

December 15, 2017

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52-026

ND-17-1811
10 CFR 50.90
10 CFR 52.63

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Request for License Amendment and Exemption:
Consistency and Clarification Changes to Annex Building, Auxiliary Building
and Basemat ITAAC (LAR-17-040)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requests an amendment to Combined License Numbers NPF-91 and NPF-92, for VEGP Units 3 and 4, respectively. The requested amendment includes changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2* and Tier 2 information and related changes to the VEGP Units 3 and 4 COL Appendix C (and corresponding plant-specific DCD Tier 1) information. 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 also requested for the plant-specific Tier 1 material departures.

The proposed changes involve consistency changes to Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) to clarify the thickness of the Nuclear Island Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building and clarify floor thicknesses in the Annex Building.

Enclosures 1 and 2 provide the description, technical evaluation, regulatory evaluation (including the Significant Hazards Consideration Determination), and environmental considerations for the proposed changes in the License Amendment Request (LAR).

Enclosure 3 provides the background and supporting basis for the requested exemption.

Enclosures 4 and 5 provide the proposed changes to the VEGP 3&4 licensing basis documents.

Enclosures 2 and 5 contain portions of the LAR and proposed markups classified as security-related, also referred to as sensitive unclassified non-safeguards information (SUNSI), protected and requested to be withheld under the provisions of 10 CFR 2.390(d).

Other than Enclosures 2 and 5, this letter, including enclosures, has been reviewed and confirmed to not contain security-related information. This letter contains no regulatory commitments.


SNC requests staff approval of this license amendment by November 30, 2018, to support closure of VEGP Units 3 and 4 ITAAC. Approval by this date will allow sufficient time to implement the licensing basis changes prior to the associated ITAAC activity. SNC expects to implement this proposed amendment (through incorporation into the licensing basis documents; e.g., the UFSAR) within 30 days of approval of the requested changes.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Ms. Paige Ridgway at (205) 992-7516.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th of December 2017.

Respectfully submitted,



Amy G. Aughtman
Licensing Director, Nuclear Development
Southern Nuclear Operating Company

- Enclosures: 1) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Request for License Amendment: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR-17-040)
- 2) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Request for License Amendment: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC **(Withheld Information)** (LAR-17-040)
- 3) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Exemption Request: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR-17-040)
- 4) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Proposed Changes to the Licensing Basis Documents (LAR-17-040)
- 5) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 - Proposed Changes to the Licensing Basis Documents **(Withheld Information)** (LAR-17-040)

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Enclosure 1

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Request for License Amendment:

**Consistency and Clarification Changes to Annex Building, Auxiliary Building and
Basemat ITAAC**

(LAR-17-040)

(Enclosure 1 consists of 21 pages, including this cover page.)

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Enclosure 1

Request for License Amendment: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR-17-040)

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Enclosure 1

Request for License Amendment: Consistency and Clarification Changes to Annex Building, Auxiliary Building and Basemat ITAAC (LAR-17-040)

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC, or the "Licensee") hereby requests an amendment to Combined License (COL) Nos. NPF-91 and NPF-92 for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively.

1. SUMMARY DESCRIPTION

This License Amendment Request (LAR) involves consistency and clarification changes for the Nuclear Island (NI) Basemat, Auxiliary Building, and Annex Building.

Basemat

The proposed change revises Tier 2* information in Updated Final Safety Analysis Report (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. 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. The NI basemat begins at elevation 60'-6" and is 6 feet thick, terminating at the inside surface of the containment vessel at elevation 66'-6". 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 beneath the center of the containment vessel bottom head includes the thickness of the containment vessel bottom head. Inspections, Tests, Analyses and Acceptance Criteria (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". As shown on UFSAR Figure 3.8.5-3, the thickness of the containment vessel bottom head is 1-5/8". Since 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), 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.

Auxiliary Building

The proposed change for the Auxiliary Building revises Tier 2* information in UFSAR Figure 3.7.2-12 to show more detailed wall thickness information. This change to Tier 2* information 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. The east face of this wall below elevation 109'-3" extends 3 inches beyond the wall face above this elevation to form a lip that supports shielding above the Waste Disposal Container Area. The wall thickness above elevation 109'-3" is 2'-9" as stated in COL Appendix C Table 3.3-1 but the wall thickness below elevation 109'-3" is 3'-0". 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 General

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. The Annex Building floor

thicknesses shown in UFSAR Figure 3.7.2-19 reflect the thickness of the respective floor from the bottom of the supporting metal decking to the top of the concrete. The Annex Building figures differs with respect to the Tier 2* information in UFSAR Figure 3.7.2-12 showing the Auxiliary Building, in which the floor thicknesses reflect the thickness of the concrete from the top of the metal decking to the top of the concrete, where applicable. This difference is not evident in the UFSAR figures or the respective Annex Building and Auxiliary Building ITAAC in COL Appendix C Table 3.3-1. As an example, this could result in the thickness of the floor from column lines 9 to 13 and E to I.1 at elevation 117'-6" being measured as 6-inches, which would not meet the 8-inch ITAAC requirement in COL Appendix C Table 3.3-1 since the concrete thickness value used for radiation shielding ITAAC is not the same as the concrete thickness used for structural integrity ITAAC. A change is proposed to COL Appendix C Table 3.3-1 to add a note to describe that the floor thicknesses listed for several Annex Building floors includes the metal decking, where applicable.

Annex Building: CSA Floor

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 (as shown on UFSAR Figure 1.2-19) 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. 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.

The requested amendment requires changes to the UFSAR in the form of departures from the plant-specific DCD Tier 2 information (as detailed in Section 2) and involves changes to COL Appendix C (and associated plant-specific Tier 1). This enclosure requests approval of the license amendment necessary to implement the COL Appendix C changes and the involved UFSAR changes. Enclosure 3 requests the exemption necessary to implement the involved changes to the plant-specific Tier 1 information.

2. COMBINED DETAILED DESCRIPTION AND TECHNICAL EVALUATION

Basemat

As described in UFSAR Subsection 1.2.1.6.1, the NI consists of a free-standing steel containment building, a concrete Shield Building, and an Auxiliary Building. The foundation for the NI is an integral basemat which supports these buildings. The NI is structurally designed to meet seismic Category I requirements, as defined in Regulatory Guide 1.29. The NI structures are designed to withstand the effects of natural phenomena such as hurricanes, floods, tornados, tsunamis, and earthquakes without loss of capability to perform safety functions. The NI is designed to withstand the effects of postulated internal events such as fires and flooding without loss of capability to perform safety functions.

As described in UFSAR Subsection 1.2.4.1, the containment building is an integral part of the overall containment system with the functions of containing the release of airborne

radioactivity following postulated design basis accidents and providing shielding for the reactor core and the reactor coolant system during normal operations.

The NI Basemat begins at elevation 60'-6" and at the intersection of column lines N and 7 is 6 feet thick, terminating at the containment vessel inside surface at elevation 66'-6". As detailed in UFSAR Subsection 3.8.3.1, the containment internal structures (CIS) are those concrete and steel structures inside (not part of) the containment pressure boundary that support the reactor coolant system components and related piping systems and equipment. UFSAR Subsection 3.8.3.1.2 describes the CIS basemat as the reinforced concrete structure filling the bottom head of the containment vessel. UFSAR Subsection 3.8.3.1.2 further states, the CIS basemat extends from the bottom of the containment vessel head at elevation 66'-6" up to the bottom of the structural modules that start between elevations 71'-6" and 103'-0". The NI Basemat and the CIS basemat are illustrated on Sheets 8 and 9 of UFSAR Figure 3.7.2-12.

UFSAR Figure 3.7.2-12 (Sheet 9) shows the elevation of the top of the basemat, including the embedded containment vessel, at 66'-6". It is not clear from the descriptions of the NI Basemat and UFSAR Figure 3.7.2-12 that the stated thickness of the NI Basemat beneath the center of the containment vessel bottom head includes the thickness of the bottom head. In other words, the containment vessel is partially embedded in the NI Basemat, making the concrete portion of the basemat less than 6-feet thick below the center of the containment bottom head in an area approximately 11-feet in diameter (based on the theoretical shape of an ellipsoidal bottom head) around the intersection of column lines N and 7. The 66'-6" elevation for the containment vessel bottom head shown on UFSAR Figure 3.7.2-12 (Sheet 9) is the elevation as measured at the inside surface of the bottom of the steel containment vessel. This is consistent with the description of the CIS basemat described in UFSAR Subsection 3.8.3.1.

