Southern Nuclear

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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Unit 3 and Unit 4
Resubmittal of Notice of Uncompleted ITAAC 225-days Prior to Initial Fuel Load
Item 2.5.02.06a.ii [Index Number 530]

Ladies and Gentlemen:

Pursuant to 10 CFR 52.99(c)(3), Southern Nuclear Operating Company hereby notifies the NRC that as of December 16, 2019, Vogtle Electric Generating Plant (VEGP) Unit 3 and Unit 4 Uncompleted Inspection, Test, Analysis, and Acceptance Criteria (ITAAC) Item 2.5.02.06a.ii [Index Number 530] has not been completed greater than 225-days prior to initial fuel load. The Enclosure describes the plan for completing ITAAC 2.5.02.06a.ii [Index Number 530]. Southern Nuclear Operating Company will at a later date provide additional notifications for ITAAC that have not been completed 225-days prior to initial fuel load.

Southern Nuclear Operating Company (SNC) previously submitted Notice of Uncompleted ITAAC 225-days Prior to Initial Fuel Load for Item 2.5.02.06a.ii [Index Number 530] ND-19-1323 [ML19304B856], dated October 31, 2019. This resubmittal supersedes letter number ND-19-1323 in its entirety.

This notification is informed by the guidance described in NEI-08-01, *Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52,* which was endorsed by the NRC in Regulatory Guide 1.215. In accordance with NEI 08-01, this notification includes ITAAC for which required inspections, tests, or analyses have not been performed or have been only partially completed. All ITAAC will be fully completed and all Section 52.99(c)(1) ITAAC Closure Notifications will be submitted to NRC to support the Commission finding that all acceptance criteria are met prior to plant operation, as required by 10 CFR 52.103(g).

This letter contains no new NRC regulatory commitments.

If there are any questions, please contact Tom Petrak at 706-848-1575.

Respectfully submitted,

Michael J. Yox
Regulatory Affairs Director Vogtle 3&4

Enclosure: Vogtle Electric Generating Plant (VEGP) Unit 3 and Unit 4
Completion Plan for Uncompleted ITAAC 2.5.02.06a.ii [Index Number 530]

MJY/JBN/sfr

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Southern Nuclear Operating Company
ND-19-1523
Enclosure

Vogtle Electric Generating Plant (VEGP) Unit 3 and Unit 4 Completion Plan for Uncompleted ITAAC 2.5.02.06a.ii [Index Number 530]

ITAAC Statement

Design Commitment

6.a) The PMS initiates an automatic reactor trip, as identified in Table 2.5.2-2, when plant process signals reach specified limits.

6.b) The PMS initiates automatic actuation of engineered safety features, as identified in Table 2.5.2-3, when plant process signals reach specified limits.

6.c) The PMS provides manual initiation of reactor trip and selected engineered safety features as identified in Table 2.5.2-4.

8.a) The PMS provides for the minimum inventory of displays, visual alerts, and fixed position controls, as identified in Table 2.5.2-5. The plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column can be retrieved in the MCR. The fixed position controls listed with a "Yes" in the "Control" column are provided in the MCR.

8.c) Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.

9.a) The PMS automatically removes blocks of reactor trip and engineered safety features actuation when the plant approaches conditions for which the associated function is designed to provide protection. These blocks are identified in Table 2.5.2-6.

9.b) The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR.

9.c) The PMS does not allow simultaneous bypass of two redundant channels.

Inspections/Tests/Analyses

An operational test of the as-built PMS will be performed using real or simulated test signals.

An operational test of the as-built PMS will be performed using real or simulated test signals.

An operational test of the as-built PMS will be performed using the PMS manual actuation controls.

i) An inspection will be performed for retrievability of plant parameters in the MCR.

iii) An operational test of the as-built system will be performed using each MCR fixed position control.

Inspection will be performed for retrievability of displays of the open/closed status of the reactor trip breakers in the MCR.

An operational test of the as-built PMS will be performed using real or simulated test signals.

An operational test of the as-built PMS will be performed.

An operational test of the as-built PMS will be performed. With one channel in bypass, an attempt will be made to place a redundant channel in bypass.

Acceptance Criteria

ii) PMS output signals to the reactor trip switchgear are generated after the test signal reaches the specified limit. This needs to be verified for each automatic reactor trip function.

Appropriate PMS output signals are generated after the test signal reaches the specified limit. These output signals remain following removal of the test signal. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis, and acceptance criteria.

ii) PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated.

i) The plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Display" column, can be retrieved in the MCR.

iii) For each test of an as-built fixed position control listed in Table 2.5.2-5 with a "Yes" in the "Control" column, an actuation signal is generated. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis and acceptance criteria.

Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.

