat that is below the containment vessel. Based on the above information, the staff concludes that the cross-sectional area of the region where the containment vessel forms part of the 6'-0" thickness is not significant in comparison to the total area of the basemat below the containment vessel and is negligible in comparison to the area of the entire basemat. On this basis, the staff concludes that since the total affected area is not significant in comparison to the total area of the basemat, any effect of additional 1-5/8" thick concrete on the mass and stiffness properties in the seismic analysis model is design insignificant and that there is no change in the design basis structural or seismic analyses models for the CIS, the NI Basemat or the Auxiliary and Shield Buildings.

The staff also requested SNC to provide the maximum stress in the basemat at the affected location and the corresponding governing design loads and load combination. Based on its review of the SNC's supplemental information, the staff finds that for the licensing basis loads and load combinations identified in UFSAR Table 3.8.4-2, more than required reinforcement is provided for the basemat around the affected area of the CVBH. The ratio of the provided steel reinforcement in the basemat to the required reinforcement varies from 1.43 to 2.56 for the governing load combination 3 (that includes SSE load) and load combination 10 (that includes 1.5 times containment design pressure load), respectively. These high reinforcement ratios indicate that significantly more reinforcement is provided and therefore there is sufficient safety margin in the licensing basis design of the basemat around the affected area of the CVBH. Because of the design margin in the design basis basemat reinforcement and because there is no change in the design basis structural or seismic analyses models, the staff concludes that there is no change in the design basis stresses in the basemat.

Based on its above evaluation of the information provided in Supplement 1 to the LAR, the staff finds that:

1. The proposed change does not require a modification to the structural or seismic analyses for the CIS, the NI Basemat, or the Auxiliary and Shield Building models;
2. SNC is not departing from the VEGP design bases methods of structural design and analysis; and
3. SNC basis design of the basemat and containment vessel is unchanged;

Therefore, the staff concludes that (1) SNC's proposed changes to revise Tier 2\* information in UFSAR Figure 3.7.2-12 to show the 66'-6" elevation of the NI Basemat is at the inside surface of the containment vessel and (2) the change to Tier 2\* information involves a change to COL Appendix C (and associated plant-specific Tier 1) Table 3.3-1 to note the six-foot thick NI Basemat thickness includes the thickness of the containment vessel, are not design changes to the basemat design, and are instead consistency changes to clarify the licensing basis.

### Evaluation of Auxiliary Building

The staff requested SNC to provide additional information for walls in the radiologically controlled area of the Auxiliary Building between the Spent Resin Tank Room and the Waste Disposal Container Area, the design basis of the 2'-9" thick section of the wall above 109'-3" and the 3'-0" thick section below 109'-3". The staff requested the governing loads and load combinations for the design of the wall and asked whether the wall connections are changed due to the variation in thickness of the Auxiliary Building wall at this elevation. SNC provided the requested information in Enclosures 6 and 7 of Supplement 1 to the LAR. SNC clarified that the design of the Auxiliary Building is described in UFSAR Subsection 1.2.4.3 and that the design functions of the N-S Shield Wall 2'-9" east of column line L-2 are (1) to maintain structural integrity in the event of a SSE (protection for the safety-related equipment against the consequences of either a postulated internal or external event) and (2) to provide shielding for the spent resin tank and waste disposal containers. The Waste Disposal Container Area is adjacent to the Spent Resin Tank Room to the east of this wall. In order to provide adequate shielding for the Waste Disposal Container Area, the wall thickness transitions at elevation 109'-3", to form a 3-inch lip. Three hatches sit on the lip formed by the top of the wall at elevation 109'-3". These hatches cover the Waste Disposal Container Area. SNC further clarified that there is no change to the wall connections due to the variation in thickness of the Auxiliary Building wall at this elevation.

The staff reviewed the required and provided horizontal and vertical reinforcement in the Auxiliary Building wall below and above 109'-3" elevation and associated governing load combinations. Based on its review of the information provided in LAR Supplement 1 (Enclosure 7), the staff finds that the governing load combinations are consistent with the UFSAR Table 3.8.4-2 and that the horizontal and vertical provided reinforcement for the wall exceeds the required reinforcement.