The ITAAC related to the Shield Building are detailed in COL Appendix C Section 3.3. COL Appendix C Table 3.3-6 includes ITAAC requirement 3.3.00.02a.ii.b, which requires an inspection of the as-built concrete thickness be performed to verify the as-built concrete thickness of the Shield Building sections (which includes the NI Basemat) conforms to the building sections defined in COL Appendix C Table 3.3-1. As detailed in COL Appendix C Table 3.3-1, the Shield Building sections include verification that the NI basemat concrete thickness below the Shield Building from elevation 60'-6" to the containment vessel is 6'-0". Since elevation 66'-6" is the elevation at the inside surface of the containment vessel at the containment centerline, the as-built concrete thickness in that location should include the thickness of the containment vessel. Without including the containment vessel, the thickness measured would be 5'-10 3/8", which does not meet the 6'-0" ITAAC requirement in COL Appendix C Table 3.3-1.

UFSAR Figure 3.7.2-12 (Sheet 9) is also changed to show that the existing 66'-6" dimension at the bottom of the containment vessel is taken from the inside surface of the centerline of the containment vessel bottom head. The change to UFSAR Figure 3.7.2-12 provides clarity and resolves the apparent inconsistency between the UFSAR Figure 3.7.2-12 and the CIS basemat elevation description in UFSAR Subsections 3.8.3.1 and 3.8.3.1.2. UFSAR Figure 3.7.2-12 also forms the basis for the concrete thickness in COL Appendix C Table 3.3-1.

ITAAC 3.3.00.02a.ii.b requires the as-built concrete thicknesses of the Shield Building sections conform to the building sections defined in Table 3.3-1. COL Appendix C Table

3.3-1 includes the thickness of the concrete underneath the containment vessel in the Shield Building sections. The ITAAC requires that the NI Basemat concrete thickness range from 6'-0" to 22'-0". A change to this ITAAC is proposed for consistency with the change to UFSAR Figure 3.7.2-12 (Sheet 9) to note the minimum thickness (6'-0") of the NI Basemat includes the thickness of the containment vessel bottom head.

This change resolves an inconsistency between the NI Basemat as described in COL Appendix C and the CIS basemat elevations described in UFSAR Subsection 3.8.3.1 and shown on UFSAR Figure 3.7.2-19 (Sheet 9). This 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. The AP1000 NI dynamic models described in UFSAR Appendix 3G reflect the plant configuration described in the proposed change. In the NI dynamic model, the containment vessel bottom head is modeled with shell elements, and the NI Basemat concrete is modeled with solid elements. The containment vessel bottom head shell elements share nodes with the concrete solid elements to simulate that the containment vessel bottom head is embedded in the NI Basemat concrete. Conversely, an additional concrete thickness of 1-5/8" has a negligible effect on the mass and the stiffness of the NI Basemat.

The design of the NI Basemat continues to meet ACI 349-01 code requirements, described in UFSAR Subsection 3.8.5.2 and 3.8.5.5. The design of the NI Basemat reinforcement is unchanged from that shown in UFSAR Figure 3.8.5-3. Additionally, as described in UFSAR Subsection 3.8.4.6.1.2, the ACI Code requirements for concrete cover for the reinforcing steel provide sufficient protection for the reinforcing steel. Concrete cover for the top reinforcement in areas below the containment vessel continues to meet ACI 349-01 Section 10.5.3 for minimum reinforcement and ACI 349-01 Section 7.7.1 for minimum concrete cover.

The concrete thickness dimension of the NI Basemat in COL Appendix C Table 3.3-1 is clarified such that the as-built concrete thickness required by the ITAAC is consistent with the design of the NI Basemat and containment vessel reflected in UFSAR Figure 3.7.2-12, and the UFSAR Subsection 3.8.3.1.2 description of the CIS basemat. This is a consistency change, and is not associated with a change to the NI Basemat design.

The proposed consistency change to the NI Basemat does not involve any systems or structures involved in containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials and does not impact the emergency plan or the physical security plan implementation.

Auxiliary Building

As described in UFSAR Subsection 1.2.4.3, 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 provides protection for the safety-related equipment against the consequences of either a postulated internal or external event. The Auxiliary Building also provides shielding for the radioactive equipment and piping that is housed within the building.

Two walls in the radiologically controlled area of the Auxiliary Building were discovered to have thicknesses that do not conform to the thicknesses in COL Appendix C Table 3.3-1. The N-S Shield Wall 2'-9" east of column line L-2 extending 12'-9" from column line 1 north, as shown on 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. As shown in UFSAR Figure 1.2-7, this shield wall forms the east wall of the Spent Resin Tank Room and the west wall of the Waste Disposal Container Area. The eastern face of this wall below elevation 109'-3" extends 3 inches beyond the wall face above this elevation to form a lip that supports shielding above the Waste Disposal Container Area. The wall thickness above elevation 109'-3" is 2'-9" as stated in COL Appendix C Table 3.3-1 but the wall thickness below elevation 109'-3" is 3'-0".

The E-W Shield Wall (northern wall of the Spent Resin Tank Area) also deviates from the description in COL Appendix C Table 3.3-1 because of the 3-inch lip formed by the N-W Shield Wall below elevation 109'-3". COL Appendix C Table 3.3-1 states that the E-W Shield Wall between column lines 1 and 2 extending 16'-3" from column line N east is 2'-9" thick. However, because of the 3 inch lip for the waste disposal container area, this wall only extends 16'-3" east below elevation 109'-3". Between elevations 109'-3" and 125'-0", this wall extends 16' east of column line N.

A section view (Section C-C) of the N-S Shield Wall between the Spent Resin Tank Room and the Waste Disposal Container Area is shown in UFSAR Figure 3.7.2-12 (Sheet 10). A change is proposed 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. 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". The orientation of these two elevations of the wall is shown in an excerpt of UFSAR Figure 3.7.2-12 (Sheet 10), provided herein as Figure 1, with the proposed dimensions shown in red.

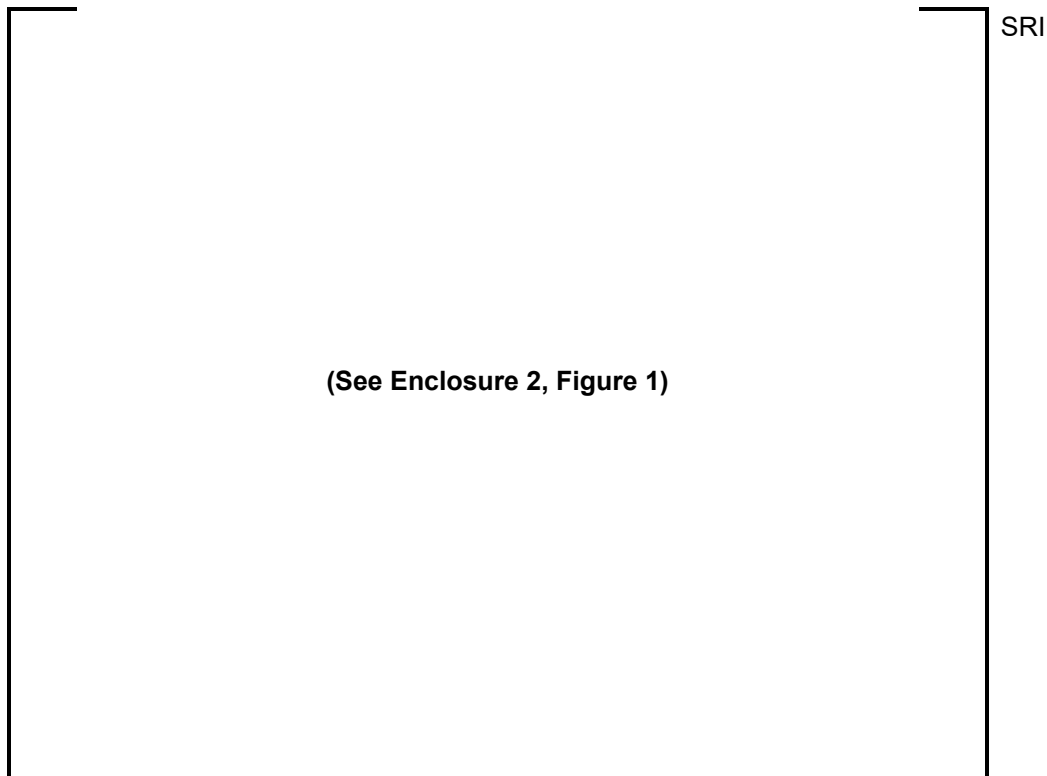


Figure 1 - Excerpt of UFSAR Figure 3.7.2-12 (Sheet 10) Section C-C Showing N-S Shield Wall with Proposed Dimensions

Consistent with the change to UFSAR Figure 3.7.2-12 (Sheet 10), the thicknesses for the N-S Shield Wall and E-W Shield Wall around the Spent Resin Tank Room are changed in COL Appendix C Table 3.3-1. The existing entry for the N-S Shield Wall must be divided into two entries, one for the section of the wall above elevation 109'-3" with a thickness of 2'-9" and one for the section of the wall below elevation 109'-3" having a thickness of 3'-0". Additionally, the entry for E-W Shield Wall from 100'-0" to 125'-0" requires a change to align with the N-S Shield Wall thicknesses. As it is currently written, the ITAAC for the E-W Shield Wall could require the thickness be measured 3 inches beyond the eastern face of the N-S Shield Wall above elevation 109'-3". In order to avoid adding complexity to the description of the E-W Shield Wall, the description of the column lines defining the E-W Shield Wall is changed so that the ITAAC requires verification of the E-W Shield wall up to the point where it intersects with the N-S Shield Wall 13'-3" east of column line N. This concept is illustrated in a highlighted excerpt of UFSAR Figure 3.7.2-12 (Sheet 4) comparing the existing scope of these two entries to the proposed scope, provided herein as Figure 2. The existing ITAAC states the wall extends 16'-3" from column line N. The proposed change states the wall extends 13'-3" from column line N.

