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

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NOS. 116 AND 115 TO COMBINED OPERATING LICENSE

NOS. NPF-91 AND NPF-92

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MEAG POWER SPVM, LLC

MEAG POWER SPVJ, LLC

MEAG POWER SPVP, LLC

CITY OF DALTON, GEORGIA

VOGTLE ELECTRIC GENERATING PLANT, UNITS 3 AND 4

DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated September 29, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17272A956), and supplemented by letter dated January 31, 2018 (ADAMS Accession No. ML18031B027), Southern Nuclear Operating Company (SNC/licensee) submitted license amendment request (LAR) 17-030 and requested that the U.S. Nuclear Regulatory Commission (NRC/Commission) amend the combined licenses (COL) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, COL Numbers NPF-91 and NPF-92, respectively. The proposed changes would revise the licensing basis of the COL regarding the process for addressing and retesting human engineering discrepancies (HEDs) identified during the integrated system validation (ISV) test as described in Tier 2\* document APP-OCS-GEH-320, "AP1000 Human Factors Engineering Integrated System Validation Plan," Rev. 6, which is incorporated by reference in the VEGP Units 3 and 4 Updated Final Safety Analysis Report (UFSAR). APP-OCS-GEH-320 references APP-OCS-GEH-420, "Human Factors Engineering Discrepancy Resolution Process," which defines the process for tracking, resolution, and closure of HEDs. The proposed changes to APP-OCS-GEH-320 do not impact APP-OCS-GEH-420.

The ISV provides a comprehensive human performance-based assessment of the design of the AP1000 Human-System Interface (HSI) resources, based on their operation within a

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Main Control Room (MCR) simulator. The ISV is part of the overall AP1000 Human Factors Engineering (HFE) Program. The ISV has been completed for VEGP Units 3 and 4 as documented in SNC letters ND-16-2242, and ND-16-2243, dated November 23, 2016, regarding inspection, test, analysis, and acceptance criteria (ITAAC) closure notification for ITAAC 3.2.00.01c.i (Index Number 741) (ADAMS Accession Numbers ML16350A108 and ML16350A110, respectively). Retesting to verify adequate resolution of HEDs remains to be completed.

The proposed changes to APP-OCS-GEH-320 and the UFSAR affect the resources and methodology used during retesting performed to verify the effectiveness of design solutions implemented to resolve significant HEDs identified during ISV testing. In addition, the licensee proposes the addition of Appendix 18A to UFSAR Chapter 18 to modify information described in APP-OCS-GEH-320 related to addressing and retesting HEDs. Finally, UFSAR Table 1.6-1, "Material Referenced," is proposed to be revised to reflect the addition of Appendix 18A for the updated reference to APP-OCS-GEH-320.

The licensee supplemented its license amendment request application by letter dated January 31, 2018 (LAR-17-030S1) (ADAMS Accession No. ML18031B027). The additional information did not expand the scope of the LAR and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 21, 2017 (82 FR 55413).

## 2.0 REGULATORY EVALUATION

Appendix D, "Design Certification Rule for the AP1000 Design," of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Section VIII.B.6 requires NRC approval for departures from Tier 2\* information. Because the proposed amendment request involves changes to Tier 2\* information, NRC approval is required before making the Tier 2\* changes. The NRC staff considered the following regulatory requirements and guidance in reviewing the licensee's proposed UFSAR changes:

10 CFR 50.34(f)(2)(iii) requires the license application to provide a control room design that reflects state-of-the-art human factors principles.

NUREG-0711, "Human Factors Engineering Program Review Model," Rev. 2 (ADAMS Accession No. ML12205A463), provides guidance for complying with 10 CFR 50.34(f)(2)(iii). As identified in Chapter 18, "Human Factors Engineering," of the VEGP Units 3 and 4 UFSAR (ADAMS Accession No. ML17172A283), the licensing basis for VEGP Units 3 and 4 is NUREG-0711, Rev. 2. Therefore, the NRC review of this LAR is based on the criteria in NUREG-0711, Rev. 2.