On this basis, the staff concludes that the licensing basis design of the walls remain unchanged, and therefore, the proposed change to the Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 10) and to COL Appendix C Table 3.3-1 to reflect more detailed description and thickness information for the Auxiliary Building walls is a clarification of the licensing basis Auxiliary Building design. The proposed clarification change resolves the inconsistencies between the ITAAC descriptions and the Tier 2\* information in UFSAR Figure 3.7.2-12. This consistency change does not involve any change to the licensing basis design of the Auxiliary Building, and therefore is acceptable.

### Evaluation of Annex Building: Floors

The staff's review finds that the concrete thicknesses for the Annex Building floors, shown in UFSAR Figure 3.7.2-19 and COL Appendix C Table 3.3-1, reflect the thickness of the respective floor from the bottom of the supporting metal decking, where applicable, to the top of the concrete. The licensing basis structural analysis and design of the Annex Building credits the strength of the metal decking. SNC did not propose any change to the licensing basis structural analysis and design of the Annex Building.

On this basis, the staff concludes that the proposed note in COL Appendix C Table 3.3-1 for the concrete thicknesses of the Annex Building floors is a clarification of the licensing basis Annex

Building design and that the proposed clarification does not involve any change to the licensing basis design of the Annex Building as shown in the UFSAR, and therefore is acceptable.

#### Evaluation of Annex Building: CSA Floor

In order to evaluate the effect on the structural integrity of the 6" concrete slab in the kitchen and restroom areas on the 117'-6" elevation of the Annex Building, the staff requested SNC to provide additional information regarding the design basis load and load combinations considered for the design of the 6" concrete floor, including the area of the reinforcement required and the reinforcement provided in the floor. Based on its review of the additional information provided in Supplement 1 to the LAR, the staff finds that the subject floor area is described in UFSAR Subsections 3.7.2 and 3.7.2.8.1 as a seismic Category II concrete structure. The mass of the 6" thick floor area in the rest room and kitchen area is considered in the seismic lumped mass model for the seismic analysis. The calculation of seismic design forces in the floor slab are based on the seismic analysis of the lumped mass model. The dead load, live load, and SSE loads are consistent with the licensing basis loads, and the load combinations considered in the concrete floor design are equivalent to those listed in UFSAR Table 3.8.4-2. The staff finds that for the governing load combination that includes the SSE load, safety margin between the provided reinforcement to the required reinforcement steel is 1.37 and 1.54 for the top and the bottom reinforcement, respectively. On the basis, the staff concludes that the provided structural reinforcement is significantly more than required and is sufficient to accommodate any adverse effect on the floor capacity due to its reduced thickness. Therefore, the reduction in floor thickness in the kitchen and restroom areas on the 117'-6" elevation does not affect the structural integrity of the floors in this area of the Annex Building.

#### Evaluation of Licensing Basis Changes

Enclosure 5 of the LAR proposes licensing basis changes to Tier 2 and Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 9), Figure 3.7.2-12 (Sheet 10), Figure 3.7.2-19 (Sheet 7 and 8), and Figure 3.7.2-19 (Sheet 10). SNC also proposes licensing basis changes in Tier 1 (and COL Appendix C) Table 3.3-1 in Enclosure 4.

The staff reviewed the markups of the licensing basis changes and evaluated the basis of markups of the LAR and finds that proposed changes do not involve any change in the licensing design basis of the NI Basemat, Auxiliary Building, and the Annex Building including the analysis and design criteria, and the ACI Code 349-01 for the design of concrete structures. Based on the above, the staff finds the proposed changes to the licensing basis documents identified in Enclosures 4 and 5 to be acceptable.