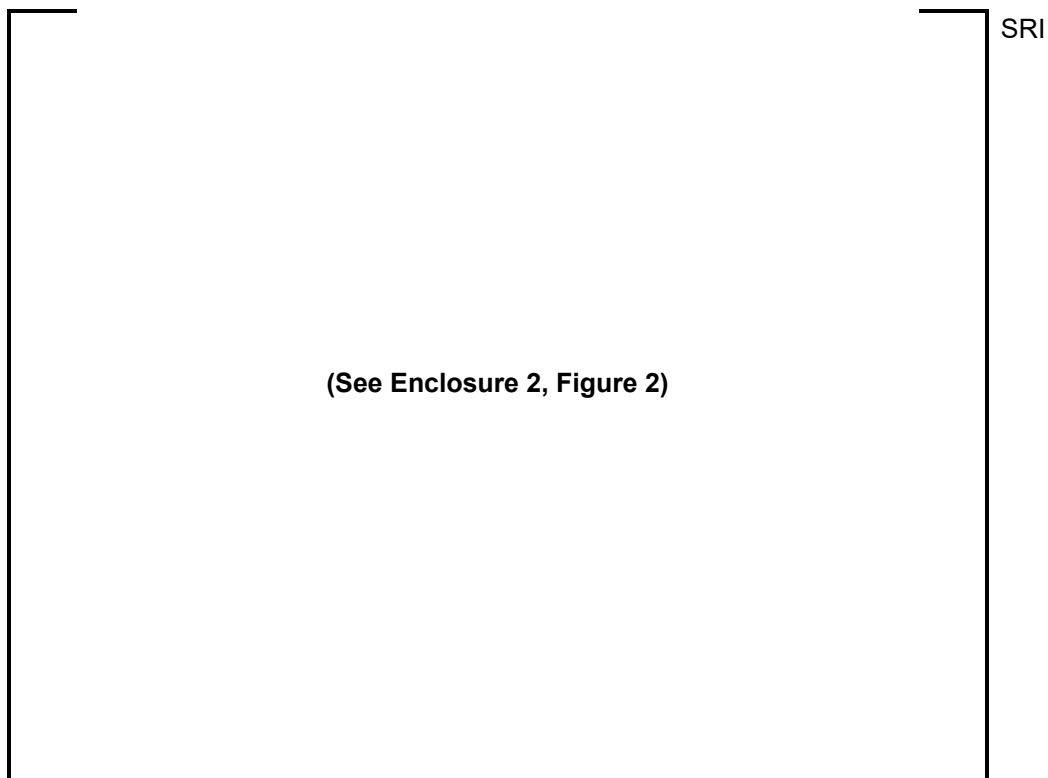


Figure 2 - Excerpt of UFSAR Figure 3.7.2-12 (Sheet 4) Comparing Existing and Proposed ITAAC Scope

The proposed change to UFSAR Figure 3.7.2-12 to add dimensions to the N-S Shield Wall is a consistency change to add clarity to the existing design; and is not a design change. UFSAR Figure 3.7.2-12 (Sheet 4) shows the 2'-9" section of the wall above 109'-3" as well as the 3-inch lip formed by the wall below 109'-3". Though no dimensions are provided, the difference between the wall elevation above and below elevation 109'-3" can be observed in UFSAR Figure 3.7.2-12 (Sheet 10). UFSAR Figure 3.7.2-12 (Sheet 10) also shows the shield cover for the Waste Disposal Container Area. The change to UFSAR Figure 3.7.2-12 is needed to provide clarity to the existing design and ensure the requirements of COL Appendix C Subsection 3.3 are consistent with the design of the wall. The proposed change for the E-W Shield Wall ITAAC, in concert with the change to the N-S Shield Wall ITAAC, will provide the equivalent level of verification provided by the previous ITAAC while resolving the inconsistencies between the ITAAC descriptions and the Tier 2* information in UFSAR Figure 3.7.2-12. This is a consistency change, and is not associated with a change to the Auxiliary Building design.

The proposed consistency change to the Auxiliary Building wall does not involve any systems or structures involved in containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials and does not impact the emergency plan or the physical security plan implementation.

Annex Building

As described in UFSAR Subsection 1.2.5, the Annex Building provides the main personnel entrance to the power generation complex. The Annex Building provides access control path ways for personnel and equipment to the clean areas of the NI in the Auxiliary Building and to the radiologically controlled area. The Annex Building also provides space for functions such as the health physics area, the Control Support Area (CSA), and the non-Class 1E electrical power supplies. The portion of the Annex Building in proximity to the seismic Category I Auxiliary Building is seismic Category II so that the Annex Building will not collapse onto the Auxiliary Building in the event of a safe shutdown earthquake.

The CSA is located on the 117'-6" elevation of the Annex Building, as shown on UFSAR Figure 1.2-19. The CSA is an area near the Main Control Room (MCR) from which support can be provided to the MCR. The CSA is equipped with restroom facilities and a kitchen area.

Annex Building: Floors General

COL Appendix C Table 3.3-1 contains the concrete thickness acceptance criteria related to both structural integrity and radiation shielding of the Nuclear Island, Annex Building and Turbine Building. 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. For the Annex Building key dimensions, including the depth formed by metal decking is consistent with what is presented in the seismic and structural analyses. The Annex Building structural analyses credit the strength imparted to the floors by the concrete and rebar in the bottom of the metal decking. The Annex Building seismic analysis credits the shear resistance of the floors as transferred to the walls. Therefore, the depth of the metal decking is integral to the key dimensions of the Annex Building floors.

The structural analysis of the Annex Building differs from that of the Auxiliary Building. For analyses of the Auxiliary Building, the metal decking is assumed only as a hold-in-place deck for wet concrete; and is not otherwise credited from a structural integrity perspective. This difference in the design of the two buildings is also reflected in the way the Annex Building key dimension figures differ from the Auxiliary Building key dimension figures in UFSAR Figure 3.7.2-12, which only reflect the thickness of the reinforced concrete from the top of the metal decking to the top of the concrete, where applicable. This nuance is not evident in the UFSAR or the respective ITAAC table; and has caused confusion in the interpretation of the concrete thickness ITAAC for the Annex Building.

The existing Annex Building acceptance criteria are correct and consistent with radiation shielding design of the building. The way the Annex Building is reflected in the key dimension drawings is consistent with the assumptions used for radiation shielding, which take account of the corrugated metal decking where required.

There are six floor sections in the Annex Building with ITAAC in COL Appendix C Table 3.3-1. The Annex Building concrete thicknesses in COL Appendix C Table 3.3-1 are consistent with the floor thicknesses as shown in UFSAR Figure 3.7.2-19 and include the depth of the metal decking as illustrated in Figure 3. However, by convention, the thickness to be indicated in COL Appendix C Table 3.3-1 is the concrete thickness, which for other buildings does not include the depth of the metal decking.