The PMS blocks are automatically removed when the test signal reaches the specified limit.

The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR.

The redundant channel cannot be placed in bypass.

ITAAC Completion Description

Multiple ITAAC are performed to verify that:

- The Protection and Safety Monitoring System (PMS) initiates an automatic reactor trip, as identified in Table 2.5.2-2, when plant process signals reach specified limits.
- The PMS provides manual initiation of reactor trip and selected engineered safety features as identified in Table 2.5.2-4.
- The PMS provides for the minimum inventory of displays, visual alerts, and fixed position controls as identified in Table 2.5.2-5, with the plant parameters listed with a "Yes" in the "Display" column and visual alerts listed with a "Yes" in the "Alert" column retrievable in the MCR (Main Control Room), and the fixed position controls listed with a "Yes" in the "Control" column provided in the MCR.

The subject ITAAC requires:

- An operational test of the as-built PMS be performed using real or simulated test signals to verify PMS output signals to the reactor trip switchgear are generated after the test signal reaches the specified limit for each automatic reactor trip function.
- An operational test of the as-built PMS be performed using the PMS manual actuation controls to verify PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated.
- An inspection be performed to verify the plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Display" column, can be retrieved in the MCR.
- An operational test of the as-built system be performed using each MCR fixed position control to verify for each test of an as-built fixed position control listed in Table 2.5.2-5 with a "Yes" in the "Control" column, an actuation signal is generated.

This ITAAC also performs:

- An operational test of the as-built PMS using real or simulated test signals to verify appropriate PMS output signals are generated after the test signal reaches the specified limit and remain following removal of the test signal to demonstrate the PMS initiates automatic actuation of engineered safety features, as identified in Table 2.5.2-3, when plant process signals reach specified limits.
- An inspection for retrievability of displays of the open/closed status of the reactor trip breakers in the MCR to demonstrate displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.
- An operational test of the as-built PMS using real or simulated test signals to demonstrate the PMS automatically removes blocks of reactor trip and engineered safety features actuation identified in Table 2.5.2-6 when the plant approaches conditions for which the associated function is designed to provide protection.
- An operational test of the as-built PMS to demonstrate the PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed and bypassed channels are alarmed in the MCR.
- An operational test of the as-built PMS in which with one channel in bypass, an attempt will be made to place a redundant channel in bypass to demonstrate the PMS does not allow simultaneous bypass of two redundant channels.

<u>ii) PMS output signals to the reactor trip switchgear are generated after the test signal reaches the specified limit. This needs to be verified for each automatic reactor trip function.</u>

An operational test of the as-built PMS is performed using simulated test signals. The operational test verifies that PMS output signals to the reactor trip switchgear are generated after the test signal reaches the specified limit for each automatic reactor trip function identified in COL Appendix C Table 2.5.2-2 (Attachment A).

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Functional testing of each PMS automatic reactor trip from the test signal input to the PMS output signals to the reactor trip switchgear

- Site software installation and regression test – Hardware and software integration verification and testing of changes

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During the test, the process parameters were simulated and adjusted to create applicable reactor trip conditions. PMS signals at reactor trip computer point PMSY-RXTR (Y = A, B, C, or D in accordance with its PMS division) were monitored and it was confirmed that each automatic reactor trip function works as designed from the simulated input to reactor trip computer point PMSY-RXTR. This testing was performed in accordance with FAT Test Procedures APP-PMS-T1P-007 (Reference 3) and APP-PMS-T1P-035 (Reference 4). The results of this testing are documented in FAT test reports SV0/SV3/SV4-PMS-T2R-007 (References 5 through 7) and SV0/SV3/SV4-PMS-T2R-035 (References 8 through 10). During testing in FAT Test Procedure APP-PMS-T1P-012 (Reference 11), a Steam Generator-2 Level Low-2 is initiated, signals at the computer point PMSY-RXTR are verified, the shunt trip outputs from PMS are verified to turn on, and the under voltage outputs from PMS are verified to turn off. The results of this testing are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-012 (References 12 through 14).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

The completed Unit 3 and Unit 4 FAT test reports (References 5 through 10 and 12 through 14), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), and regression test results (References 17 through 19) confirm that appropriate PMS output signals are generated after the test signal reaches the specified limit. These output signals remain following removal of the test signal. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis, and acceptance criteria.