## 3.0 TECHNICAL EVALUATION

Enclosure 1A (non-proprietary) and Enclosure 1B (proprietary) to LAR-17-030 list the proposed changes to APP-OCS-GEH-320 and the VEGP Units 3 and 4 UFSAR. The proposed changes affect the retesting methodology discussed in APP-OCS-GEH-320, Section 7.3, which requires that for any scenario [REDACTED]

[REDACTED] ] The licensee proposed the following three changes in this LAR:

- Change the minimum number of scenario trials conducted during retesting. The proposed change would revise the licensing basis documents to say [REDACTED] require [REDACTED]. The licensing basis documents currently require [REDACTED].
- Change the scenarios used for retesting. The proposed change would revise the licensing basis documents to say that scenarios used for retesting [REDACTED]. Currently, the licensing basis documents require [REDACTED].
- Change the number of utilities (i.e., licensees) required to provide test participants, or crews, for retesting. The proposed change would revise the licensing basis documents to say retesting will be use test participants from [REDACTED]. Currently the licensing basis documents require crews consisting of test participants from [REDACTED].

The staff's evaluation of these changes is presented below.

### 3.1 Changes to the Number of Scenarios Runs Conducted during Retesting

#### Acceptance Criteria

NUREG-0711, Rev. 2, Section 11.4.3.2.8 "Validation Conclusions," Criterion (1) says, "The statistical and logical bases for determining that performance of the integrated system is and will be acceptable should be clearly documented."

#### Application

APP-OCS-GEH-320, Section 7.3, "Addressing HEDs and Re-Test Requirements," contains retest requirements. The licensee is proposing to reduce the minimum number of scenario trials conducted for retesting from [REDACTED] Figure 7.3-1, "Flow Diagram for Re-Run and Re-Test Requirements," shows that the HED resolution process does not end until [REDACTED] successful trials occur.

In proprietary Enclosure 1B of the LAR, the licensee said that a minimum of [REDACTED] retest trials were not necessary to fulfill the HED resolution process as defined in APP-GEH-OFS-420, and also stated,

*The justification for this change is based on the nature of the HED resolution process as focused on confirming that the HEDs already identified were correctly identified and resolved. While discovery of new issues is possible, it is not the main purpose of the re-test. For the purpose of verifying resolutions, it is sufficient to demonstrate that*

acceptable results are replicable, not anomalous. For purposes of verification, [REDACTED] are considered to be conservative.

#### Staff's Evaluation

Following implementation of changes to address HEDs, APP-OCS-GEH-320, Section 7.3, currently says that a minimum of [REDACTED] trials must be performed for retesting and successful results achieved in order to complete the validation process. This is the same number of trials that was conducted during the ISV testing.

In some cases, it may be acceptable to perform fewer trials for retesting than were performed for the initial ISV test, or to not even perform any scenario trials. For example, consider a case where none of the crews were able to complete a task successfully during a given scenario because the procedure used to perform the task was missing a critical step. If the procedure step was added to the procedure, then the adequacy of the revised procedure could be verified by simulating the same conditions that existed during the initial ISV scenario and using the revised procedure to perform the task. It would not be necessary in this particular case to perform multiple trials of the ISV scenario to confirm this particular change was effective to resolve the HED.

In other cases [REDACTED] successful retest trials may not provide sufficient evidence to logically conclude the HED has been resolved and performance of the integrated system is and will be acceptable under the conditions where the HED was identified. For example, if three of three crews tested during ISV failed to successfully perform an important human action (IHA), then it would not be logical to conclude that operators in the plant will be able to perform the IHA. Depending on the IHA and the consequences that might occur if the IHA is not performed successfully, it may be necessary to make significant design changes. It also may be necessary to perform at least the same number of scenario trials for retesting as were performed during ISV testing, and to obtain satisfactory results for each of the retest trials, in order to have sufficient evidence to support a logical conclusion that operators in the plant will be able to perform the IHA if needed.