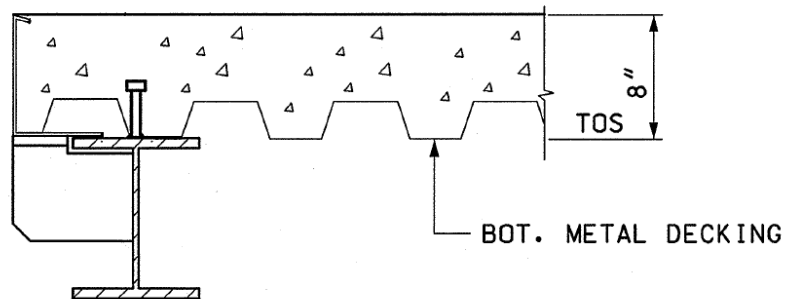


Figure 3 - Example 8-inch Floor on Metal Decking

A change is proposed for the Annex Building concrete thicknesses in COL Appendix C Table 3.3-1 to add a note stating the concrete thickness for each floor reflects the thickness of the floor including the depth of the metal decking, where applicable. Table 1 presents a description of each Annex Building floor with ITAAC in COL Appendix C Table 3.3-1. Where the floor is supported on metal decking, the requisite sections making up the concrete thickness are presented.

Table 1: Description of Annex Building Floors	
Wall or Section Description, Column Lines, Elevation	Description of Floor and Change Required
Floor, From 2 to 4 and E to H, 135'-3"	There is no change required because this floor is supported by steel plates.
Floor, From 4 to 4.1 and E to H, 135'-3"	A change is required. The total thickness of this floor is 12", with concrete poured over 3-inch metal decking. A small portion of this floor is supported by steel plate.
Floor, From 9 to 13 and E to I.1, 117'-6"	A change is required. The total thickness of this floor is 8", with concrete poured over 2-inch metal decking.
Floor, From 9 to 13 and E to I.1, 135'-3"	A change is required. The total thickness of this floor is 8", with concrete poured over 2-inch metal decking.
Containment Filtration Rm A (Floor), 135'-3"	A change is required. The total thickness of this floor is 12", with of concrete poured over 3-inch metal decking.
Containment Filtration Rm B (Floor), 150'-3"	A change is required. The total thickness of this floor is 8", with concrete poured over 2-inch metal decking.

The proposed amendment to clarify the Annex Building concrete thickness acceptance criteria reflects dimensions consistent with the existing Annex Building design, as described in UFSAR Figure 3.7.2-19. The proposed note for the concrete thicknesses of the Annex Building floors as shown in COL Appendix C Table 3.3-1 is a clarification of the existing Annex Building design; and does not involve a change to the design of the Annex Building as shown in the UFSAR. The floor thicknesses in UFSAR Figure 3.7.2-19 reflect the full thickness of the floor, inclusive of the metal decking; and do not require changes. No changes to the structural or seismic analyses for the Annex Building are necessary.

The floors listed in COL Appendix C Table 3.3-1 are designed to provide radiation shielding. The proposed clarification does not affect the radiation analyses or radiation zones shown in UFSAR Figures 12.3-1 or 12.3-2. The proposed clarification of the concrete thicknesses of the Annex Building floors does not affect the conclusion of radiation shielding analyses. The Annex Building shielding analyses takes into account the corrugated design of the floor decking, where required.

The proposed amendment to clarify the Annex Building concrete thickness acceptance criteria does not adversely impact the emergency plan or the physical security plan implementation, because there are no changes to physical access to credited equipment inside the Nuclear Island (including containment or the auxiliary building) and no impact to plant personnel's ability to respond to any plant operations or security event.

The proposed amendment to clarify the Annex Building concrete thickness acceptance criteria does not impact any functions associated with containing, controlling, channeling,

monitoring, or processing radioactive or non-radioactive materials. The types and quantities of expected plant effluents are not changed. The design function of effluent release paths is not adversely affected by the proposed changes. Therefore, neither radioactive nor non-radioactive material effluents are affected by this activity

Annex Building: CSA Floor

The portion of the Annex Building area outlined by column lines E - I.1 and 2 - 13 is designed to seismic Category II requirements and contains the CSA. 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. 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 floor of the CSA is reinforced concrete on metal decking. As shown on UFSAR Figure 3.7.2-19, the floor of the CSA area between column lines 9 and 13 and E and I.1 on the 117'-6" elevation is 8-inches thick. This is the depth from the top of the concrete to the bottom of the metal decking. The floors of the kitchen and restrooms in the CSA are finished with conventional mortar and tile materials. To allow for installation of the tiled floor, the concrete in the kitchen and restroom areas of the CSA is poured to 6-inches above the bottom of the metal decking. The final 2 inches of floor is filled in with mortar and tile to keep the CSA floors as level as possible, minimizing tripping hazards in these rooms, and to provide a finish appropriate for continuously inhabited, moisture-prone areas.

UFSAR Figure 3.7.2-19 (Sheets 7, 8 and 10) are changed to add a note to the figures denoting the areas of the CSA that have a 2-inch concrete thickness reduction to accommodate the kitchen and restroom area floor finishes. Sheets 7 and 8, and Section J-J of sheet 10 each show an 8" floor thickness for the floor between column lines 9 to 13 and E to I.1 at elevation 117'-6". The proposed change involves adding a note to this dimension to state the dimension does not include the kitchen and/or restroom areas (depending on the section cut through), which can be identified in UFSAR Section 1.2. The kitchen and restroom areas of the CSA are shown on the general arrangement figures of the UFSAR Section 1.2, specifically UFSAR Figure 1.2-19. UFSAR Figure 3.7.2-19 (Sheet 7) shows the kitchen and a restroom area near column line G, while Sheets 8 and 10 of the figure show only the restroom area near column line I. Consistent with the change to UFSAR Figure 3.7.2-19, the ITAAC thickness for the floor from column lines 9 to 13 and E to I.1 at elevation 117'-6" (floor of the CSA) in COL Appendix C Table 3.3-1 is changed to allow the ITAAC to be completed with the allowance for the floor finishes. The ITAAC for the CSA floor is changed by adding a note stating the concrete in the kitchen and restroom areas is 2 inches thinner. Stating the difference between the concrete in the kitchen and restroom as opposed to citing the actual thickness prevents confusion on whether the thickness includes the metal decking.

The reduction in floor thickness in the kitchen and restroom areas of the CSA does not affect the structural integrity of the floors in this area of the Annex Building. The kitchen and restroom areas of the CSA are provided with structural reinforcement sufficient to overcome any negative impact of the reduced concrete thickness. The floors of the kitchen and restroom areas of the CSA are designed to support dead and live loads based on a 6" reinforced concrete slab (including the 2" decking). In addition, the lumped

mass stick model used to generate safe shutdown earthquake seismic acceleration profiles for the Annex Building was generated using thicknesses consistent with the configuration described in this activity.

Though the floor of the CSA is designed to provide radiation shielding, the reduction in floor thickness in the kitchen and restroom areas of the CSA does not affect Annex Building shielding for normal operating conditions or the normal operation radiation zone mapping shown in UFSAR Figure 12.3-1. The primary sources of radiation during normal operation are inside containment and in the radiologically controlled side of the Auxiliary Building. As shown on UFSAR Figure 12.3-1, the Shield Building and E-W shield wall between the radiologically controlled and non-radiologically controlled sides of the Auxiliary Building provide shielding adequate to attenuate radiation on the non-radiologically controlled side of the Auxiliary Building to Zone I (≤ 0.25 mRem/hr) levels. The areas surrounding the CSA kitchen and restroom areas, including the security area below the CSA, are also Zone I areas. There are no sources of radiation in the CSA or in the Annex Building, Auxiliary Building and Turbine Building rooms surrounding the kitchen and restroom areas of the CSA. Therefore, the change in thickness of the kitchen and restroom floors does not adversely affect shielding during normal operation.

The reduction in floor thickness in the kitchen and restroom areas of the CSA would not affect Annex Building shielding for design basis accident conditions or the post-accident radiation zone mapping shown in UFSAR Figure 12.3-2. The CSA floor is not credited with radiation shielding for design basis accidents. Adequate radiation shielding of external radiation sources is provided by other Annex Building structures. The Annex Building roof and external walls, combined with wall I of the Auxiliary Building and the Annex Building Corridor Wall between column lines G and H provide radiation shielding sufficient to maintain personnel dose within the CSA and security areas less than the limit of General Design Criterion (GDC) 19 during a design basis event.

The Annex Building is designed to provide radiation shielding against low level radiation from either internal sources or external sources under accident conditions. The walls and floors of the Annex Building have been shown by analysis to provide adequate shielding during accident conditions associated with the design basis events described in UFSAR Chapters 6 and 15, as well as the shutdown events described in Chapter 19E of the UFSAR. The proposed change would not affect the ability to maintain personnel dose within the limit prescribed in GDC 19.

The restroom (Room Number 40401) is included as part of Fire Area 4041 AF 02, which is comprised of this restroom and the adjacent corridor. As described in UFSAR Table 9A-2, there are no systems, structures or components required for safe shutdown in this fire area. There are no systems in this fire area that normally contain radioactive material.

