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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Unit 4
ITAAC Closure Notification on Completion of ITAAC 2.5.01.02a [Index Number 506]

Ladies and Gentlemen:

In accordance with 10 CFR 52.99(c)(1), the purpose of this letter is to notify the Nuclear Regulatory Commission (NRC) of the completion of Vogtle Electric Generating Plant (VEGP) Unit 4 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Item 2.5.01.02a [Index Number 506] for verification that Diverse Actuating System (DAS) initiates reactor trip, actuates selected functions, and provides plant information to the operator. The closure process for this ITAAC is based on 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.

This letter contains no new NRC regulatory commitments. Southern Nuclear Operating Company (SNC) requests NRC staff confirmation of this determination and publication of the required notice in the Federal Register per 10 CFR 52.99.

If there are any questions, please contact Kelli Roberts at 706-848-6991.

Respectfully submitted,

Jamie Coleman

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Enclosure: Vogtle Electric Generating Plant (VEGP) Unit 4
Completion for ITAAC 2.5.01.02a [Index Number 506]

JMC/TL/sfr

cc: Regional Administrator, Region ll
Director, Office of Nuclear Reactor Regulation (NRR)
Director, Vogtle Project Office NRR
Senior Resident Inspector – Vogtle 3 & 4

Southern Nuclear Operating Company
ND-23-0578
Enclosure

Vogtle Electric Generating Plant (VEGP) Unit 4
Completion for ITAAC 2.5.01.02a [Index Number 506]

ITAAC Statement

Design Commitment

2.a) The DAS provides an automatic reactor trip on low wide-range steam generator water level, or on low pressurizer water level, or on high hot leg temperature, separate from the PMS.

2.b) The DAS provides automatic actuation of selected functions, as identified in Table 2.5.1-1, separate from the PMS.

2.c) The DAS provides manual initiation of reactor trip, and selected functions, as identified in Table 2.5.1-2, separate from the PMS. These manual initiation functions are implemented in a manner that bypasses the control room multiplexers, if any; the PMS cabinets; and the signal processing equipment of the DAS.

2.d) The DAS provides MCR displays of selected plant parameters, as identified in Table 2.5.1-3, separate from the PMS.

3.f) The DAS is powered by non-Class 1E uninterruptible power supplies that are independent and separate from the power supplies which power the PMS.

3.g) The DAS signal processing cabinets are provided with the capability for channel testing without actuating the controlled components.

Inspections/Tests/Analyses

Electrical power to the PMS equipment will be disconnected and an operational test of the as-built DAS will be performed using real or simulated test signals.

Electrical power to the PMS equipment will be disconnected and an operational test of the as-built DAS will be performed using real or simulated test signals.

Electrical power to the control room multiplexers, if any, and PMS equipment will be disconnected and the outputs from the DAS signal processing equipment will be disabled. While in this configuration, an operational test of the as-built system will be performed using the DAS manual actuation controls.

Electrical power to the PMS equipment will be disconnected and inspection will be performed for retrievability of the selected plant parameters in the MCR.

Electrical power to the PMS equipment will be disconnected. While in this configuration, a test will be performed by providing simulated test signals in the non-Class 1E uninterruptible power supplies.

Channel tests will be performed on the as built system.

Acceptance Criteria

The generator field control relays (contained in the control cabinets for the rod drive motor-generator sets) open after the test signal reaches the specified limit.

Appropriate DAS output signals are generated after the test signal reaches the specified limit.

i) The generator field control relays (contained in the control cabinets for the rod drive motor-generator sets) open after reactor and turbine trip manual initiation controls are actuated.

ii) DAS output signals are generated for the selected functions, as identified in Table 2.5.1-2, after manual initiation controls are actuated.

The selected plant parameters can be retrieved in the MCR.

A simulated test signal exists at the DAS equipment when the assigned non-Class 1E uninterruptible power supply is provided the test signal.

The capability exists for testing individual DAS channels without propagating an actuation signal to a DAS controlled component.

ITAAC Determination Basis

Multiple inspections and tests were performed to verify the Diverse Actuation System (DAS) initiates reactor trip, actuates selected functions, and provides plant information to the operator. The inspections and tests for DAS verified that:

- The DAS provides an automatic reactor trip separate from the Protection and Safety Monitoring System (PMS) on each of the following signals:
    - low wide-range steam generator water level
    - low pressurizer water level
    - high hot leg temperature
- The DAS provides automatic actuation of selected functions, as identified in Combined License (COL) Appendix C Table 2.5.1-1 (Attachment A), are separate from the PMS.
- The DAS provides manual initiation of reactor trip (the generator field control relays open after a reactor and turbine trip manual initiation). The manual initiation function bypasses the PMS cabinets and the signal processing equipment of the DAS.
- The DAS provides manual initiation of selected functions, as identified in Table 2.5.1-2, (Attachment B) other than manual reactor and turbine trip. The manual initiation function bypasses the PMS cabinets and the signal processing equipment of the DAS.
- The DAS provides MCR displays of selected plant parameters, as identified in Table 2.5.1-3, (Attachment C) separate from the PMS.
- The DAS is powered by non-Class 1E uninterruptible power supplies that are independent and separate from the power supplies which power the PMS.
- The as-built DAS signal processing cabinets are provided with the capability for channel testing without actuating the controlled components.