References 5 through 10 and 12 through 19 are available for NRC inspection as part of the Unit 3 and 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

<u>Appropriate PMS output signals are generated after the test signal reaches the specified limit. These output signals remain following removal of the test signal. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis, and acceptance criteria.</u>

An operational test of the as-built PMS is performed using simulated test signals. The operational test verifies that appropriate PMS output signals are generated after the test signal reaches the specified limit and that these output signals remain following removal of the test signal.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Functional testing of PMS automatic engineered safety features from the test signal input to the actuation signal output
- Site software installation and regression test – Hardware and software integration verification and testing of changes

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT includes testing of PMS inputs and outputs, logic, and functionality. During this test, the initial conditions for the test scenarios were established and confirmed that the setpoints and logics which generated output signals for all the engineered safety features (ESF) identified in COL Table 2.5.2-3 (Attachment B) work as designed. Testing initially inputs a test signal that verifies the bistable and coincidence logic of the PMS. The output from the PMS is then sent to modules that operate the devices in the field with the output signals of these modules documented. Additionally, output signals which are designed to remain following removal of the test signal were verified. This testing was performed in accordance with FAT Test Procedures APP-PMS-T1P-007 (Reference 3), APP-PMS-T1P-008 (Reference 20), APP-PMS-T1P-009 (Reference 21), APP-PMS-T1P-012 (Reference 11), and APP-PMS-T1P-035 (Reference 4). The results of the tests are documented in FAT Test Reports SV0/SV3/SV4-PMS-T2R-007 (References 5 through 7), SV0/SV3/SV4-PMS-T2R-008 (References 22 through 24), APP/SV3/SV4-PMS-T2R-009 (References 25 through 27), and SV0/SV3/SV4-PMS-T2R-012 (References 12 through 14), and SV0/SV3/SV4-PMS-T2R-035 (References 8 through 10).

The output signals for the Turbine Trip ESF function are designed to not remain following removal of the test signal and is not included in the testing above. In the event of a Turbine Trip, manual operator action is performed to latch the Turbine.

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

The completed Unit 3 and Unit 4 FAT test reports (References 5 through 10, 12 through 14, and 22 through 27), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), and regression test results (References 17 through 19) confirm that appropriate PMS output signals

are generated after the test signal reaches the specified limit. These output signals remain following removal of the test signal. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis, and acceptance criteria.

References 5 through 10, 12 through 19, and 22 through 27 are available for NRC inspection as part of the Unit 3 and 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

ii) PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated.

An operational test of the as-built PMS is performed using PMS manual actuation controls. The operational test verifies that PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Testing of PMS logic and functions using simulated manual initiation control inputs and verifying generation of the outputs for reactor trip and ESF functions
- Site software installation and regression test – Hardware and software integration verification and testing of changes
- Component Test – Testing of the as-built manual initiation controls and verifying the inputs to PMS for ESF functions
- Preoperational Test – Testing of the as-built manual initiation controls and verifying the inputs to PMS for reactor trip functions

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During this test, the manual initiation control inputs to the PMS were simulated and it was confirmed that the output signals were actuated for reactor trip and selected engineered safety features manual actuations as identified in COL Appendix C Table 2.5.2-4 (Attachment C). This testing was performed in accordance with the PMS FAT procedures APP-PMS-T1P-007 (Reference 3) and APP-PMS-T1P-008 (Reference 20). The results of the tests are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-007 (References 5 through 7) and SV0/SV3/SV4-PMS-T2R-008 (References 22 through 24).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e.,

change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

Testing of selected ESF manual initiation controls identified in Attachment C is performed in accordance with component test packages SNCXXXXXX (Unit 3) and SNCYYYYYY (Unit 4) (References 28 and 29). These component test packages utilize B-GEN-ITPCI-006 (Reference 30) to test ESF manual initiation controls. Selected ESF manual initiation controls are actuated and confirmed at the PMS input, by visually inspecting the digital input LED. The completed Unit 3 and Unit 4 component test packages confirm that select ESF manual controls actuations are received at PMS.

Testing of reactor trip manual controls is performed in accordance with pre-operational tests 3/4-PMS-ITPP-504 (References 31 and 32) to test reactor trip manual initiation controls. Reactor trip manual initiation controls PMS-HS025 and PMS-HS026 are actuated in the Main Control Room (MCR) and Manual Reactor Trip Logic Trip is verified on each divisional safety display. The completed Unit 3 and Unit 4 test procedures confirm that each RTCB trip status is changed after actuation of manual controls.

The completed Unit 3 and Unit 4 FAT test reports (References 5 through 7 and 22 through 24), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), regression test results (References 17 through 19), completed component test packages (References 28 and 29), and completed preoperational test results (References 31 and 32), confirm that the PMS output signals are generated for reactor trip and selected engineered safety features as identified in Table 2.5.2-4 after the manual initiation controls are actuated.