The kitchen (Room Number 40405) and restroom (40404) in the CSA are in Fire Area 4041 AF 01. As described in UFSAR Table 9A-2, there are no systems, structures or components required for safe shutdown in this fire area. There are no systems in this fire area that normally contain radioactive material.

As shown on UFSAR Figure 9A-3, the floors of Fire Areas 4041 AF 01 and 4041 AF 02 serve as a 2-hour fire barrier between a fire in that fire area and the Annex Building security access areas below. The finished floors in the kitchen and restroom areas of the CSA are adequate to serve as a 2-hour fire barrier.

The proposed design of these floors would not pose a negative impact on plant security. The proposed change to the Annex Building does not adversely impact the emergency plan or the physical security plan implementation, because there are no changes to physical access to credited equipment inside the Nuclear Island (including containment or the auxiliary building) and no adverse impact to plant personnel's ability to respond to any plant operations or security event.

The proposed change to the Annex Building does not adversely impact any functions associated with containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials. The types and quantities of expected plant effluents are not changed. The design function of effluent release paths is not adversely affected by the proposed changes. Therefore, neither radioactive nor non-radioactive material effluents are affected by this change.

Licensing Basis Change Descriptions

1. Basemat

- a. UFSAR Figure 3.7.2-12 (Sheet 9): Add "INSIDE SURFACE" to the elevation description at the bottom of the containment vessel.
- b. COL Appendix C Table 3.3-1: Add a new Note 14 to the 6-foot thickness for the Shield Building Nuclear Island Basemat stating the concrete thickness includes the thickness of the containment vessel bottom head in a local area in the center of containment.

2. Auxiliary Building

- a. UFSAR Figure 3.7.2-12 (Sheet 10): Add a 109'-3" elevation reference to the lip of the Waste Disposal Container Area. Add two dimensions to the wall between the Spent Resin Tank Room and the Waste Disposal Container Area, 3'-0" below elevation 109'-3" and 2'-9" between elevation 109'-3" and 125'-0".
- b. COL Appendix C Table 3.3-1: Add a second entry for the Auxiliary Building N-S Shield Wall 2'-9" east of column line L-2 extending 12'-9" from column line 1 north for the floor elevation from 100'-0" to 109'-3" requiring a concrete thickness of 3'-0". Change the existing entry for the Auxiliary Building N-S Shield Wall 2'-9" east of column line L-2 extending 12'-9" from column line 1 north to require the concrete thickness be measured from elevation 109'-3" to 125'-0" instead of 100'-0" to 125'-0".
- c. COL Appendix C Table 3.3-1: Revise the column lines description of the Auxiliary Building E-W Shield Wall to require it be measured from 10'-0" north of column line 1 extending to 13'-3" east of column line N.

3. Annex Building

- a. UFSAR Figure 3.7.2-19 (Sheet 7): Add a note to the 8" dimension for the floor on elevation 117'-6" stating an exception for the kitchen and restroom areas.
- b. UFSAR Figure 3.7.2-19 (Sheet 8): Add a note to the 8" dimension for the floor on elevation 117'-6" between column lines 11.15 and 13 stating an exception for the restroom area.

- c. UFSAR Figure 3.7.2-19 (Sheet 10): Add a note to the 8" dimension for the floor on elevation 117'-6" of Section J-J stating an exception for the restroom area.

- d. COL Appendix C Table 3.3-1:
 - i. Add new Note 12 to the Concrete Thickness acceptance criterion for each of the floors specified in Table 1 in this Enclosure stating the concrete thickness is the total floor thickness, including the metal decking, where applicable.
 - ii. For the Floor from column lines 9 to 13 and E to I.1 at elevation 117'-6", apply new Note 13. Add Note 13, stating the concrete in the kitchen and restroom areas is 2 inches thinner.

Summary of Changes

The proposed changes include adding detail to Tier 2* information and changing ITAAC in COL Appendix C Table 3.3-1 to resolve inconsistencies in NI Basemat and Auxiliary Building dimensions, clarify the Annex Building concrete thickness acceptance criteria in COL Appendix C Table 3.3-1, and reduce the concrete thickness of the kitchen and restroom floors on elevation 117'-6" of the Annex Building in the UFSAR and in ITAAC in COL Appendix C Table 3.3-1. No structure, system, or component is adversely affected by the proposed changes. The NI Basemat, Auxiliary Building, and Annex Building continue to perform their design basis functions. Plant radiation zones and radiological controls required under 10 CFR 20 are not affected by the proposed changes. The proposed changes do not involve any change to the expected amounts or types of radioactive materials stored on site. Therefore, individual and cumulative radiation exposures are not affected by these changes.

The proposed changes do not adversely impact any functions associated with containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials. The types and quantities of expected plant effluents are not changed. The design function of effluent release paths is not adversely affected by the proposed changes. Therefore, neither radioactive nor non-radioactive material effluents are affected by this activity.

The proposed changes do not adversely impact the emergency plan or the physical security plan implementation, because there are no changes to physical access to credited equipment inside the Nuclear Island (including containment or the Auxiliary Building) and no adverse impact to plant personnel's ability to respond to any plant operations or security event.

3. TECHNICAL EVALUATION (SEE SECTION 2)

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL. This activity involves a departure from plant specific Tier 1 information, and corresponding changes to the COL Appendix C. Therefore, this activity requires a proposed amendment to the COL. Accordingly, NRC approval is required prior to making the plant-specific changes in this license amendment request.

10 CFR Part 52, Appendix D, VIII.B.6, requires prior NRC approval for departure from Tier 2* information. The proposed amendment includes a departure from Tier 2* information. Therefore, a license amendment request (LAR) (as supplied herein) is required.

10 CFR 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. The proposed changes to UFSAR design information including UFSAR Figure 3.7.2-19, involves a change to COL Appendix C (and associated Tier 1) Table 3.3-1. Therefore, NRC approval is required for the Tier 2 and involved Tier 1 departures.

10 CFR 20, Subpart C, § 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. The proposed amendment clarifies the concrete thickness for Annex Building floors supported by corrugated metal decking and changes the thickness as inspected via ITAAC of a floor in the control support area. These floors are designed to provide radiation shielding. However, the proposed amendment does not involve an increase in plant radiation zones or a change in radiation shielding analysis methodology and will not adversely affect personnel occupational dose. The proposed amendment to clarify the Annex Building floor thicknesses does not require a change in the design of any structure that provides radiation shielding. Therefore, engineered structures used to aid compliance with 10 CFR 20.1201(a) are not adversely affected.

10 CFR 50, Appendix A, General Design Criterion (GDC) 1, Quality standards and records, requires that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. The Nuclear Island (NI) Basemat, Auxiliary Building and the seismic Category II portion of the Annex Building continue to meet the design codes committed to in the UFSAR Subsections 3.3.2.3 and 3.8. GDC 1 also requires that appropriate records of the design, fabrication, erection, and testing of structures, systems, and components (SSCs) important to safety be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit. The quality assurance requirements of Appendix B to 10 CFR Part 50 are applied to activities affecting the NI Basemat, the Auxiliary Building, and the seismic Category II portion of the Annex Building. The proposed changes do not affect the quality assurance program and compliance with GDC 1 is maintained.

10 CFR 50, Appendix A, GDC 2, Design Bases for Protection Against Natural Phenomena, requires that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornados, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions. The proposed change to the NI Basemat involves clarifying Tier 2* Figure 3.7.2-12 to show that the reference point for elevation at the bottom of the containment vessel is the inside surface of the containment vessel, and changing the ITAAC for the NI Basemat to clarify the associated concrete thickness in order to resolve an inconsistency in the licensing basis. The proposed change to the NI Basemat does not require revision to any of the seismic analyses for the NI or the containment internal structures. The design of the NI Basemat continues to comply with the ACI 349-01 code. The proposed change to the Auxiliary Building involves a consistency change to reflect the Tier 2* information in the associated ITAAC in COL Appendix C Section 3.3. The portion of the Annex Building in proximity to the seismic Category I Auxiliary Building is seismic Category II so that the Annex Building will not collapse onto the Auxiliary Building in the event of a safe shutdown earthquake. The proposed change to clarify the Annex Building concrete thickness acceptance criteria does not involve a change to the design of the Annex Building as described in the UFSAR. The proposed change to reduce the concrete thickness in the kitchen and restroom areas of the control support area (CSA) of the Annex Building does not require revision to the seismic analyses for the seismic Category II area of the Annex Building. The proposed changes do not involve a reduction in the ability of any structure, system or component to withstand the effects of natural phenomena; and compliance with GDC 2 is maintained.