The generator field control relays (contained in the control cabinets for the rod drive motor-generator sets) open after the test signal reaches the specified limit.

Testing was performed in accordance with the Unit 4 ITP work order and preoperational test procedure listed in Reference 1 to confirm that with electrical power to the Protection and Safety Monitoring System (PMS) equipment removed, an operational test of the as-built DAS using simulated test signals, provided an automatic reactor trip separate from the PMS for each of the following signals:

- low wide-range steam generator water level
- low pressurizer water level
- high hot leg temperature

Initially, PMS was de-energized and the generator field control relays for the control rod motor-generator (MG) sets were verified to be closed through local verification. The DAS instruments have simulated signals generated for each of the following parameters:

- wide-range steam generator level
- pressurizer level
- hot leg temperature

When the required setpoints and logic for instrumentation actuation were met, the generator field control relays of the control rod MG sets were locally verified to trip open. This testing verified that exceeding the actuation setpoint will generate a reactor trip for each of these distinct parameters. The DAS processor cabinet 1 was utilized to confirm reactor trip status.

The completed test results (Reference 1) confirmed that the generator field control relays (contained in the control cabinets for the rod drive MG sets) open after the test signal reaches the specified limit.

Appropriate DAS output signals are generated after the test signal reaches the specified limit.

Testing was performed in accordance with ITP work order and preoperational test procedure listed in Reference 1 to confirm that with electrical power to the PMS equipment removed, the DAS provided automatic actuation of selected functions, as identified in Combined License (COL) Appendix C Table 2.5.1-1 (Attachment A), separate from the PMS.

Initially, PMS was de-energized and test instruments were connected to the DAS instruments to provide simulated signals. Initial conditions of components involved for the following selected functions were verified prior to test initiation.

- Initially, the Reactor Trip relay and Turbine Trip relay were verified in the non-actuated condition. Reactor and Turbine Trip were simulated on each of:
    - Low Wide-range Steam Generator Water Level
    - Low Pressurizer Water Level
    - High Hot Leg Temperature

  Once the simulated test signal reached the specified limit, actuation of the automatic Reactor Trip relay and Turbine Trip relay were verified locally.

- Initially, solenoid actuation valves for the Passive Residual Heat Removal (PRHR) Heat Exchanger (HX) Outlet valves and the In-containment Refueling Water Storage Tank (IRWST) Gutter Isolation valves were verified in the non-actuated condition. PRHR Actuation and IRWST Gutter Isolation were simulated on each of:
    - Low Wide-range Steam Generator Water Level
    - High Hot Leg Temperature

  Once the simulated test signal reached the specified limit, actuation of the solenoid actuation valves for the PRHR HX Outlet valves and the IRWST Gutter Isolation valves were verified locally.

- Initially, the solenoid actuation valve for the Core Makeup Tank (CMT) outlet valves and the Reactor Coolant Pumps (RCP) Non-1E beakers were verified in the non-actuated condition. CMT outlet valves actuation and Trip of RCP breakers were simulated on each of:
    - Low Wide-Range Steam Generator Water Level
    - Low Pressurizer Water Level

  Once the simulated test signal reached the specified limit, actuation of the solenoid actuation valve for the CMT outlet valves and trip of the RCP switchgear Non-1E circuit breakers were verified locally.

- Initially, the PCS outlet motor-operated valve was verified closed and the solenoid actuation valves for the Passive Containment Cooling System (PCS) outlet valves and selected Containment Isolation valves identified in Combined License (COL) Appendix C Table 3.7-1 (Attachment D) were verified in the non-actuated condition. Isolation of selected Containment Penetrations and Initiation of PCS were simulated on High Containment Temperature. Once the simulated test signal reached the specified limit, the PCS outlet motor-operated valve was verified open and actuation of the solenoid actuation valves for PCS outlet valves and selected Containment Isolation valves identified in Attachment D were verified locally.

The completed test results (Reference 1) confirmed that the appropriate DAS output signals are generated after the test signal reaches the specified limit.