References 5 through 7, 15 through 19, 22 through 24, and 28 through 32 are available for NRC inspection as part of the Unit 3 and Unit 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

<u>i) The plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Display" column, can be retrieved in the MCR.</u>

An inspection is performed to verify the retrievability of the VEGP Unit 3 and Unit 4 plant parameters in the MCR. The inspection for retrievability confirms that the plant parameters listed in COL Appendix C Table 2.5.2-5 (Attachment D) with a "Yes" in the "Display" column can be retrieved in the MCR.

The inspection is performed in accordance with Work Orders SNC921600 (Unit 3) and SNCZZZZZZ (Unit 4) (References 33 and 34) and visually confirms that when each of the plant parameters identified in Attachment D with a “Yes” in the “Display” column is recalled using the MCR PMS Visual Display Units (VDUs), the expected display appears on the PMS VDU.

The inspection results are included in References 33 and 34 and confirm that the plant parameters listed in Table 2.5.2-5 with a "Yes" in the "Display" column can be retrieved in the MCR.

References 33 and 34 are available for NRC inspection as part of the Unit 3 and Unit 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

iii) For each test of an as-built fixed position control listed in Table 2.5.2-5 with a "Yes" in the "Control" column, an actuation signal is generated. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis and acceptance criteria.

An operational test of the as-built PMS is performed using each MCR fixed position control to verify that for each test of an as-built fixed position control listed in COL Appendix C Table 2.5.2-5 with a "Yes" in the "Control" column (Attachment D), an actuation signal is generated.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Testing of PMS logic and functions using simulated fixed position control inputs and verifying generation of the actuation signal output
- Site software installation and regression test – Hardware and software integration verification and testing of changes
- Component Test – Testing of the as-built fixed position controls and verifying the inputs to PMS for ESF functions
- Preoperational Test – Testing of the as-built fixed position controls and verifying the inputs to PMS for reactor trip functions

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During this test, the fixed position control inputs to the PMS were simulated and it was confirmed that the actuation signals were generated for reactor trip and selected engineered safety features manual actuations as identified in Attachment D. This testing was performed in accordance with the PMS FAT procedures APP-PMS-T1P-007 (Reference 3) and APP-PMS-T1P-008 (Reference 20). The results of the tests are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-007 (References 5 through 7) and SV0/SV3/SV4-PMS-T2R-008 (References 22 through 24).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

Testing of selected ESF fixed position controls identified in Attachment D is performed in accordance with component test packages SNCXXXXXX (Unit 3) and SNCYYYYYY (Unit 4) (References 28 and 29). These component test packages utilize B-GEN-ITPCI-006 (Reference 30) to test ESF fixed position controls. Selected ESF fixed position controls identified in

Attachment D are actuated and confirmed at the PMS input, by visually inspecting the digital input LED.

Testing of the Manual ADS and IRWST Injection Unblock is performed in accordance with Unit 3 and Unit 4 component test packages SNCAAAAAA and SNCBBBBBB (References 35 and 36). These component test packages utilize B-GEN-ITPCI-039 (Reference 43) to direct the performance of test procedures 3/4-PMS-OTS-17-012 (References 44 and 45). The Manual ADS and IRWST Injection Unblock fixed position control switch is taken to unblock in the MCR and the block is verified to be removed at the Component Interface Modules (CIM).

Testing of reactor trip fixed position controls is performed in accordance with pre-operational tests 3/4-PMS-ITPP-504 (References 31 and 32) to test reactor trip fixed position controls. Reactor trip fixed position controls are actuated in the Main Control Room (MCR) and Manual Reactor Trip Logic Trip is verified on each divisional safety display. The completed Unit 3 and Unit 4 test procedures confirm that each RTCB trip status is changed after actuation of the manual reactor trip fixed position controls.

The completed Unit 3 and Unit 4 FAT test reports (References 5 through 7 and 22 through 24), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), regression test results (References 17 through 19), completed component test packages (References 35 and 36), and completed preoperational test results (References 31 and 32) confirm that for each test of an as-built fixed position control listed in Attachment D with a "Yes" in the "Control" column, an actuation signal is generated. Tests from the actuation signal to the actuated device(s) are performed as part of the system-related inspection, test, analysis and acceptance criteria.

References 5 through 7, 15 through 19, 22 through 24, 31, 32, 35, and 36 are available for NRC inspection as part of the Unit 3 and Unit 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

Displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.

An inspection is performed to verify the displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.

The inspection is performed in accordance with 3/4-PMS-ITPP-504 (References 31 and 32) and visually confirms that when each of the displays of the open/closed status of the reactor trip breakers are summoned using the MCR PMS Visual Display Units (VDUs), the expected display appears on the PMS VDU.

The inspection results are included in References 31 and 32 and confirm that displays of the open/closed status of the reactor trip breakers can be retrieved in the MCR.

References 31 and 32 are available for NRC Inspection as part of the Unit 3 and Unit 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

The PMS blocks are automatically removed when the test signal reaches the specified limit.