10 CFR 50, Appendix A, GDC 3, Fire Protection, requires that SSCs important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. The proposed change to clarify the Annex Building concrete thickness acceptance criteria does not involve a change to the design of the Annex Building in the UFSAR, or the fire areas or zones described in the UFSAR. The change to the concrete thickness for the floor of the CSA in the Annex Building does not adversely affect plant fire protection features protecting SSCs important to safety. As described in UFSAR Table 9A-2, there are no systems, structures or components required for safe shutdown in the Annex Building. There are no systems in the CSA that normally contain radioactive material. Therefore, the requirements of GDC 3 continue to be met.

10 CFR 50, Appendix A, GDC 4, Environmental and Dynamic Effects Design Bases, requires SSCs important to safety 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-coolant accidents. The changes to Tier 2* UFSAR Figure 3.7.1-12 for the NI Basemat and the Auxiliary Building are consistency changes only, and do not involve a change to the design of the NI Basemat or the Auxiliary Building. The change to clarify the Annex Building ITAAC is a clarification of the existing design and does not involve a change to the design of the Annex Building. The Annex Building does not house SSCs important to safety. However, the Annex Building is designed such that the portion of the building adjacent to the Auxiliary Building maintains structural integrity during a safe shutdown earthquake. The proposed change to the Annex Building kitchen and restroom floor concrete thickness has been considered in the seismic analysis of the Seismic

Category II portion of the Annex Building. Therefore, the design continues to comply with GDC 4.

10 CFR 50, Appendix A, GDC 19, Control Room, requires a control room be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. GDC 19 also requires adequate radiation protection be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. The changes to Tier 2* UFSAR Figure 3.7.2-12 for the NI Basemat and the Auxiliary Building are consistency changes only, and do not involve a change to the design of the NI Basemat or the Auxiliary Building. The Annex Building provides the security-controlled access path to the main control room. The change to clarify the Annex Building ITAAC is a clarification of the existing design; and does not involve a change to the design of the Annex Building, shielding for the Annex Building, or the normal operation or post-accident radiation zoning of the Annex Building. The proposed change to the Annex Building kitchen and restroom floor concrete thickness does not affect the radiation zone of the security-controlled access path to the main control room because the floor was not credited with radiation shielding in development of the predicted radiation zoning for the security entrance shown in UFSAR Figure 12.3-2. Therefore, the design continues to comply with GDC 19.

4.2 Precedent

None.

4.3 Significant Hazards Consideration Determination

The proposed changes affect the Updated Final Safety Analysis Report (UFSAR) and COL Appendix C (and associated plant-specific Tier 1) information to clarify the thickness of the Nuclear Island Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building and clarify floor thicknesses in the Annex Building.

An evaluation to determine whether or not a significant hazards consideration is involved with the proposed amendment was completed by focusing on the three standards set forth in 10 CFR 50.92, "*Issuance of amendment,*" as discussed below:

4.3.1 Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed changes do not affect the operation or reliability of any system, structure or component (SSC) required to maintain a normal power operating condition or to mitigate anticipated transients without safety-related systems. The change to the NI Basemat and Auxiliary Building dimensions is a consistency change, and involves no design changes or technical reanalysis. The change to the Annex Building concrete thickness acceptance criteria is a clarification and does not involve a change to the design of the Annex Building or reanalysis of

the Annex Building. The change to the Annex Building kitchen and restroom floor thickness involves only structural changes, and does not affect the performance of any SSC relied upon to maintain normal power operation, or to effect safe shutdown using nonsafety-related equipment. The change to the Annex Building kitchen and restroom floor thickness does not adversely affect occupational radiation dose to personnel in these areas because calculations show the dose rates in the Annex Building during normal operations and in post-accident conditions are maintained within regulatory limits. Therefore, the requested amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

4.3.2 Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes do not affect the operation of any safety-related SSC relied upon to mitigate design basis accidents. The proposed changes to the NI Basemat and the Auxiliary Building resolve inconsistencies to reflect NI existing structural design, which has been analyzed and shown to comply with seismic and structural criteria. The change to the Annex Building concrete thickness acceptance criteria is a clarification, and does not involve a change to the design of the Annex Building or reanalysis of the Annex Building. The seismic Category II section of the Annex Building has been shown to maintain its structural integrity following a design basis earthquake. The proposed changes to the Annex Building kitchen and restroom floor thickness do not affect the structural integrity or seismic response of the Annex Building. The design of these structures continues to meet the requirements of 10 CFR 50 Appendix A General Design Criterion 2, Design Bases for Protection Against Natural Phenomena. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

4.3.3 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed changes do not affect existing safety margins. The proposed changes to the NI Basemat and the Auxiliary Building resolve inconsistencies to reflect NI existing structural design. The change to the Annex Building concrete thickness acceptance criteria is a clarification, and does not involve a change to the design of the Annex Building or reanalysis of the Annex Building. The proposed changes to the Annex Building kitchen and restroom floor thickness do not involve a reduction to the structural integrity of the seismic Category II portion of the building, as adequate reinforcement is provided in the floor of the kitchen and restroom areas of the CSA to support the design function of the Annex Building. No margin to the specified acceptable fuel design limits is affected by the proposed changes

4.4 Conclusions

Based on the considerations discussed above, (1) there is reasonable assurance that 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, it is concluded that the requested amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5. ENVIRONMENTAL CONSIDERATIONS

Sections 2 and 3 of this License Amendment Request provide the details of the proposed changes.

The proposed changes affect the Updated Final Safety Analysis Report (UFSAR) and COL Appendix C (and associated plant-specific Tier 1) information to clarify the thickness of the Nuclear Island Basemat, to revise wall thicknesses and descriptions in the Auxiliary Building and clarify floor thicknesses in the Annex Building.

(i) There is no significant hazards consideration.

As described in Section 4.3, Significant Hazards Consideration Determination, an evaluation was completed to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment." The Significant Hazards Consideration Determination concluded that (1) the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the proposed amendment does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed changes do not affect any aspect of plant construction or operation that introduces a change to any effluent types (for example effluents containing chemicals or biocides, sanitary system effluents, and other effluents), and does not affect any plant radiological or non-radiological effluent release quantities. The proposed changes do not affect the structure or functionality of any design feature or operational arrangements credited with controlling the release of effluents during plant operation. The proposed changes to specify the point of reference of the NI Basemat is a consistency change, and does not involve a change to the design of the basemat. The proposed change to add dimensions to shield walls in the Auxiliary Building is a consistency change, and does not involve a change to the design of the Auxiliary Building. The proposed change to clarify the Annex Building concrete thickness acceptance criteria does not involve a

change to any system associated with containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials. The proposed change to reduce the required concrete thickness for the kitchen and restroom areas of the control support area in the Annex Building does not involve any systems or structures associated with containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials that may be released offsite.

Therefore, there is no significant change in the types or significant increase in the amounts of any radioactive or non-radioactive effluents that may be released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

Company and station policies keep radiation exposure of personnel within limits defined by 10 CFR 20, "Standards for Protection Against Radiation." Administrative procedures and practices are implemented to maintain radiation exposure of personnel as low as is reasonably achievable.

The proposed changes for the Nuclear Island Basemat and the Auxiliary Building are consistency changes and do not involve a change to the design. The proposed change to clarify the Annex Building concrete thickness acceptance criteria does not involve a change to the design of the Annex Building. The change to the Annex Building involves a change to the concrete thickness of the kitchen and restroom areas of the control support area in COL Appendix C Table 3.3-1. This change does not involve an increase in individual or cumulative occupational radiation exposure because a reduction of the thickness of the floor of the control support area does not adversely affect radiation shielding analyses. There are no systems in the control support area or the surrounding rooms that normally contain radioactive material, and adequate shielding from normal radiation sources is provided by the Shield Building and shield walls between the radiologically controlled and non-radiologically controlled areas of the Auxiliary Building. Therefore, the requested amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

6. REFERENCES

None.

Southern Nuclear Operating Company

ND-17-1811

Enclosure 2

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Request for License Amendment:

**Consistency and Clarification Changes to Annex Building, Auxiliary Building and
Basemat ITAAC (Withheld Information)**

(LAR-17-040)

(Enclosure 2 consists of 3 pages, including this cover page.)

Southern Nuclear Operating Company

ND-17-1811

Enclosure 3

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Exemption Request:

**Consistency and Clarification Changes to Annex Building, Auxiliary Building and
Basemat ITAAC**

(LAR-17-040)

(Enclosure 3 consists of 8 pages, including this cover page.)