#### Evaluation of Radiation Protection Aspects

The NRC staff reviewed the changes provided in LAR 17-040, including LAR 17-040, Supplement 1, which includes changes to Tier 1, Table 3.3-1, wall and floor parameters, and thicknesses. SNC specifies that the plant radiation zones and radiological controls are not affected by the proposed changes made in the LAR, and the NRC staff agrees with SNC's assessment.

Specifically, the LAR changes include adding a note to the NI Basemat thickness of 6'-0" indicating that the 6-foot concrete thickness includes the thickness of the containment vessel

bottom head in a local area at the center of containment. The staff reviewed this change and concludes that this change has no radiological effect because the NI Basemat plays no role in radiation shielding.

The LAR also proposes consistency changes to ITAAC to revise wall thicknesses and descriptions in the Auxiliary Building. The staff reviewed these changes and determined that none of the changes to the Auxiliary Building include any reduction in the radiation shielding or any increase in radiation dose to workers inside the Auxiliary Building or the public. Therefore, the staff concludes that the changes associated with the Auxiliary Building are acceptable.

Finally, the LAR indicates that the concrete thickness for some Annex Building floors provided in Tier 1, Table 3.3-1, include the thickness of metal decking and that the concrete thickness for the kitchen and restroom areas on the 117'-6" elevation are 2 inches thinner than the 8 inches specified to allow 2 inches for mortar and tile. The staff reviewed this change and determined that the reduction in floor thicknesses are all internal to the Annex Building, therefore, the staff concludes that the changes are not expected to have any effect on public radiation exposure.

Regarding specifying that the thicknesses to some floors in the Annex Building includes the thickness in corrugated metal decking, the staff determined that the reduction in concrete thicknesses is not expected to result in a significant increase in occupational radiation exposure because the reduction in radiation shielding is relatively small (a few inches) and the maximum dose rates from the radiation sources requiring shielding are relatively low (less than 15 mrem/hour). For example, the most significant radiation areas in the Annex Building effected by the shielding changes are the Containment Filtration Rooms A and B. Containment Filtration Rooms A and B, contain the containment filters and associated ventilation system equipment, and are zoned as radiation Zone 3 (less than 15 mrem/hour). The dose rates in areas below these rooms are Zone 1 (less than 0.25 mrem/hour) and Zone 2 (less than 2.5 mrem/hour). SNC specifies that these dose rates will not change as a result of the changes made in the LAR and that the corrugated metal decking is accounted for in the shielding analysis. SNC stated that the changes proposed in the LAR are relatively minor, the associated areas are all relatively low dose areas, the corrugated flooring was accounted for in the shielding analysis, and none of the radiation zones change as a result of the changes proposed in the LAR. The staff has reviewed this information and has reasonable assurance that there will not be a significant increase in occupational radiation exposure as a result of the changes made in the LAR.

Regarding the reduction of concrete thickness in the restroom and kitchen areas on the 117'-6" elevation of the Annex Building, the restroom and kitchen areas are all radiation Zone 1 and all of the areas underneath them are radiation Zone 1 and are not areas expected to contain radiation sources. Therefore, the staff determined that there should be essentially no change to the radiation dose in the restroom and kitchen areas during normal operation.

In addition, the staff concludes that none of the changes are expected to result in any significant changes to radiation dose during any design basis accidents or result in any changes to vital area mission dose.

As a result of the above, the NRC staff finds that the changes proposed in LAR 17-040, including Supplement 1, are acceptable in accordance with the requirements of 10 CFR Part 20 and provide reasonable assurance that there will not be a significant increase in occupational or public radiation exposure.