An operational test of the as-built PMS is performed using simulated test signals to verify that PMS blocks are automatically removed when the test signal reaches the specified limit.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Functional testing of PMS ability to automatically remove blocks
- Site software installation and regression test – Hardware and software integration verification and testing of changes

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During this test, the initial conditions for the test scenarios were established and confirmed that PMS blocks are automatically removed as appropriate for the reactor trip and engineered safety feature actuation blocks identified in COL Appendix C Table 2.5.2-6 (Attachment E). During the test, the process parameters were simulated and adjusted to create applicable unblock conditions, PMS unblock signals were monitored, and it was confirmed that the automatic unblock functions work as designed. This testing was performed in accordance with FAT Test Procedures APP-PMS-T1P-008 and APP-PMS-T1P-035 (Reference 20 and 4). The results of the testing are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-008 (References 22 through 24) and SV0/SV3/SV4-PMS-T2R-035 (References 8 through 10).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

The completed Unit 3 and Unit 4 FAT test reports (References 8 through 10 and 22 through 24), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), and regression test results (References 17 through 19) confirm that the PMS blocks are automatically removed when the test signal reaches the specified limit.

References 8 through 10, 15 through 19, and 22 through 24 are available for NRC inspection as part of the Unit 3 and 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

The PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. All bypassed channels are alarmed in the MCR.

An operational test of the as-built PMS is performed to verify that PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed and that all bypassed channels are alarmed in the MCR.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Functional testing of PMS to ensure two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed and that all bypassed channels are alarmed in the MCR
- Site software installation and regression test – Hardware and software integration verification and testing of changes
- Pre-operational Test – Functional testing of PMS to ensure that an alarm is received in the MCR when a channel is bypassed

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During this test, the initial conditions for the test scenarios were established and confirmed that PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed. During the test, one of the four PMS channels was taken to bypass, PMS logic was monitored, and it was confirmed that the change in logic works as designed. This testing was performed in accordance with FAT Test Procedures APP-PMS-T1P-026 (Reference 37). The results of the testing are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-026 (References 38 through 40).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

Testing of bypass alarms in the MCR is performed in accordance with pre-operational tests 3/4-PMS-ITPP-521 (References 41 and 42). Each PMS division is individually placed in partial bypass at the Maintenance and Test Panel (MTP) and the bypassed channel alarms are verified in the MCR. The completed Unit 3 and Unit 4 test procedures confirm that each RTCB trip status is changed after actuation of the manual reactor trip fixed position controls.

The completed Unit 3 and Unit 4 FAT test reports (References 38 through 40), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), regression test results (References 17 through 19), and completed preoperational test results (References 41 and 42), confirm that the PMS two-out-of-four initiation logic reverts to a two-out-of-three coincidence logic if one of the four channels is bypassed and that all bypassed channels are alarmed in the MCR.

References 38 through 40, 15 through 19, 41, and 42 are available for NRC inspection as part of the Unit 3 and 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

The redundant channel cannot be placed in bypass.

An operational test of the as-built PMS is performed by attempting to place a redundant channel in bypass with one channel in bypass to verify the redundant channel cannot be placed in bypass.

This ITAAC is completed as a combination of:

- Factory Acceptance Test – Functional testing of PMS to ensure redundant channels cannot be placed in bypass with one channel in bypass
- Site software installation and regression test – Hardware and software integration verification and testing of post system delivery changes

The Factory Acceptance Testing (FAT) follows the guidance of NEI 08-01 Section 9.4 (Reference 50) for the as-built tests to be performed at other than the final installed location. The FAT was performed in accordance with PMS Software Program Manual WCAP-16096 (Reference 1), PMS Test Plan APP-PMS-T5-001 (Reference 2), and applicable Codes and Standards described in Vogtle 3 and 4 UFSAR Chapter 7 (Reference 48).

The FAT included testing of PMS inputs and outputs, logic, and functionality. During this test, the initial conditions for the test scenarios were established and confirmed that with one channel of PMS in bypass, the redundant channel cannot be placed in bypass. During the test, one of the four PMS channels was taken to bypass, an attempt to place a redundant channel in bypass was made, and it was confirmed that the redundant channel cannot be placed in bypass. This testing was performed in accordance with FAT Test Procedure APP-PMS-T1P-026 (Reference 37). The results of the testing are documented in the FAT test reports SV0/SV3/SV4-PMS-T2R-026 (References 38 through 40).

