

**Southern Nuclear Operating Company**

**ND-19-1292**

**Enclosure 1**

**Vogtle Electric Generating Plant (VEGP) Units 3 and 4**

**Request for License Amendment:**

**PCS Wetted Perimeter Test Modification**

**(LAR-19-018)**

(Enclosure 1 consists of 10 pages, including this cover page.)

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Enclosure 1

Request for License Amendment: PCS Wetted Perimeter Test Modification (LAR-19-018)

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Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC, or "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**

The requested amendment proposes changes to COL Appendix C information, with corresponding changes to plant-specific DCD Tier 1 information and involved Updated Final Safety Analysis Report (UFSAR/plant specific DCD) information, as appropriate. The proposed change is to update the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Containment Vessel (CV) wetted perimeter measurement to be taken at any elevation between the 266 ft. elevation and the spring line instead of the current requirement of taking the measurement directly at the spring line (approximate elevation of 244 ft.). This enclosure requests approval of a license amendment necessary to implement the COL Appendix C and involved UFSAR changes described below. Enclosure 2 requests the exemption necessary to implement the changes to the plant-specific DCD Tier 1 information.

## **2. DETAILED DESCRIPTION and TECHNICAL EVALUATION**

### **Detailed Description**

As described in Update Final Safety Analysis Report (UFSAR) Subsection 6.2.2, the passive containment cooling system (PCS) is an engineered safety features (ESF) system. The PCS performs the following safety-related functions:

- a) The PCS delivers water from the passive containment cooling water storage tank (PCCWST) to the outside, top of the CV.
- b) The PCS wets the outside surface of the CV.

The functional objective is to reduce the containment temperature and pressure following a loss of coolant accident (LOCA) or a main steam line break (MSLB) accident inside the containment by removing thermal energy from the containment atmosphere. The passive containment cooling system also serves as the means of transferring heat to the safety-related ultimate heat sink for other events resulting in a significant increase in containment pressure and temperature.

Operation of the PCS is automatically initiated upon receipt of two out of four High-2 containment pressure signals. When the actuation signal is received, the PCCWST isolation valves open. This allows cooling water to be delivered to the top, external surface of the steel containment shell. This flow of water, provided entirely by the force of gravity, forms a water film over the dome and side walls of the containment structure. To adequately wet the containment surface, the water is delivered to a distribution bucket above the center of the containment dome which then delivers the water onto the containment surface. A weir-type water distribution system is used on the dome surface to distribute the water for effective wetting of the dome and vertical sides of the containment shell.

As described in UFSAR Subsection 6.2.2.4.2, preoperational testing of the PCS includes a containment water coverage test. The containment coverage is measured at the base of the upper annulus in addition to measuring coverage at the spring line for the full flow case and a lower flow case using the PCCWST to deliver cooling water to the containment shell.

UFSAR Subsection 14.2.9.1.4 describes how the flow testing is to be performed. This includes item d) “[...] Water delivery and coverage is verified at the initial minimum water level and as each of the first two standpipes is uncovered. Water coverage is measured at the spring line and the base of the upper annulus as described in Subsection 6.2.2.4.2.”

Combined License Appendix C (COL Appendix C) Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) 2.2.02.07b.i) (Index Number 138) requires the PCS flow test be performed and requires the containment shell coverage to be measured at the spring line.

Currently, the air baffle panels (also PCS components) are located at an elevation above the spring line, which causes construction and testing difficulties. If the water coverage measurement location is adjusted to above the spring line, the air baffle installation and subsequent PCS wetted coverage test can be decoupled and neither will be impacted by the other activity. Additionally, the current WGOTHIC evaluation model wetted coverage assumptions more closely align with a coverage measurement location between elevation 266 ft. and the spring line. The model is not limited to strictly measuring the wetted coverage at the spring line.

COL Appendix C ITAAC is proposed to be modified to allow the containment vessel wetted perimeter measurement to be taken at any elevation between the 266 ft. elevation and the spring line. In addition, other involved UFSAR sections that reference the measurement location as being taken at the spring line will be adjusted to reference the measurement being performed in this range.

In support of the proposed change to the ITAAC, UFSAR Table 3.9-17, System Level Operability Test Requirements, Note 1 is proposed to be reworded to clarify that air baffle panels may be removed if needed to perform the test. Note 1 retains the requirement to observe the water coverage at four locations, approximately 90 degrees apart.