### 3.1.3 SUMMARY OF THE TECHNICAL EVALUATION

The staff reviewed SNC's proposed changes provided in LAR 17-040, including Supplement 1. Based on the staff's technical evaluation described in this safety evaluation, the staff found that:

1. SNC's proposed changes (1) to revise Tier 2\* information in UFSAR Figure 3.7.2-12 to show the 66'-6" elevation of the NI Basemat is at the inside surface of the containment vessel and (2) to note the 6'-0" thick NI Basemat thickness includes the thickness of the CVBH in COL Appendix C (and associated plant-specific Tier 1) Table 3.3-1, are not design changes to the basemat design and instead are consistency changes to clarify the licensing basis.
2. SNC's proposed change to the Tier 2\* information in UFSAR Figure 3.7.2-12 (Sheet 10) and to COL Appendix C Table 3.3-1 to reflect more detailed description and thickness information for the Auxiliary Building walls is a clarification of the licensing basis Auxiliary Building design, and the proposed clarification resolves the inconsistencies between the ITAAC descriptions and the Tier 2\* information in UFSAR Figure 3.7.2-12. This consistency change does not involve any change to the licensing basis design of the Auxiliary Building.
3. SNC's proposed note in COL Appendix C Table 3.3-1 for the concrete thicknesses of the Annex Building floors is a clarification of the licensing basis Annex Building design, and the proposed clarification does not involve any change to the licensing basis design of the Annex Building as shown in the UFSAR.
4. SNC's proposed change in COL Appendix C Table 3.3-1 for the Annex Building CSA floor to show that the concrete in the kitchen and the restroom areas on the 117'-6" elevation is thinner than the indicated 8" is acceptable since the provided structural reinforcement is sufficient to accommodate any adverse effect on the floor capacity due to its reduced thickness. The reduction in floor thickness in the kitchen and restroom areas does not affect the structural integrity of the floors in this area of the Annex Building.

For the reasons specified above, the staff finds that the proposed changes to identified UFSAR figures and COL Appendix C Table 3.3-1 acceptable. Furthermore, SNC's proposed changes do not change the licensing basis, and the supporting analysis provided in the LAR meets the relevant design code provisions and does not alter the relevant conclusions made for the AP1000 standard design.

Based on these findings, the NRC staff concludes that there is reasonable assurance that the requirements of GDC 1, GDC 2, and GDC 4 of 10 CFR Part 50, Appendix A, and 10 CFR Part 50, Appendix S, will continue to be met. Additionally, the staff finds that the changes proposed in LAR 17-040, including Supplement 1, are acceptable in accordance with the requirements of 10 CFR Part 20 and provide reasonable assurance that there will not be a significant increase in occupational or public radiation exposure. Therefore, the staff finds the changes proposed in this LAR acceptable.

### 3.2 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 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 is described above in the technical evaluation. The result of this exemption would be that SNC could implement modifications to Tier 1 information related to consistency changes to ITAAC to clarify the thickness of the NI Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building, and to clarify floor thicknesses in the Annex Building. 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 17-040. 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. SNC 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:

#### 3.2.1 AUTHORIZED BY LAW

The requested exemption would allow SNC to implement the amendment described above. 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 COL 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.

### 3.2.2 NO UNDUE RISK TO PUBLIC HEALTH AND SAFETY

As discussed above in the technical evaluation, the proposed changes comply with the NRC's substantive safety regulations. Therefore, there is no undue risk to the public health and safety.

### 3.2.3 CONSISTENT WITH COMMON DEFENSE AND SECURITY

The proposed exemption would allow changes as described above in the technical evaluation, thereby departing from the AP1000 certified (Tier 1) design information. The change does not alter or impede the design, function, or operation of any plant SSCs associated with the facility's physical or cyber security and, therefore, does 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.

### 3.2.4 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 construct and operate a plant based on the certified information found in the AP1000 DCD, which was incorporated by reference into VEGP Units 3 and 4 licensing basis. The proposed changes described in the above technical evaluation do not impact the ability of any SSCs to perform their functions or negatively impact safety.

Special circumstances are present in the particular circumstances discussed in LAR 17-040 because the application of the specified Tier 1 information is not necessary to achieve the underlying purpose of the rule. The proposed changes are equal or provide additional clarity to the existing requirements. 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 involved. 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. 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.