<u>i) The generator field control relays (contained in the control cabinets for the rod drive motor-generator sets) open after reactor and turbine trip manual initiation controls are actuated.</u>

Testing was performed in accordance with ITP work order and preoperational test procedure listed in Reference 1 to confirm that the DAS provided manual initiation of reactor trip while the PMS cabinets and the signal processing equipment of the DAS were bypassed.

The preoperational test de-energized the PMS cabinet power supplies (no multiplexer exists) and prevented DAS automatic output actuation by placing DAS in Master Test. These conditions ensured that the actuations tested were caused by the DAS manual functions. Testing was performed by initially verifying the generator field control relays were closed locally and then manually actuating the DAS manual functions to trip the reactor and turbine. During the manual reactor and turbine trip, the generator field control relays were verified to open locally by inspection at the motor-generator set control cabinets.

The completed test results (Reference 1) confirmed that the generator field control relays (contained in the control cabinets for the rod drive motor-generator sets) open after reactor and turbine trip manual initiation controls were actuated.

ii) DAS output signals are generated for the selected functions, as identified in Table 2.5.1-2, after manual initiation controls are actuated.

Testing was performed in accordance with ITP work order and preoperational test procedure listed in Reference 1 to confirm that the DAS provided manual initiation of selected DAS manual functions identified in Combined License (COL) Appendix C Table 2.5.1-2 (Attachment B) while the PMS cabinets and the signal processing equipment of the DAS were bypassed.

The preoperational test de-energized the PMS cabinet power supplies (no multiplexer exists) and prevented DAS automatic output actuation by placing DAS in Master Test. These conditions ensured that the actuations tested were caused by the DAS manual functions. Testing was performed by manually actuating selected DAS manual functions identified in Attachment B. During the testing of the manual functions, the DAS output signal was verified for each selected function by relay contact inspection in the DAS cabinets.

The completed test results (Reference 1) confirmed that the DAS output signals were generated for the selected functions, as identified in Table 2.5.1-2 after manual initiation controls were actuated.

The selected plant parameters can be retrieved in the MCR.

Testing was performed in accordance with ITP the work order and preoperational test procedure listed in Reference 2 to confirm that the DAS provided MCR displays of selected plant parameters, as identified in Combined License (COL) Appendix C Table 2.5.1-3 (Attachment C), separate from the PMS.

The preoperational test included inspections (checks) that with electrical power to the PMS equipment disconnected, analog signals provided an indication at the DAS panel in the MCR for the Sensors and Displays as identified in Attachment C. Testing was performed by simulating an analog signal and then inspection was performed to check that appropriate indication was retrieved in the MCR.

The completed test results (Reference 2) confirmed that the selected plant parameters can be retrieved in the MCR.

A simulated test signal exists at the DAS equipment when the assigned non-Class 1E uninterruptible power supply is provided the test signal.

Testing was performed in accordance with the Unit 4 component test package and preoperational test procedure listed in Reference 3 to verify that the non-Class 1E power supply to DAS was independent from the Class 1E power supplied to the PMS.

The PMS cabinet power supplies were de-energized and testing was performed by verifying uninterruptible power from the non-Class 1E DAS power supply was present at the DAS equipment.

The completed test results (Reference 3) confirmed that a simulated test signal exists at the DAS equipment when the assigned non-Class 1E uninterruptible power supply was provided the test signal.

The capability exists for testing individual DAS channels without propagating an actuation signal to a DAS controlled component.

Testing was performed in accordance with Reference 4 to confirm that the DAS signal processing cabinets were provided with the capability for channel testing without actuating the controlled components.

Factory Acceptance Testing (FAT) was performed to ensure that the capability exists for testing individual DAS channels without propagating an actuation signal to a DAS controlled component, as designed (Reference 4). FAT was performed and followed the guidance of NEI 08-01 (Reference 5) Section 9.4 for the as-built test to be performed at other than the final installed location. Two test cases were performed for each applicable channel. First, two related channels were set into the trip state, causing an automatic actuation and the Actuation Relay to activate. The channel bypass was then turned on and the maintenance display was confirmed to revert to the non-actuated state, confirming the that with the bypass set, the test signal does not propagate to the controlled component. The Master Test mode blocks were then tested. The Master Test mode was turned on, preventing any automatic actuation from propagating to the field. The test cart then individually placed the channel into the trip state by injecting a test signal on the sensor input, and the Output Relay was confirmed to have no actuation, proving the Master Test mode is capable of preventing an automatic actuation signal from propagating to the component. This testing was repeated until the RCS High Hot Leg Temperature, Low Wide-range Steam Generator Water Level, Low Pressurizer Water Level, and High Containment Temperature variables in all DAS channels had been tested.

The completed test results (Reference 4) confirmed that the capability exists for testing individual DAS channels without propagating an actuation signal to a DAS controlled component.