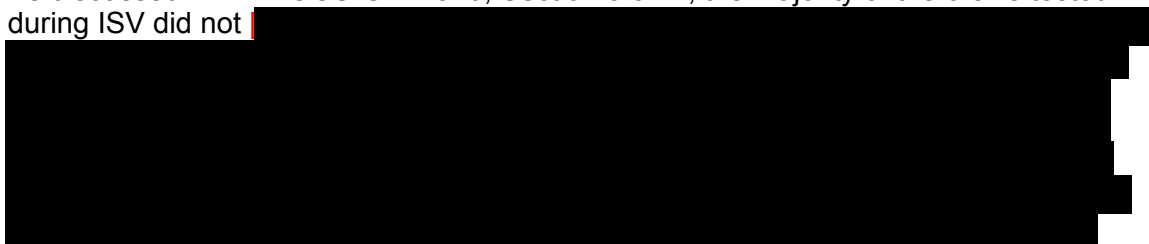
Thus the staff could not determine whether the proposed changes to the minimum number of retest trials is acceptable without understanding the HEDs that require retesting in accordance with APP-OCS-GEH-320, Section 7.3 and the specific changes that were implemented to resolve them. Therefore, on January 8, 2018 (ADAMS Accession No. ML18008A254), the staff issued a request for additional information (RAI) Question 5 and Question 6. RAI Question 5 requested the licensee to identify the specific scenarios requiring retesting per APP-OCS-GEH-320, Section 7.3 and the changes that have been implemented to resolve the HEDs identified in those scenarios. RAI Question 6 requested the licensee explain how reducing the minimum number of successful retest trials for those scenarios will provide a logical basis for concluding the design supports safe plant operation.

In response to RAI Question 5, the licensee stated in LAR-17-030S1, Enclosure 7, *"The HED resolution verification will require retest of five (5) of the original ISV scenarios in accordance with the pass/fail criteria of the ISV. Significant HEDs which led to scenario failure during the ISV have been resolved through design changes, procedure changes, and/or training."*

In response RAI Question 6, the licensee stated in LAR-17-030S1, Enclosure 7, *“The initial ISV report concluded that the Main Control Room and Human System Interface support safe operation since no safety limits were exceeded during the test. HED resolution verification process provides additional margin to safety and resolves risk informed human action (RIHA) failures. The reduction of the number of successful retest results needed to validate the correction of the HEDs associated with ISV scenario failures continues to support safe operation. The ISV test was developed to provide adequate discovery of issues. The objective of the HED resolution verification is to ensure HEDs are documented, tracked, and adequately addressed. The reduction of the number of scenario iterations still fulfills the objective as it demonstrates that the success of representative operating crew is repeatable and not anomalous. This confirms that resolution of the identified ISV HEDs has occurred and are no longer a challenge to completing the objectives of the ISV scenarios. ISV retest observers will continue to monitor to ensure scenario and safety limits are not violated.”*

The NRC Inspection Plan, for verifying certain aspects of Westinghouse’s program associated with the integrated system validation of the main control room, dated January 2, 2018 (ADAMS Accession No. ML18002A418), describes the objectives of a vendor inspection the staff commenced January 9 – 12, 2018, at Westinghouse Electric Company (WEC)<sup>1</sup>. The purpose of the January 2018 inspection was to review design documents, test summary reports and results from evaluation of test data, including proposed corrective actions to address significant HEDs to verify consistency with the licensing basis, design commitments, and the acceptance criteria of ITAAC 3.2.00.01c(ii) and 3.2.00.01d. During the inspection, the licensee provided APP-OCS-GER-320, “AP1000 Human Factors Engineering Integrated System Validation Report,” Revision 3, which is proprietary and documents the results of completing the activities described in APP-OCS-GEH-320, for the staff to review the details of the five scenarios discussed in the response to the RAI Question 5 and the significant HEDs that were identified during those scenarios. Also, the licensee provided documentation of the corrective actions taken to resolve the significant HEDs that required retesting in accordance with APP-OCS-GEH-320, Section 7.3. The documentation of corrective actions implemented to resolve HEDs is maintained in WEC’s Human Factors Tracking System as discussed in APP-OCS-GEH-420, Section 2.4, “Human Factors Tracking System.” The corrective actions implemented to resolve the HEDs identified in these five scenarios are discussed below.

- As discussed in APP-OCS-GER-320, Section 3.3.24, the majority of the crews tested during ISV did not



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<sup>1</sup> WEC provides software and hardware design, fabrication, testing, and delivery for the AP1000 new reactor COL holders and applicants. The inspection conducted at WEC January 9 – 12, 2018 was the first part of an inspection primarily focused on verifying aspects of the vendor’s program associated with the ISV of the MCR that are directly relevant to ITAACs 3.2.00.01c(ii) and 3.2.00.01d. The results of the inspection will be documented in Inspection Report Number 99900404/2017-202 following completion of the inspection activities.

[REDACTED]. The staff found the corrective actions identified to address the HEDs directly associated with these failed scenario trials were supported by the licensee's analysis of the HEDs and were, therefore, reasonable and appropriate. For example, the staff found the licensee made changes to the HSI to improve indications that were ambiguous to the operators and also made changes to a procedure to clarify operator actions.