1.0 PURPOSE

Southern Nuclear Operating Company (the Licensee) requests a permanent exemption from the provisions of 10 CFR 52, Appendix D, Section III.B, *Design Certification Rule for the AP1000 Design, Scope and Contents*, to allow a plant-specific departure from elements of the certification information in Tier 1 of the plant-specific AP1000 Design Control Document (DCD). The regulation, 10 CFR 52, Appendix D, Section III.B, requires an applicant or licensee referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in DCD Tier 1. The Tier 1 information for which a plant-specific departure and exemption is being requested is related to clarifying the thickness of the Nuclear Island Basemat, revising wall thicknesses and descriptions in Auxiliary Building and clarifying the floor thicknesses in the Annex Building.

This request for exemption will apply the requirements of 10 CFR 52, Appendix D, Section VIII.A.4 to allow departures from Tier 1 information due to the following proposed consistency and clarification changes to the system-based design descriptions in Table 3.3-1:

- Table 3.3-1 is revised to identify the listed thickness of Auxiliary Building N-S Shield Wall as follows:
 - 3'-0", between 2'-9" east of column line K-2 extending 12'-9" from column line 1 north, from elevation 100'-0" to 109'-3".
 - 2'-9", between 2'-9" east of column line K-2 extending 12'-9" from column line 1 north, from elevation 109'-3" to 125'-0".
- Table 3.3-1 is revised to identify the wall location of the Auxiliary Building E-W Shield Wall as 10'-0" north of column line 1 extending 13'-3" from column line N east.
- Three new notes associated with Table 3.3-1 are added, as described below:
 - Note 12 is added to describe that the concrete thickness acceptance criterion for each of the Auxiliary Building floors, where applicable, is the total floor thickness, including the metal decking.
 - Note 13 is added to describe that the flooring in the kitchen and restroom areas is two-inches thinner than the value described in the Table.
 - Note 14 is added to describe that the minimum NI Basemat concrete thickness (6'-0") includes the thickness of the containment vessel bottom head in a local area in the center of containment.

This request will provide for the application of the requirements for granting exemptions from design certification information, as specified in 10 CFR Part 52, Appendix D, Section VIII.A.4, 10 CFR 52.63, §52.7, and §50.12.

2.0 BACKGROUND

The Licensee is the holder of Combined License Nos. NPF-91 and NPF-92, which authorize construction and operation of two Westinghouse Electric Company AP1000 nuclear plants, named Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively.

Inconsistencies were identified that necessitate consistency and clarification changes to plant-specific Tier 1 Table 3.3-1 for defining the minimum thicknesses of the Nuclear Island Basemat, for defining the thickness of the Auxiliary Building N-S Shield Wall at elevations 100'-0" to 109'-3" and 109'-3" to 125'-0" and for defining the thickness of multiple floors in the Annex Building. In addition, an inconsistency was identified in the location description of the E-W Shield Wall.

An exemption from elements of the AP1000 certified (Tier 1) design information to allow a departure from the design description is requested.

3.0 TECHNICAL JUSTIFICATION OF ACCEPTABILITY

An exemption is requested to depart from AP1000 plant-specific DCD Tier 1 material with regard to clarifying the thickness of the Nuclear Island Basemat, revising wall thicknesses and descriptions in Auxiliary Building and clarifying the floor thicknesses in the Annex Building.

The NI basemat begins at elevation 60'-6" and is 6 feet thick, terminating at the inside surface of the containment vessel at elevation 66'-6". The 66'-6" elevation is at the inside surface of the containment vessel at the intersection of column lines N and 7 (containment vessel center axis), and includes the 1-5/8" thick containment vessel. New Note 14 is added to describe that the minimum NI Basemat concrete thickness (6'-0") includes the thickness of the containment vessel bottom head in a local area in the center of containment. The design of the NI Basemat continues to meet ACI 349-01 code requirements and the design of the NI Basemat reinforcement is unchanged. The Auxiliary Building walls, N-S Shield Wall and E-W Shield Wall, are changed for consistency with associated Figures in the UFSAR.

Due to the way the Annex Building is analyzed, it makes it difficult to serve both Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) purposes of Table 3.3-1, structural integrity and radiation shielding, because the thickness assumed for structural analysis purposes is not the same floor thickness assumed to provide radiation shielding. The thickness used for radiation shielding ITAAC is the thickness of the concrete from the top of the metal decking to the top of concrete. The thickness used for structural ITAAC takes into account the metal decking and includes the bottom of metal decking to the top of concrete. Due to the differences in how the concrete thicknesses for structural and radiation shielding are analyzed, Note 12 is added to describe the concrete floor thickness in Table 3.3-1 includes the metal decking, where applicable.

In the kitchen and restroom areas of the Control Support Area (CSA), the floor is two-inches thinner than the surrounding areas, as described in added Note 13. The floor in the kitchen and restroom areas are two-inches thinner because they are finished with conventional mortar and tile to keep the CSA floors as level as possible, minimizing tripping hazards in

these rooms, and to provide a finish appropriate for continuously inhabited, moisture-prone areas.

The proposed consistency and clarification changes to the description information presented in plant-specific Tier 1 are at a level of detail that is consistent with the information currently provided therein. The proposed consistency and clarification changes neither adversely impact the ability to meet the design functions of the components, nor involve a significant decrease in the level of safety provided by the components. The proposed consistency and clarification changes to information in plant-specific Tier 1 continue to provide the detail necessary to implement the corresponding ITAAC. Further, application of the current plant-specific certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B, in the particular circumstances discussed in this request would not serve the underlying purpose of the rule since it could be read to be inconsistent with design and programmatic information currently provided in Tier 2 of the plant-specific DCD related to dose reduction.

4.0 JUSTIFICATION OF EXEMPTION

10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.63(b)(1) govern the issuance of exemptions from elements of the certified design information for AP1000 nuclear power plants. Since SNC has identified consistency and clarification changes to the Tier 1 information as discussed in Enclosures 1 and 2 of the accompanying License Amendment Request, an exemption from the certified design information in Tier 1 is needed.

10 CFR Part 52, Appendix D, and 10 CFR 50.12, §52.7, and §52.63 state that the NRC may grant exemptions from the requirements of the regulations provided six conditions are met: 1) the exemption is authorized by law [§50.12(a)(1)]; 2) the exemption will not present an undue risk to the health and safety of the public [§50.12(a)(1)]; 3) the exemption is consistent with the common defense and security [§50.12(a)(1)]; 4) special circumstances are present [§50.12(a)(2)]; 5) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption [§52.63(b)(1)]; and 6) the design change will not result in a significant decrease in the level of safety [Part 52, App. D, VIII.A.4].

The requested exemption to allow changes to the description of the components satisfies the criteria for granting specific exemptions, as described below.

1. This exemption is authorized by law

The NRC has authority under 10 CFR 52.63, §52.7, and §50.12 to grant exemptions from the requirements of NRC regulations. Specifically, 10 CFR 50.12 and §52.7 state that the NRC may grant exemptions from the requirements of 10 CFR Part 52 upon a proper showing. No law exists that would preclude the changes covered by this exemption request. Additionally, granting of the proposed exemption does not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations.

Accordingly, this requested exemption is "authorized by law," as required by 10 CFR 50.12(a)(1).

2. This exemption will not present an undue risk to the health and safety of the public

The proposed exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would allow changes to elements of the Tier 1 DCD to depart from the AP1000 certified (Tier 1) design information. The plant-specific Tier 1 will continue to reflect the approved licensing basis for VEGP Units 3 and 4, and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the DCD. Therefore, the affected plant-specific Tier 1 ITAAC will continue to serve its required purpose.

The proposed consistency and clarification changes to the Nuclear Island Basemat, the Auxiliary Building N-S Shield Wall and the floors in the Annex Building in plant-specific Tier 1 Table 3.3-1 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. The proposed revision to the wall description for the Auxiliary Building E-W Shield Wall aligns the description of the E-W Shield Wall in the plant-specific Tier 1 to more accurately reflect the design of the AP1000 Auxiliary Building.

Because the changes will not alter the operation of any plant equipment or system's ability to perform their design function, these changes do not present an undue risk to existing equipment or systems. The changes do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they modify or remove any design or operational controls or safeguards that are intended to mitigate any existing on-site hazards. Furthermore, the proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures. Accordingly, these consistency changes do not present an undue risk from any new equipment or systems.

Therefore, the requested exemption from 10 CFR 52, Appendix D, Section III.B would not present an undue risk to the health and safety of the public.