### **Technical Evaluation**

The design basis accident (DBA) containment analyses are performed using the WGOTHIC computer code in accordance with the WGOTHIC methodology described in UFSAR Subsection 6.2.1.1.3 and WCAP-15846, Revision 5 (Reference 1). Starting at elevation 266 ft., it is assumed there is at least 90% of the perimeter wetted. From the 266 ft. elevation and up, there is an assumed maximum wetted coverage of 56%. The 56% versus 90% coverage relates to the location of the upper weirs, approximate elevation 279.5 ft. and the location of the lower weirs, approximate elevation 269.25 ft. The ITAAC proposed change is consistent with the elevations and modeling of the AP1000 WGOTHIC containment model. The 90 percent coverage is equivalent to a 220

gpm PCS water flow rate as discussed in WCAP-15846. The minimum allowable flow rate with all PCS standpipes covered is 469.1 gpm (UFSAR Table 6.2.2-1).

The PCS water coverage test described in COL Appendix C ITAAC 2.2.02.07b.i) and UFSAR Section 14.2.9.1.4 item d) is to be performed at ambient, outside conditions; therefore, little to no evaporation will occur during the test; thus, there is no mechanism for a significant reduction in coverage for a given PCS flowrate. This is consistent with the observations recorded in WCAP-15846, Chapter 7. Therefore, it is functionally equivalent to measure the wetted perimeter at any of the following elevations: 244 ft. (approximate elevation of the spring line), 255 ft. (approximate elevation of the top of the air baffle seal plate), or elevation 266 ft. The exact elevation is not relevant during this test as long as it is below the second weir (approximate elevation 269 ft.).

In the performance of this specific test, the perimeter (dry) at the selected measurement elevation is determined. Flow is then established, and the wetted perimeter measured. The wetted coverage (in percent) is the wetted perimeter divided by the perimeter. Additional detail is provided in letter ND-19-1138, Notice of Uncompleted ITAAC 225-days Prior to Initial Fuel Load Item 2.2.02.07b.i [Index Number 138] (Reference 2).

The proposed range of elevations is consistent with the conservative assumption of a maximum 90% wetted coverage between elevation 266 ft and the spring line in the AP1000 WGOTHIC containment evaluation model.

### **Summary**

The PCS will continue to perform its safety-related design basis functions. The change to allow a range of elevations as the measurement location for the test does not change the requirement to perform the test as described nor does it change the performance requirements of the test. The air baffle panels are attached to the containment vessel starting at approximately elevation 255'. This change proposes no modifications to the air baffle. The air baffle structural configuration is depicted in UFSAR Figures 1.2-14 and 3.8.4-1. This change will decouple installation of the air baffle and the PCS preoperational testing. Therefore, there is no adverse change to the design or operation of any components of the PCS as a result of this change.

The proposed changes to ITAAC comply with the requirements of 10 CFR Part 52 Appendix D and the COL Appendix C (and plant-specific Tier 1) design descriptions, and 10 CFR 52.99 for ITAAC closure notification and completion.

This change does not make any significant technical changes to the COL Appendix C (and plant-specific Tier 1) design descriptions, tables, and figures. No structure, system, or component (SSC) design function or analysis as described in the UFSAR is affected. No defense-in-depth safety function is affected. There are no significant technical changes to plant-specific ITAAC.

COL Appendix C (and plant-specific Tier 1) information is comprised of the design information and functions subject to verification by the ITAAC closure process. The proposed change does not technically affect design criteria, design functions or involve a decrease in safety provided by the associated systems. COL Appendix C (and plant

specific Tier 1) ITAAC information will continue to adequately validate the corresponding UFSAR (Tier 2) design commitments.

The proposed change does not impact an SSC, function or feature used in the prevention or mitigation of accidents or their safety or design analyses. The change does not affect any SSC accident initiator or initiating sequence of events or involve any safety-related SSC or function used to mitigate an accident.

The proposed change does not involve a change to a fission product barrier. The change does not result in a new failure mode, malfunction, or sequence of events that could affect safety. The change 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.

The proposed change does not affect any safety-related equipment, design code limit, safety related function, safety-related design analysis, safety analysis input or result, or design or safety margin. No safety analysis or design basis acceptance limit or criterion would be challenged or exceeded.

The proposed activity has no adverse impact on 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) and no adverse impact on the ability to monitor plant parameters post-accident.

In conclusion, the proposed change does not involve a significant technical (design, analysis, function or qualification) change, (e.g., there is no change to an associated calculation, design parameter or design requirement). Therefore, the change will not result in a decrease in plant safety.

The proposed change associated with this license amendment request does not affect the containment, control, channeling, monitoring, processing or releasing of radioactive and non-radioactive materials. No effluent release path is impacted. Therefore, radioactive or non-radioactive material effluents are not affected. Plant radiation zones (as described in UFSAR Section 12.3), controls under 10 CFR 20, and expected amounts and types of radioactive materials are not affected by the proposed change. Therefore, individual and cumulative radiation exposures will not change.