Further, the results of the scenario trials discussed in APP-OCS-GER-320 show that each of the crews maintained the simulated plant in a safe condition during each of the trials of this scenario. Thus the staff concludes that the ISV test results support the conclusion that the design does support safe plant operation during the conditions simulated in the scenario; however, the results do not support a conclusion that the operators can perform [REDACTED]. Additional retesting is necessary to confirm the corrective actions are adequate and also to provide test results that demonstrate the operators can successfully perform this specific evolution, which is required by ITAAC 3.2.00.01 c(ii). For these reasons, the staff concludes that a minimum of [REDACTED] successful retest trials for this particular scenario is sufficient to determine whether the corrective actions have been adequate to resolve the HEDs and to provide sufficient evidence that operators will be able to successfully perform the task in the plant.

- Three of the five scenarios required operators to perform RIHAs. [REDACTED]

[REDACTED] The staff found the corrective actions identified to address the HEDs directly associated with these failed RIHAs were sufficiently supported by the licensee's analysis of the HEDs and were therefore reasonable and appropriate. For example, the licensee improved an indication in the control room to provide unambiguous cues to the operators to inform them that the RIHA needs to be performed. The staff also observed a crew perform one of these scenarios as part of preparation activities for retesting. The staff observed the crew took a reasonable amount of time to observe and interpret indications of plant status, read procedure steps, communicate with other crew members, and perform actions as directed by procedures. The crew accomplished the action within the time window the PRA assumes operators will complete the RIHA, but there was a relatively small margin.

The staff recognizes there are limitations to how quickly operators will be able to perform their tasks, including RIHAs, even when the control room HFE design is adequate. As part of performing their tasks, operators need to observe and interpret indications, diagnose conditions, select appropriate procedures, read procedure steps, communicate and coordinate tasks with other crew members, and read component controls prior to actuation to ensure the correct control will be operated. These actions take a certain amount of time to perform, and the time it takes a crew to perform these tasks will vary to some degree based on the skill and knowledge level of the crew members. If the crews demonstrate the ability to perform the RIHAs while taking a reasonable amount of time to do so, and if the operators are not delayed in performance of their tasks because



of an inadequate HFE design, then it's not likely that there are any HFE improvements that could be made to further reduce the time it would take a crew to perform the action.

Because the crews were all able to perform the RIHAs during ISV testing, the staff concludes the HFE design that was tested during the ISV does include the necessary controls and indications for operators to perform these actions. The licensee has identified improvements to the HFE design to further reduce the time it takes operators to perform these actions, and the proposed retesting will demonstrate whether the corrective actions taken to address the HEDs related to RIHAs for these scenarios have improved the HFE design such that there will be additional margin for performance of these RIHAs within the times assumed in the PRA.

- In one scenario, [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]. Because the licensee changed the control function for this plant component from manual (i.e., operator) to automatic control, there is no longer any operator actions to verify as part of assessing the adequacy of the corrective action. Verification of the corrective action implemented to resolve this HED could be performed by test personnel establishing the conditions in the simulator to test the automatic feature and observing the automatic feature actuated when needed; a crew of operators would not need to participate in this verification activity. Therefore, the staff finds the licensee's proposal to run [REDACTED] trials of the scenario conservative and thus sufficient to verify resolution of the HED.

For the reasons discussed above, the staff concludes the licensee's proposed change to the minimum number of successful scenario runs that must be achieved during ISV retesting is sufficient to verify HEDs have been resolved. Verification that HEDs have been resolved together with the results obtained from the ISV test provide a logical basis for determining that performance of the integrated system is and will be acceptable. Thus the staff concludes that the licensee's proposed method for retesting continues to conform to the guidance in NUREG-0711, Section 11.4.3.2.8, and therefore is acceptable.

### **3.2 Changes to the Content of Retest Scenarios**

#### Acceptance Criteria

NUREG-0711, Section 11.4.4.2, "Human Engineering Discrepancy Resolution Review Criteria," Criterion (6), "Design Solution Evaluation," says, "Designs should be evaluated by repeating the appropriate analyses of the verification and validation. For example, the HSI Task Support Verification should be conducted to provide reasonable assurance that the design satisfies personnel task requirements. Portions of the HFE design verification analysis should be conducted to provide reasonable assurance that the design is consistent with HFE guidelines,

and integrated system validation could be conducted to evaluate its usability. When the problems identified by an HED cannot be fully corrected, justification should be given.”