Additional hardware and software installation and associated inspections and testing are performed on-site to verify that the cabinets are intact and functional in accordance with Units 3 and 4 for applicable Field Change Notifications (FCNs) AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1 and AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1, and B-GEN-ITPCI-001 (References 15, 16, and 49). References 15, 16, and 49 include steps that confirm and document successful software load and further confirm the physical properties of the as-built PMS. A regression analysis (i.e., change evaluation) is performed for hardware changes (References 17 and 18) and software changes (Reference 19) to determine if additional testing is needed for the as-built system.

The completed Unit 3 and Unit 4 FAT test reports (References 38 through 40), FCNs (References 15 and 16), B-GEN-ITPCI-001 (Reference 49), and regression test results (References 17 through 19) confirm that with one PMS channel in bypass, the redundant channel cannot be placed in bypass.

References 38 through 40 and 15 through 19 are available for NRC inspection as part of the Unit 3 and 4 ITAAC 2.5.02.06a.ii Completion Packages (References 46 and 47).

List of ITAAC Findings

In accordance with plant procedures for ITAAC completion, Southern Nuclear Operating Company (SNC) performed a review of all findings pertaining to the subject ITAAC and associated corrective actions. This review found there are no relevant ITAAC findings associated with this ITAAC.

References (available for NRC inspection)

1. WCAP-16096 "Software Program Manual for Common Q Systems" Revision 4A
2. APP-PMS-T5-001, Rev. 5, "AP1000 Protection and Safety Monitoring System Test Plan"
3. APP-PMS-T1P-007, "AP1000 Protection and Safety Monitoring System – Reactor Trip Channel Integration Test Procedure"
4. APP-PMS-T1P-035, "AP1000 Protection and Safety Monitoring System Display Calibration Data Test Procedure"
5. SV3-PMS-T2R-007, "Vogtle Unit 3 AP1000 Protection and Safety Monitoring System Display Calibration Data Test Report"
6. SV4-PMS-T2R-007, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System Display Calibration Data Test Report"
7. SV0-PMS-T2R-007, "AP1000 Protection and Safety Monitoring System Display Calibration Data Test Report"
8. SV3-PMS-T2R-035, "Vogtle Unit 3 AP1000 Protection and Safety Monitoring System – Reactor Trip Channel Integration Test Report"
9. SV4-PMS-T2R-035, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System – Reactor Trip Channel Integration Test Report"
10. SV0-PMS-T2R-035, "AP1000 Protection and Safety Monitoring System – Reactor Trip Channel Integration Test Report"
11. APP-PMS-T1P-012, "AP1000 Protection and Safety Monitoring System – System Integration Test for Time Response Test Procedure"
12. SV3-PMS-T2R-012, "Vogtle Unit 3 AP1000 Protection and Safety Monitoring System – System Integration Test for Time Response Test Report"
13. SV4-PMS-T2R-012, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System – System Integration Test for Time Response Test Report"
14. SV0-PMS-T2R-012, "AP1000 Protection and Safety Monitoring System – System Integration Test for Time Response Test Report"
15. SV3-GW-GCW-300, Field Change Notice "AP1000 Vogtle Unit 3 PMS Initial Software Installation - Software Release 8.7.0.1"

16. SV4-GW-GCW-XXX, Field Change Notice "AP1000 Vogtle Unit 4 PMS Initial Software Installation - Software Release 8.7.0.1"
17. GIC-AP1000-HEDS-19-001, Rev. 0 "Regression Testing Analysis for Vogtle Unit 3 Protection and Safety Monitoring System (PMS) Baseline 8.2 to 8.4 Hardware Modifications Performed at Site"
18. GIC-AP1000-HEDS-YY-XXX, Rev. X "Regression Testing Analysis for Vogtle Unit 4 Protection and Safety Monitoring System (PMS) Baseline X.X to X.X Hardware Modifications Performed at Site" (YY-XXX is the Year-Letter #)
19. SV0-PMS-T2R-050, "AP1000 Protection and Safety Monitoring System Channel Integration Test Integrated System Validation Test Report"
20. APP-PMS-T1P-008, "AP1000 Protection and Safety Monitoring System – System-Level Engineered Safety Features Channel Integration Test Procedure"
21. APP-PMS-T1P-009, "AP1000 Protection and Safety Monitoring System – Integrated Logic Processor Component Logic Channel Integration Test Procedure"
22. SV3-PMS-T2R-008, "Vogtle Unit 3 AP1000 Protection and Safety Monitoring System – System-Level Engineered Safety Features Channel Integration Test Report"
23. SV4-PMS-T2R-008, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System – System-Level Engineered Safety Features Channel Integration Test Report"
24. SV0- PMS-T2R-008, "AP1000 Protection and Safety Monitoring System – System-Level Engineered Safety Features Channel Integration Test Report"
25. SV3-PMS-T2R-009, "Vogtle Unit 3 AP1000 Protection and Safety Monitoring System – Integrated Logic Processor Component Logic Channel Integration Test Report"
26. SV4-PMS-T2R-009, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System – Integrated Logic Processor Component Logic Channel Integration Test Report"
27. APP-PMS-T2R-009, "AP1000 Protection and Safety Monitoring System – Integrated Logic Processor Component Logic Channel Integration Test Report"
28. SNCXXXXXX
29. SNCYYYYYY
30. B-GEN-ITPCI-006, "Main Control Room & Remote Shutdown Room"
31. 3-PMS-ITPP-504, "PMS REACTOR TRIP BREAKERS"
32. 4-PMS-ITPP-504, "PMS REACTOR TRIP BREAKERS"
33. SNC921600, "Perform ITAAC 2.5.02.06a.ii, Item 8.a.i"
34. SNCZZZZZZ
35. SNCAAAAAA
36. SNCBBBBBB
37. APP-PMS-T1P-026, "AP1000 Protection and Safety Monitoring System Display Partial Actuate / Partial Bypass Test Procedure"
38. SV0-PMS-T2R-026, "AP1000 Protection and Safety Monitoring System Display Partial Actuate / Partial Bypass Test Report"
39. SV3-PMS-T2R-026, "Vogtle Unit 3AP1000 Protection and Safety Monitoring System Display Partial Actuate / Partial Bypass Test Report"
40. SV4-PMS-T2R-026, "Vogtle Unit 4 AP1000 Protection and Safety Monitoring System Display Partial Actuate / Partial Bypass Test Report"