3. The exemption is consistent with the common defense and security

The exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would clarify the thickness of the Nuclear Island Basemat, revise wall thicknesses and descriptions in Auxiliary Building and clarify the floor thicknesses in the Annex Building, as presented in plant-specific Tier 1 information, thereby departing from the AP1000 certified design information. The proposed exemption will enable performance of the ITAAC associated with these changed elements, by reflecting the revised design information in the text and tables that are referenced in these ITAAC. The exemption does not alter or impede the design, function, or operation of any plant structures, systems, or components (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. The proposed exemption has no impact on plant security or safeguards.

Therefore, the requested exemption is consistent with the common defense and security.

4. Special circumstances are present

10 CFR 50.12(a)(2) lists six “special circumstances” for which an exemption may be granted. Pursuant to the regulation, it is necessary for one of these special circumstances to be present in order for the NRC to consider granting an exemption request. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when “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 rule under consideration in this request for exemption is 10 CFR 52, Appendix D, Section III.B, which requires that a licensee referencing the AP1000 Design Certification Rule (10 CFR Part 52, Appendix D) shall incorporate by reference and comply with the requirements of Appendix D, including Tier 1 information. The VEGP Units 3 and 4 COLs reference the AP1000 Design Certification Rule and incorporate by reference the requirements of 10 CFR Part 52, Appendix D, including Tier 1 information. The underlying purpose of Appendix D, Section III.B is to describe and define the scope and contents of the AP1000 design certification, and to require compliance with the design certification information in Appendix D.

The proposed consistency and clarification changes to the Nuclear Island Basemat, the Auxiliary Building N-S Shield Wall and the floors in the Annex Building in plant-specific Tier 1 Table 3.3-1 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. The proposed revision to the wall description for the Auxiliary Building E-W Shield Wall aligns the description of the E-W Shield Wall in the plant-specific Tier 1 to more accurately reflect the design of the AP1000 Auxiliary Building.

The proposed change to Tier 1 information is to the design thicknesses of the Nuclear Island Basemat, the Auxiliary Building N-S Shield Wall and the floors in the Annex Building, and the location description for the Auxiliary Building E-W Shield Wall. These changes do not impact the ability of any SSCs to perform their functions or negatively impact safety. Accordingly, this exemption from the certification information will enable the licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR 52, Appendix D. Therefore, special circumstances are present, because application of the current plant-specific certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B in the particular circumstances discussed in this request is not necessary to achieve the underlying purpose of the rule.

5. The special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

Based on the nature of the changes to the plant-specific Tier 1 information and the understanding that these changes are necessary to support the actual system functions,

it is likely that other AP1000 licensees will request this exemption. However, if this is not the case, the special circumstances continue to outweigh any decrease in safety from the reduction in standardization because the design functions of the systems associated with this request will continue to be maintained. The proposed consistency and clarification changes to the NI Basemat, Auxiliary Building and Annex Building, are departures from Table 3.3-1 in the plant-specific AP1000 DCD. This exemption request and the associated marked-up table demonstrate that there is a minimal change from the plant-specific AP1000 DCD, minimizing the reduction in standardization and consequently the safety impact from the reduction.

Therefore, the special circumstances associated with the requested exemption outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

6. The design change will not result in a significant decrease in the level of safety.

The proposed exemption would allow revision to the design thicknesses of the Nuclear Island Basemat, the Auxiliary Building N-S Shield Wall and the floors in the Annex Building, and the location description for the Auxiliary Building E-W Shield Wall, as described in the plant-specific Tier 1 information.

The proposed consistency and clarification changes to the Nuclear Island Basemat, the Auxiliary Building N-S Shield Wall and the floors in the Annex Building in plant-specific Tier 1 Table 3.3-1 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. The proposed revision to the wall description for the Auxiliary Building E-W Shield Wall aligns the description of the E-W Shield Wall in the plant-specific Tier 1 to more accurately reflect the design of the AP1000 Auxiliary Building.

The proposed consistency and clarification changes require revisions to plant-specific Tier 1. There is no technical design change or plant function change associated with this exemption. Because the consistency and clarification changes associated with this exemption request will not adversely affect the ability of any systems or equipment to perform their design functions, there are no new failure modes introduced by these changes and the level of safety provided by the current systems and equipment. It is concluded that the consistency change associated with this proposed exemption will not result in a significant decrease in the level of safety.

5.0 RISK ASSESSMENT

A risk assessment was not determined to be applicable to address the acceptability of this proposal.

6.0 PRECEDENT

None identified.

7.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed exemption does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Specific justification is provided in Section 5 of the corresponding license amendment request. Accordingly, the proposed exemption meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need to be prepared in connection with the proposed exemption.

8.0 CONCLUSION

The proposed consistency changes to DCD Tier 1 are necessary to revise information in design descriptions in plant-specific Tier 1 information. The exemption request meets the requirements of 10 CFR 52.63, 10 CFR 52.7, 10 CFR 50.12, 10 CFR 51.22 and 10 CFR 52 Appendix D. Specifically, the exemption request meets the criteria of 10 CFR 50.12(a)(1) in that the request is authorized by law, presents no undue risk to public health and safety, and is consistent with the common defense and security. Furthermore, approval of this request does not result in a significant decrease in the level of safety, presents special circumstances, does not present a significant decrease in safety as a result of a reduction in standardization, and meets the eligibility requirements for categorical exclusion.

9.0 REFERENCES

None.

Southern Nuclear Operating Company

ND-17-1811

Enclosure 4

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Proposed Changes to the Licensing Basis Documents

(LAR-17-040)

Note:

Added text is shown as bold Blue Underline
Deleted text is shown as bold ~~Red Strikethrough~~

(Enclosure 4 consists of 4 pages, including this cover page)

Tier 1 (and COL Appendix C) Table 3.3-1, Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building

Table 3.3-1 - Revise the information in the locations shown below.

Table 3.3-1 (cont.)				
Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building ⁽¹⁾				
Wall or Section Description	Column Lines ⁽⁷⁾	Floor Elevation or Elevation Range ⁽⁷⁾⁽⁸⁾	Concrete Thickness ⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾	Applicable Radiation Shielding Wall (Yes/No)
* * *				
Shield Building ⁽⁶⁾				
* * *				
Nuclear Island Basemat	Below Shield Building	From 60'-6" to containment vessel or 82'-6"	6'-0" ⁽¹⁴⁾ to 22'-0" (varies)	No
Auxiliary Building Walls/Floors Radiologically Controlled				
* * *				
<u>N-S Shield Wall</u>	<u>2'-9" east of column line L-2 extending 12'-9" from column line 1 north</u>	<u>From 100'-0" to 109'-3"</u>	<u>3'-0"</u>	<u>Yes</u>
N-S Shield Wall	2'-9" east of column line L-2 extending 12'-9" from column line 1 north	From 100'-0" <u>109'-3"</u> to 125'-0"	2'-9"	Yes
E-W Shield Wall	Between 1 and 2 extending 16'-3" from column line N east <u>10'-0" north of column line 1 extending 13'-3" from column line N east</u>	From 100'-0" to 125'-0"	2'-9"	Yes
* * *				

Tier 1 (and COL Appendix C) Table 3.3-1, Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building (cont.)

Table 3.3-1 (cont.)				
Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building ⁽¹⁾				
Wall or Section Description	Column Lines ⁽⁷⁾	Floor Elevation or Elevation Range ⁽⁷⁾⁽⁸⁾	Concrete Thickness ⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁹⁾	Applicable Radiation Shielding Wall (Yes/No)
Annex Building				
* * *				
Floor	From 4 to 4.1 and E to H	135'-3"	1'-0" (12) (13)	Yes
Floor	From 9 to 13 and E to I.1	117'-6"	0'-8" (12)	Yes
Floor	From 9 to 13 and E to I.1	135'-3"	0'-8" (12)	Yes
* * *				
Containment Filtration Rm A (Floor)	Between column line E to H	135'-3"	1'-0" (12)	Yes
Containment Filtration Rm B (Floor)	Between column line E to H	150'-3"	0'-8" (12)	Yes
* * *				

Tier 1 (and COL Appendix C) Table 3.3-1, Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building

Table 3.3-1 - Add Notes 12 and 13, as shown below.

Notes:

Notes 1 - 11 remain unchanged.

12. The concrete thickness is the total floor thickness, including the metal decking, where applicable.

13. The concrete in the kitchen and restroom areas is 2 inches thinner.

14. The 6-foot concrete thickness includes the thickness of the containment vessel bottom head in a local area at the center of containment.

Southern Nuclear Operating Company

ND-17-1811

Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

**Proposed Changes to the Licensing Basis Documents
(Withheld Information)**

(LAR-17-040)

Note:

Proposed changes to Figures are enclosed in **Red Bubbles**

(Enclosure 5 consists of 6 pages, including this cover page)