#### Application

The licensee is proposing to develop new scenarios for ISV retesting instead of replicating the same scenarios used in ISV testing. In proprietary Enclosure 1B of the LAR, the licensee said, “Scenarios used for retesting would continue to meet the criteria for performance-based testing as described in NUREG-0711, Section 8.4.6.2, “Performance-Based Tests.” Also, the licensee said the retest scenarios would use [REDACTED]. The licensee also said a new document is under development that contains the specific scenario information associated with HED resolution verification. The licensee’s justification for the change is that NUREG-0711 does not say it is necessary to replicate the ISV scenarios during retesting.

#### Staff’s Evaluation

Repeating the same scenarios for retesting using different crews that have not previously participated in the scenario allows all test variables to remain constant except for two: the test participants (i.e., the crews) and the changes implemented to correct HEDs. Using test participants who are representative of the actual users of the HSI, but who do not have prior knowledge of the scenarios, is desirable when evaluating changes implemented to correct HEDs because, otherwise, it could be difficult to determine whether successful trial results are achieved because the changes are effective or if the crews learned the action(s) necessary to achieve successful test results based on participation in earlier testing. Also, replicating the same scenario allows for the same conditions to be established during retesting that existed during the ISV testing. These conditions, such as high-workload conditions, can affect human performance. Therefore the effectiveness of changes can be evaluated under the same conditions that were established during the ISV test trials. If the test conditions are not the same or similar, then it will be difficult to determine whether successful trial results are achieved because of the changes implemented to correct HEDs, or because the test conditions were different, and the difference facilitated better human performance.

Under certain circumstances, it may be reasonable to change the scenarios used for retesting. For example, if a significant HED was identified in Event 4 of a scenario consisting of 10 total events, then it would be reasonable to only retest Events 1-4 of that scenario instead of retesting all 10 events if satisfactory results had been achieved for Events 5-10 during ISV testing. However, the licensee did not explain how the scenarios used for retesting will be different from the scenarios used for the ISV testing or how changing the scenarios used for retesting may impact the ability to evaluate the effectiveness of the design solutions implemented to address HEDs. Therefore, on January 8, 2018 (ADAMS Accession No. ML18008A254), the staff issued RAI Question 2 to request the licensee explain the specific changes that will be made to the scenarios requiring retesting per APP-OCS-GEH-320, Section 7.3, and what, if any, impact the changes will have on the ability to draw conclusions that the changes implemented to address HEDs are effective.

In response to RAI Question 2, the licensee stated in LAR-17-030S1, Enclosure 7, “*The changes to the scenarios primarily resulted from the plant operating procedure changes that*



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*occurred as a result of human engineering deficiency (HED) resolution activities. The ISV retest scenarios continue to create an environment which tests the integrated plant operation and Human System Interface. The initial conditions and portions of scenarios leading to HED portions remain essentially unchanged. As such, the scenario continues to include distractors, workloads, and complexity leading to events under test (i.e., test objectives). The scenarios will continue to meet the same complexity requirements as when they were executed during the original ISV test. APP-OCS-GEH-320, Section 7.3, will be revised to clarify that changes to scenarios will not affect the ability to draw conclusions that the changes implemented to address HEDs are effective. The proposed revision to Section 7.3 is shown after the response to NRC Question 6 below in the proposed revision to UFSAR Appendix 18A, Human Factors Engineering Licensing Basis Document Changes.”*

During the January 2018 inspection, the licensee provided APP-OCS-GEH-324, “Human Factors Engineering Integrated System Validation Retest Scenario Information,” Revision 0, for staff review. APP-OCS-GEH-324 is proprietary and identifies the changes to the five ISV scenarios that will be retested. The staff confirmed the changes to the scenarios include changes to address revisions to operating procedures that resulted from the HED resolution process, and the initial conditions and portions of the scenarios leading to HED portions remain the same with those exceptions. The staff concludes these changes are necessary to be able to verify HED resolutions that affected operating procedures and therefore are acceptable.

Additionally, the staff found that the retest scenarios [REDACTED]. Therefore, the staff concludes the same conditions will be established during retesting that existed during the ISV testing, which will allow the effectiveness of design changes to be evaluated under the same conditions that were established during the ISV test trials. The staff also concludes it is acceptable to [REDACTED] and where the events leading up to those events are also retested, because satisfactory results have already been achieved for those portions of the scenarios. For these reasons, the staff finds the licensee’s proposed changes to the content of retest scenarios is acceptable.