41. 3-PMS-ITPP-521, "Protection and Safety Monitoring System Logic Test Preoperational Test Procedure"
42. 4-PMS-ITPP-521, "Protection and Safety Monitoring System Logic Test Preoperational Test Procedure"
43. B-GEN-ITPCI-039, "PMS CIM Component Test Procedure"
44. 3-PMS-OTS-17-012, "ADS & IRWST Injection Block and Squib Valve Testing"
45. 4-PMS-OTS-17-012, "ADS & IRWST Injection Block and Squib Valve Testing"
46. 2.5.02.06a.ii -U3-CP-Rev 0 "U3 ITAAC 2.5.02.06a.ii Completion Package"
47. 2.5.02.06a.ii -U4-CP-Rev 0 "U4 ITAAC 2.5.02.06a.ii Completion Package"
48. Vogtle Electric Generating Plant (VEGP) Units 3 and 4 Updated Final Safety Analysis Report (UFSAR)
49. B-GEN-ITPCI-001, "PMS CABINETS"
50. NEI 08-01, "Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52"

Attachment A
Excerpt from COL Appendix C Table 2.5.2-2*

PMS Automatic Reactor Trips*
Source Range High Neutron Flux Reactor Trip
Intermediate Range High Neutron Flux Reactor Trip
Power Range High Neutron Flux (Low Setpoint) Trip
Power Range High Neutron Flux (High Setpoint) Trip
Power Range High Positive Flux Rate Trip
Reactor Coolant Pump High-2 Bearing Water Temperature Trip
Overtemperature Delta-T Trip
Overpower Delta-T Trip
Pressurizer Low-2 Pressure Trip
Pressurizer High-2 Pressure Trip
Pressurizer High-3 Water Level Trip
Low-2 Reactor Coolant Flow Trip
Low-2 Reactor Coolant Pump Speed Trip
Low-2 Steam Generator Narrow Range Water Level Trip
High-3 Steam Generator Water Level Trip
Automatic or Manual Safeguards Actuation Trip
Automatic or Manual Depressurization System Actuation Trip
Automatic or Manual Core Makeup Tank (CMT) Injection Trip
Passive Residual Heat Removal (PRHR) Actuation Reactor Trip

Attachment B
Excerpt from COL Appendix C Table 2.5.2-3*

PMS Automatically Actuated Engineered Safety Features*
Safeguards Actuation
Containment Isolation
Automatic Depressurization System (ADS) Actuation
Main Feedwater Isolation
Reactor Coolant Pump Trip
CMT Injection
Turbine Trip (Isolated signal to non-safety equipment)
Steam Line Isolation
Steam Generator Relief Isolation
Steam Generator Blowdown Isolation
Passive Containment Cooling Actuation
Startup Feedwater Isolation
Passive Residual Heat Removal (PRHR) Heat Exchanger Alignment
Block of Boron Dilution
Chemical and Volume Control System (CVS) Makeup Line Isolation
Steam Dump Block (Isolated signal to non-safety equipment)
Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization
Auxiliary Spray and Purification Line and Zinc/Hydrogen Addition Isolation
Containment Air Filtration System Isolation
Normal Residual Heat Removal Isolation
Refueling Cavity and Spent Fuel Pool Cooling System (SFS) Isolation
In-Containment Refueling Water Storage Tank (IRWST) Injection
IRWST Containment Recirculation
CVS Letdown Isolation
Pressurizer Heater Block (Isolated signal to nonsafety equipment)
Containment Vacuum Relief
Component Cooling System Containment Isolation Valve Closure