References 1 through 4 are available for NRC inspection as part of Unit 4 ITAAC 2.5.01.02a Completion Package (Reference 6).

ITAAC Finding Review

In accordance with plant procedures for ITAAC completion, Southern Nuclear Operating Company (SNC) performed a review of all ITAAC findings pertaining to the subject ITAAC and associated corrective actions. This review found there were no relevant findings associated with this ITAAC. The review is documented in the ITAAC Completion Package (Reference 6) and is available for NRC review.

ITAAC Completion Statement

Based on the above information, SNC hereby notifies the NRC that ITAAC 2.5.01.02a was performed for VEGP Unit 4 and that the prescribed acceptance criteria are met.

Systems, structures, and components verified as part of this ITAAC are being maintained in their as-designed, ITAAC compliant condition in accordance with approved plant programs and procedures.

References (available for NRC inspection)

1. SV4-DAS-ITR-800506, Rev 0, " ITAAC Technical Report, Unit 4 DAS Automatic and Manual Actuations, ITAAC 2.5.01.02a Items 2.a, 2.b, and 2.c, NRC Index Number: 506"
2. SV4-DAS-ITR-801506, Rev 0, “ITAAC Technical Report, Unit 4 DAS MCR Displays, ITAAC 2.5.01.02a Item 2.d, NRC Index Number: 506”
3. SV4-DAS-ITR-802506, Rev. 0, “ITAAC Technical Report, Unit 4 DAS Power Supply, ITAAC 2.5.01.02a Item 3.f, NRC Index Number: 506”
4. SV4-DAS-T2-900, Rev. 1, “Vogtle Unit 4 AP1000 Diverse Actuation System ITAAC 2.5.01.02a Principal Closure Document Review”
5. NEI 08-01, Rev. 5, “Industry Guideline for the ITAAC Closure Process under 10 CFR Part 52”
6. 2.5.01.02a-U4-CP-Rev0, “ITAAC Completion Package”

Attachment A

COL Appendix C Table 2.5.1-1

Table 2.5.1-1 **Functions Automatically Actuated by the DAS**
1. Reactor and Turbine Trip on Low Wide-range Steam Generator Water Level or Low Pressurizer Water Level or High Hot Leg Temperature
2. Passive Residual Heat Removal (PRHR) Actuation and In-containment Refueling Water Storage Tank (IRWST) Gutter Isolation on Low Wide-range Steam Generator Water Level or on High Hot Leg Temperature
3. Core Makeup Tank (CMT) Actuation and Trip All Reactor Coolant Pumps on Low Wide-Range Steam Generator Water Level or Low Pressurizer Water Level
4. Isolation of Selected Containment Penetrations and Initiation of Passive Containment Cooling System (PCS) on High Containment Temperature

Attachment B

COL Appendix C Table 2.5.1-2

Table 2.5.1-2 **Functions Manually Actuated by the DAS**
1. Reactor and Turbine Trip
2. PRHR Actuation and IRWST Gutter Isolation
3. CMT Actuation and Trip All Reactor Coolant Pumps
4. First-stage Automatic Depressurization System (ADS) Valve Actuation
5. Second-stage ADS Valve Actuation
6. Third-stage ADS Valve Actuation
7. Fourth-stage ADS Valve Actuation
8. PCS Actuation
9. Isolation of Selected Containment Penetrations
10. Containment Hydrogen Igniter Actuation
11. IRWST Injection Actuation
12. Containment Recirculation Actuation
13. Actuate IRWST Drain to Containment

Attachment C

COL Appendix C Table 2.5.1-3

Table 2.5.1-3 DAS Sensors and Displays	
Equipment Name	**Tag Number**
Reactor Coolant System (RCS) Hot Leg Temperature	RCS-300A
RCS Hot Leg Temperature	RCS-300B
Steam Generator 1 Wide-range Level	SGS-044
Steam Generator 1 Wide-range Level	SGS-045
Steam Generator 2 Wide-range Level	SGS-046
Steam Generator 2 Wide-range Level	SGS-047
Pressurizer Water Level	RCS-305A
Pressurizer Water Level	RCS-305B
Containment Temperature	VCS-053A
Containment Temperature	VCS-053B
Core Exit Temperature	IIS-009
Core Exit Temperature	IIS-013
Core Exit Temperature	IIS-030
Core Exit Temperature	IIS-034
Rod Control Motor Generator Voltage	PLS-001
Rod Control Motor Generator Voltage	PLS-002

Attachment D

*Excerpted from COL Appendix C Table 3.7-1

Table 3.7-1 Risk-Significant Components	
***Equipment Name**	***Tag Number**
Containment Isolation Valves Controlled by DAS	CVS-PL-V045, -V047 VFS-PL-V003, -V004, -V009, -V010 WLS-PL-V055, -V057