Also, the staff reviewed NUREG-0711, Section 8.4.6.2, which contains criteria for performance-based tests conducted during HSI design. The HSI design activities occur prior to validation testing. The criteria for validation testing is contained in NUREG-0711, Section 11.4.3, “Integrated System Validation.” Retesting ISV scenarios is part of validation testing. Therefore, on January 8, 2018 (ADAMS Accession No. ML18008A254), the staff issued RAI Question 3 to request the licensee explain why the scenarios used for ISV retesting would not meet the criteria for ISV testing in NUREG-0711, Section 11.4.3.

In response to RAI Question 3, the licensee stated in LAR-17-030S1, Enclosure 7, “*The Integrated System Validation (ISV) provides a comprehensive human performance-based assessment of the final design of the AP1000® Human-System Interface (HSI) resources, as described in APP-OCS-GEH-320, AP1000 Human Factors Engineering Integrated System Validation Plan, Section 1.1. The ISV plan was developed using guidance of NUREG-0711 including performance based validation described in NUREG Section 11.4.3. The ISV retest will continue to use the guidance of both NUREG Sections 8.4.6.2 and 11.4.3 criteria.*”

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During the January 2018 inspection, the staff observed the licensee’s preparation activities for the ISV retest in the WEC ISV simulator. Although these particular test preparation activities are outside the scope of the APP-OCS-GEH-320, the staff observed the licensee was using the guidance in NUREG Section 8.4.6.2. The criteria in Section 11.4.3 is applicable to the actual validation testing (i.e., the ISV retest). Therefore, the staff concludes the licensee’s response is acceptable because the licensee clarified the criteria in NUREG-0711, Section 11.4.3 will be used for the ISV retest.

For the reasons discussed above, the staff finds the licensee’s proposed changes to the content of retest scenarios are in some cases necessary to verify the resolution of HEDs. Also, the staff finds the licensee’s proposed changes continue to conform to the guidance in NUREG-0711, Section 11.4.4.2, because the licensee will still repeat the appropriate validation method (i.e., the ISV) for HEDs identified during ISV to verify the HEDs have been resolved, and the portions of the ISV scenarios that will be repeated will essentially be unchanged. Therefore, the changes are acceptable.

### **3.3 Change to the Number of Utilities Required to Participate in ISV Retesting**

#### Acceptance Criteria

NUREG-0711, Section 11.4.3.2.3, “Plant Personnel,” Criterion (1) says, “Participants in the validation tests should be representative of actual plant personnel who will interact with the HSI, e.g., licensed operators rather than training or engineering personnel.”

NUREG-0711, Section 11.4.3.2.3, “Plant Personnel,” Criterion (2) says, in part, “Several factors that should be considered in determining representativeness include: license and qualifications, skill/experience, age, and general demographics.”

#### Application



#### Staff’s Evaluation

APP-OCS-GEH-320, Section 4.1.1, “Selection,” contains selection criteria for personnel to comprise the crews (i.e., “plant personnel”) used for ISV testing. NUREG-1793, Supplement 2, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design”

(ADAMS Accession No. ML112061231), Section 18.11.8.2.4.3, “Plant Personnel,” documents the staff’s finding that the selection criteria acceptably addresses NUREG-0711, Section 11.4.3.2.3, Criterion (1) and (2).

LAR-17-030 did not include any revisions to APP-OCS-GEH-320, Section 4.1.1. However, the staff observed that APP-OCS-GEH-320, Section 4.1.1, says that crews from more than one utility will participate in ISV testing, and crews for ISV testing will meet the selection criteria in Section 4.1.1. It is not clear to the staff whether crews of plant personnel assembled for ISV retesting will also meet the selection criteria in Section 4.1.1. Using test participants who are representative of the personnel who will actually use the HSI allows for conclusions to be drawn that the design solutions will be suitable for the personnel who will actually use the HSI. Therefore, on January 8, 2018 (ADAMS Accession No. ML18008A254), the staff issued RAI Question 1 to request that the licensee explain whether test participants who will form the crews for ISV retesting will meet the selection criteria in APP-OCS-GEH-320, Section 4.1.1.