Attachment C

Excerpt from COL Appendix C Table 2.5.2-4*

PMS Manually Actuated Functions*
Reactor Trip
Safeguards Actuation
Containment Isolation
Depressurization System Stages 1, 2, and 3 Actuation
Depressurization System Stage 4 Actuation
Feedwater Isolation
Core Makeup Tank Injection Actuation
Steam Line Isolation
Passive Containment Cooling Actuation
Passive Residual Heat Removal Heat Exchanger Alignment
IRWST Injection
Containment Recirculation Actuation
Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization
Steam Generator Relief Isolation
Chemical and Volume Control System Isolation
Normal Residual Heat Removal System Isolation
Containment Vacuum Relief

Attachment D
Excerpt from COL Appendix C Table 2.5.2-5*

Description*	Control*	Display*
Neutron Flux	-	Yes
Startup Rate	-	Yes
Reactor Coolant System (RCS) Pressure	-	Yes
Wide-range Hot Leg Temperature	-	Yes
Wide-range Cold Leg Temperature	-	Yes
RCS Cooldown Rate Compared to the Limit Based on RCS Pressure	-	Yes
Wide-range Cold Leg Temperature Compared to the Limit Based on RCS Pressure	-	Yes
Containment Water Level	-	Yes
Containment Pressure	-	Yes
Pressurizer Water Level	-	Yes
Pressurizer Water Level Trend	-	Yes
Pressurizer Reference Leg Temperature	-	Yes
Reactor Vessel-Hot Leg Water Level	-	Yes
Pressurizer Pressure	-	Yes
Core Exit Temperature	-	Yes
RCS Subcooling	-	Yes
RCS Cold Overpressure Limit	-	Yes
IRWST Water Level	-	Yes
PRHR Flow	-	Yes
PRHR HX Outlet Temperature	-	Yes
PRHR HX Inlet Isolation and Control Valve Status		Yes
Passive Containment Cooling System (PCS) Storage Tank Water Level	-	Yes
PCS Cooling Flow	-	Yes
IRWST to Normal Residual Heat Removal System (RNS) Suction Valve Status	-	Yes
Remotely Operated Containment Isolation Valve Status	-	Yes
Containment Area High-range Radiation Level	-	Yes
Containment Pressure (Extended Range)	-	Yes
CMT Level	-	Yes
Manual Reactor Trip (also initiates turbine trip)	Yes	-
Manual Safeguards Actuation	Yes	-
Manual CMT Actuation	Yes	-
Manual MCR Emergency Habitability System Actuation	Yes	-
Manual ADS Stages 1, 2, and 3 Actuation	Yes	-
Manual ADS Stage 4 Actuation	Yes	-
Manual PRHR Actuation	Yes	-
Manual Containment Cooling Actuation	Yes	-
Manual IRWST Injection Actuation	Yes	-
Manual Containment Recirculation Actuation	Yes	-
Manual Containment Isolation	Yes	-
Manual Main Steam Line Isolation	Yes	-
Manual Feedwater Isolation	Yes	-
Manual Containment Vacuum Relief	Yes	
Manual ADS and IRWST Injection Unblock	Yes	-

Note: Dash (-) indicates not applicable.

Attachment E

Excerpt from COL Appendix C Table 2.5.2-6*

PMS Blocks*
Source Range High Neutron Flux Reactor Trip
Intermediate Range High Neutron Flux Reactor Trip
Power Range High Neutron Flux (Low Setpoint) Trip
Pressurizer Low-2 Pressure Trip
Pressurizer High-3 Water Level Trip
Low-2 Reactor Coolant Flow Trip
Low-2 Reactor Coolant Pump Speed Trip
High-3 Steam Generator Water Level Trip
Low-2 Steam Generator Narrow Range Water Level Trip
ADS and IRWST Injection Actuation
Automatic Safeguards
Containment Isolation
Main Feedwater Isolation
Reactor Coolant Pump Trip
Core Makeup Tank Injection
Steam Line Isolation
Startup Feedwater Isolation
Block of Boron Dilution
Chemical and Volume Control System Isolation
Chemical and Volume Control System Letdown Isolation
Refueling Cavity and Spent Fuel Pool Cooling System (SFS) Isolation
Steam Dump Block
Auxiliary Spray and Letdown Purification Line Isolation
Passive Residual Heat Removal Heat Exchanger Alignment
Normal Residual Heat Removal System Isolation