### 3.2.5 SPECIAL CIRCUMSTANCES OUTWEIGH REDUCED STANDARDIZATION

This exemption would allow the implementation of changes to Tier 1 Table 3.3-1 in the PS-DCD. The design functions of the system associated with this request will continue to be maintained because the associated revisions to Table 3.3-1 demonstrate that the applicable regulatory requirements will continue to be met. The proposed exemption would clarify the thickness of the NI Basemat, revise wall thicknesses and descriptions in the Auxiliary Building, and clarify floor thicknesses in the Annex Building, as presented in plant-specific Tier 1 information. Consequently, the safety impact that may result from any reduction in standardization are minimal, while the proposed changes to the thickness of the NI Basemat, wall thicknesses and descriptions in the Auxiliary Building, and floor thicknesses in the Annex Building maintain and update the necessary information in the table to confirm that the SSCs related to this activity are constructed in accordance with the design certification as verified by plant-specific Tier 1 Table 3.3-6 ITAAC, consistent with the purposes of the rule. Based on the foregoing reasons, as required by 10 CFR Part 52.63(b)(1), the staff finds that the special circumstances outweigh the effects the departure has on the standardization of the AP1000 design.

### 3.2.6 NO SIGNIFICANT REDUCTION IN SAFETY

This exemption would allow the implementation of changes discussed above. The exemption request proposes to depart from the certified design by allowing changes discussed above in the technical evaluation. Because there is no technical design change or plant function change associated with this exemption request, the proposed changes will not adversely affect the ability of any systems or equipment from performing their design function, and no new failure modes are introduced. 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.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), on June 1, 2018, the Georgia State official was consulted regarding 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*, 83 FR 9555, dated March 6, 2018). 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.

Because the exemption is necessary to allow the changes proposed in this LAR, and because the exemption does not authorize any activities other than those proposed in this LAR, 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), the staff finds that 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 proposed in this LAR (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) justifies that the special circumstances outweigh the potential decrease in safety due to reduced standardization; and (6) does not result in a significant decrease in the level of safety otherwise provided by the design. Therefore, the NRC staff grants the exemption from the Tier 1 information requested by SNC.

The staff has also concluded, based on the technical evaluation presented in Section 3.1.2 above regarding the consistency changes to ITAAC to clarify the thickness of the NI Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building, and to clarify floor thicknesses in the Annex Building that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by construction and 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 NRC staff finds the changes proposed in this LAR acceptable.

## 7.0 REFERENCES

1. Request for License Amendment and Exemption RE: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR 17-040) letter from Southern Nuclear Operating Company, dated December 15, 2017 (ADAMS Accession No. ML17349A924).
2. LAR 17-040 Clarification Questions for Public Meeting on March 8, 2018 (ADAMS Accession No. ML18059A173).
3. Supplement to Request for License Amendment and Exemption RE: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR 17-040S1) letter from Southern Nuclear Operating Company, dated April 6, 2018 (ADAMS Accession No. ML18096A718).
4. Vogtle Electric Generating Plant, Units 3 and 4 Updated Final Safety Analysis Report, Revision 6 and Tier 1, Revision 5, dated June 15, 2017 (ADAMS Accession No. ML17172A218).

5. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).
6. Summary of March 8, 2018, Public Meeting, Southern Nuclear Operating Company to Discuss Issues Associated with the Safety Review of Licensing Actions for SNC's Vogtle Electric Generating Plant Units 3 and 4, dated March 23, 2018 (ADAMS Accession No. ML18068A645).
7. NUREG-2124, Volume 1, "Final Safety Evaluation Report Related to the Combined Licenses for Vogtle Electric Generating Plant, Units 3 and 4," August 5, 2011 (ADAMS Accession No. ML12271A045).
8. American Concrete Institute (ACI) Standard ACI 349-01, "Code Requirements for Nuclear Safety Related Structures".
9. American Institute of Steel Construction (AISC) Standard AISC N690-1994, "Specification for the Design, Fabrication and Erection of Steel Safety Related Structures for Nuclear Facilities".
10. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.8.4 "Other Seismic Category I Structures," and Section 3.8.5, "Foundations".