### **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 amendment involves a departure from plant specific Tier 1 information, and corresponding changes to the COL Appendix C. Therefore, this amendment 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 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 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 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 change to the location for performing the wetted perimeter test continues to meet the testing requirements committed to in the UFSAR Subsections 6.2.2.4 with regard to the ability to measure containment coverage. 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 testing of the passive containment cooling system (PCS). The proposed change does not affect the quality assurance program and compliance with GDC 1 is maintained.

10 CFR 50, Appendix A, GDC 40, Testing of the containment heat removal system, requires that the containment heat removal system be designed to permit appropriate periodic functional testing to assure the operability and performance of the system as a whole. The passive containment cooling system provides containment heat removal to limit the peak containment pressure following design basis events. The system piping and components are designed to permit access for periodic inspection and testing of equipment, according to the ASME Code and technical specification requirements, to provide confidence in the integrity and capability of the system. The proposed change to move the location of the wetted perimeter measurement does not impact the ability to perform the functional test or the ability to evaluate the test results to confirm the ability to remove heat to limit the peak containment pressure following design basis events. Thus, compliance with GDC 40 is maintained.

10 CFR 50, Appendix A, GDC 46, Testing of cooling water system, requires that the cooling water system be designed to permit appropriate functional testing to assure the operability of the system as a whole and, under conditions as close to design as practical. The passive containment cooling system provides containment heat removal to limit the peak containment pressure following design basis events. The system piping and components are designed to permit access for periodic inspection and testing of equipment, according to the ASME Code and technical specification requirements, to provide confidence in the integrity and capability of the system. The proposed change to move the location of the wetted perimeter

measurement does not impact the ability to perform the functional test or the ability to evaluate the test results to confirm the ability to remove heat to limit the peak containment pressure following design basis events. Thus, compliance with GDC 46 is maintained.

#### **4.2 Precedent**

None.

#### **4.3 Significant Hazards Consideration Determination**

The proposed change revises combined license (COL) Appendix C (and plant-specific Tier 1 information) and involved Updated Final Safety Analysis Report (UFSAR/plant-specific DCD) information to allow the containment vessel wetted perimeter measurement to be taken at any elevation between the 266 ft. elevation and the spring line as described in the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) COL Appendix C Table 2.2.2-3, 2.2.02.07b.i) (Index Number 138) rather than at the spring line.

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*":

##### **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 change does 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 Passive Containment Cooling System (PCS) Wetted Perimeter Measurement ITAAC involves no design changes or technical reanalysis. The change moves the location where the shell coverage measurement is to be taken. Measurement location is not a consideration in any accident and cannot affect any accident previously considered.

Therefore, the proposed 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 amendment does not affect the operation of any safety-related SSC relied upon to mitigate design basis accidents. The proposed change to the measurement location of the PCS Wetted Perimeter Test does not involve



a change to the design or any analysis. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

Response: No

The proposed change does not affect existing safety margins. The proposed change to take measurements of the wetted perimeter above the spring line does not involve a change to the design or effect the WGOTHIC analysis of the containment design basis accident (DBA) response in any way. No margin to the specified acceptable fuel design limits is affected by the proposed changes.

Therefore, the proposed amendment does not involve a significant reduction in a margin of safety.

**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**

Section 2 of this License Amendment Request provides the details of the proposed change.

The proposed change affects the COL Appendix C and associated plant-specific Tier 1 information and involved UFSAR information.

*(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 change does 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 change does 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 change to the test measurement location of the PCS wetted perimeter test does not involve a change to the design of the associated structures. The proposed changes to the ITAAC do not involve a change to any system associated with containing, controlling, channeling, monitoring, or processing radioactive or non-radioactive materials. The proposed change does not involve a change to any systems structures or component 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 change to the test measurement location of the PCS wetted perimeter test ITAAC does not involve an increase in individual or cumulative occupational radiation exposure because the proposed change does not adversely affect radiation shielding analyses. Therefore, the requested amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the requested amendment, it has been determined that anticipated construction and operational effects of the requested amendment do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the requested amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed amendment is not required.

## 6. REFERENCES

1. WCAP-15846, WGOTHIC Application to AP600 and AP1000, Revision 5.
2. Letter ND-19-1138, Southern Nuclear Operating Company Vogtle Electric Generating Plant Unit 3 and Unit 4 Notice of Uncompleted ITAAC 225-days Prior to Initial Fuel Load Item 2.2.02.07b.i [Index Number 138].