



May 3, 2016
NND-16-0132
10 CFR 52.99(c)(1)

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

Subject: Virgil C. Summer Nuclear Station (VCSNS) Unit 2
Combined License No. NPF-93
Docket Number 52-027
ITAAC Closure Notification on Completion of ITAAC 2.5.01.03c [Index No. 513]

Attachments: References

The purpose of this letter is to notify the Nuclear Regulatory Commission (NRC) in accordance with 10 CFR 52.99(c)(1) of the completion of Virgil C. Summer Nuclear Station (VCSNS) Unit 2 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Item 2.5.01.03c for verifying that any Diverse Actuation System (DAS) algorithms, logic, program architecture, executable operating systems, and executable software/logic are different than those used in the Protection and Safety Monitoring System (PMS). The closure process for this ITAAC is based on the guidance described in NEI 08-01 (Reference 1), which was endorsed by the NRC in Regulatory Guide 1.215.

ITAAC Statement

Design Commitment:

3.c) Software diversity between the DAS and PMS will be achieved through the use of different algorithms, logic, program architecture, executable operating system, and executable software/logic.

Inspections, Tests, Analyses:

Inspection of the DAS and PMS design documentation will be performed.

Acceptance Criteria:

Any DAS algorithms, logic, program architecture, executable operating systems, and executable software/logic are different than those used in the PMS.

ITAAC Determination Basis

An inspection of design documentation was performed to verify the algorithms, logic, program architecture, executable operating systems, and executable software/logic used within the DAS are different than those used in the PMS (including the Common Q and the Component Interface Module (CIM) subsystem).

The basis of diversity used for prevention of common mode failure is established by Sections 2.6.3 and 3.2.6 of NUREG/CR-6303, "Method for Performing Diversity and Defense-In-Depth Analyses of Reactor Protection Systems" (Reference 2). The DAS and PMS software were assessed on the elements of diversity established within the ITAAC Acceptance Criteria. The results of the inspection are documented in the AP1000 Diverse Actuation System Diversity Analysis report (Reference 3). A summary of the observed differences between the DAS and PMS software are shown in the table below:

Diversity Type	DAS	PMS	
		Common Q	CIM Subsystem
Algorithms	Simple mathematical conversion calculations reviewed and found to be different from the PMS Cyclic Redundancy Check operations with different code implementation from the CIM subsystem	Numerous calculations based on complex operations found to be different than DAS	Cyclic Redundancy Check operations with different code implementation from DAS
Logic	Unique Gate Structure associated with DAS-specific Field Programmable Gate Array (FPGA) technology	Logic performed within software	Unique Gate Structure associated with CIM-specific FPGA technology
Program Architecture	DAS-specific FPGA technology	Central Processing Unit (CPU) Based	CIM-specific FPGA technology
Executable Operating Systems	None used	Proprietary Operating Systems	None used
Executable Software/Logic	<i>Executable Software:</i> <ul style="list-style-type: none"> None Used <i>Executable Logic:</i> <ul style="list-style-type: none"> Unique Gate Structure associated with DAS-specific FPGA technology (Programmed using a hardware description language) 	<i>Executable Software:</i> <ul style="list-style-type: none"> Mix of proprietary and common programming language <i>Executable Logic:</i> <ul style="list-style-type: none"> None used 	<i>Executable Software:</i> <ul style="list-style-type: none"> None used <i>Executable Logic:</i> <ul style="list-style-type: none"> Unique Gate Structure associated with CIM-specific FPGA technology (Programmed using a hardware description language)

The AP1000 Diverse Actuation System Diversity Analysis report concludes that software diversity between the DAS and PMS has been achieved through the use of different algorithms, logic, program architecture, executable operating systems, and executable software/logic.

ITAAC Finding Review

In accordance with plant procedures for ITAAC completion, SCE&G performed a review of all findings pertaining to the subject ITAAC and associated corrective actions. This review found that there are no relevant ITAAC findings associated with this ITAAC. The ITAAC completion review is documented in the ITAAC Completion Package for ITAAC 2.5.01.03c (Reference 4) and available for NRC inspection.

ITAAC Completion Statement

Based on the above information, SCE&G hereby notifies the NRC that ITAAC 2.5.01.03c was performed for VCSNS Unit 2 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.

We request NRC staff confirmation of this determination and publication of the required notice in the Federal Register per 10 CFR 52.99(e)(1).

If there are any questions, please contact Nick Kellenberger at (803) 941-9834.

Sincerely,



April R. Rice
Manager
Nuclear Licensing
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References (available for NRC inspection):

1. NEI 08-01, Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52.
2. NUREG/CR-6303, Method for Performing Diversity and Defense-in-Depth Analyses of Reactor Protection Systems
3. APP-DAS-JOR-002, AP1000 Diverse Actuation System Diversity Analysis
4. ITAAC 2.5.01.03c Completion Package