In response to RAI Question 4, the licensee stated in LAR-17-030S1, Enclosure 7, *“All operators chosen for ISV retest trials will continue to meet the criteria described in Section 4.1.1 of APP-OCS-GEH-320. APP-OCS-GEH-320, Section 7.3, will be revised to clarify that test participants will meet the selection criteria specified in Section 4.1.1. The proposed revision to Section 7.3 is shown below in the proposed revision to UFSAR Appendix 18A, Human Factors Engineering Licensing Basis Document Changes.”*

NUREG-7011 states, in part, “Several factors that should be considered in determining representativeness include: license and qualifications, skill/experience, age, and general demographics.” If the plant personnel used in validation tests are representative of actual plant personnel who will interact with the HSI in the actual plant, then the guidance in NUREG-0711 is satisfied. [REDACTED]

[REDACTED] and because the plant personnel who will participate in validation testing will continue to be selected using the criteria in APP-OCS-GEH-320, Section 4.1.1, the staff finds the change is both necessary and acceptable.

### **3.4 Summary**

The staff concludes that the changes proposed in LAR-17-030 conform to HFE-related regulatory guidance as explained in the technical evaluation section of this safety evaluation. Based on the findings, the NRC staff concludes there is reasonable assurance that the requirements in Appendix D to 10 CFR 52, “Licenses, Certifications and Approvals for Nuclear Power Plants” and 10 CFR 50.34(f)(2)(iii) will continue to be met. Therefore, the staff finds the proposed changes acceptable.

### **4.0 STATE CONSULTATION**

In accordance with the Commission’s regulations in 10 CFR 50.91(b)(2), on February 14, 2018, the Georgia State official was consulted on the amendment. The State official had no comment.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, “*Standards for Protection Against Radiation*.” The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite. Also, there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (82 FR 55413 published on November 21, 2017). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The staff has concluded, based on the considerations discussed in Section 3.0 of this safety evaluation and confirming that these changes do not change an analysis, methodology, assumptions, or the design itself, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission’s regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Therefore, the staff finds the changes proposed in LAR-17-030 to be acceptable.

## 7.0 REFERENCES

1. Southern Nuclear Operating Company, Inc., letter to U.S. Nuclear Regulatory Commission, “Request for License Amendment: Human Factors Engineering Resolution Verification Process (LAR-17-030),” September 29, 2017 (ADAMS Accession No. ML17272A956).
2. Southern Nuclear Operating Company, Inc., letter to U.S. Nuclear Regulatory Commission, “Vogtle Electric Generating Plant Units 3 and 4 Supplement to Request for License Amendment: Human Factors Engineering Resolution Verification Process Revisions (LAR-17-030S1),” January 31, 2018 (ADAMS Accession No. ML18031B027).
3. Southern Nuclear Operating Company, Inc., letter to U.S. Nuclear Regulatory Commission, “Vogtle Electric Generating Plant Unit 3 ITAAC Closure Notification on Completion of ITAAC 3.2.00.01 c.i [Index Number 7411,” November 23, 2016 (ADAMS Accession No. ML16350A108).
4. Southern Nuclear Operating Company, Inc., letter to U.S. Nuclear Regulatory Commission, “Vogtle Electric Generating Plant Unit 4 ITAAC Closure Notification on Completion of ITAAC 3.2.00.01 c.i (Index Number 7411,” November 23, 2016 (ADAMS Accession No. ML16350A110).
5. U.S. Nuclear Regulatory Commission, NUREG-0711, Revision 2 “Human Factors Engineering Program Review Model,” February 2004 (ADAMS Accession

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No. ML12205A463).

6. U.S. Nuclear Regulatory Commission, NUREG-1793, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," (ADAMS Accession No. ML112061231).
7. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
8. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).
9. Westinghouse Electric Company, LLC, "AP1000 HFE Integrated System Validation Plan," APP-OCS-GEH-320, Revision 6, January 2015 (Proprietary).
10. Westinghouse Electric Company, LLC, "AP1000 Human Factors Engineering Discrepancy Resolution Process," APP-OCS-GEH-420, Revision 2, December 2014 (Proprietary).
11. Westinghouse Electric Company, LLC, "AP1000 Human Factors Engineering Integrated System Validation Report," APP-OCS-GER-320, Revision 3, November 2016 (Proprietary).
12. Westinghouse Electric Company, LLC, "Human Factors Engineering Integrated System Validation Retest Scenario Information," APP-OCS-GEH-324, Revision 0, February 2018. (Proprietary).

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