April R. Rice
Manager
New Nuclear Licensing

July 5, 2017
NND-17-0397
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 3
Combined License No. NPF-94
Docket Number 52-028
ITAAC Closure Notification on Completion of ITAAC 2.5.02.14 [Index No. 553]

Attachments: (1) References
(2) CIM Life Cycle Process

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 3 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Item 2.5.02.14 for verifying the Component Interface Module (CIM) was developed using a planned design process which provides for specific design documentation and reviews. 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.

Virgil C. Summer Nuclear Station previously submitted ITAAC Closure Notification on Completion of VCSNS Unit 3 ITAAC 2.5.02.14 [Index Number 553], NND-17-0087 [ML17051A013], dated February 20, 2017. This resubmittal provides additional details requested by the staff during public meetings and supersedes NND-17-0087 in its entirety.

ITAAC Statement

Design Commitment:

14. *The Component Interface Module (CIM) is developed using a planned design process which provides for specific design documentation and reviews.*

    {Design Acceptance Criteria}

Inspections, Tests, Analyses:

An inspection and or an audit will be performed of the processes used to design the hardware, development software, qualification and testing.

Acceptance Criteria:

A report exists and concludes that CIM meets the below listed life cycle stages.

Life cycle stages:

a. Design requirements phase, may be referred to as conceptual or project definition phase
b. System definition phase
c. Hardware and software development phase, consisting of hardware and software design and implementation
d. System integration and test phase
e. Installation phase

ITAAC Determination Basis

An inspection was performed of the processes used to design, develop, qualify, and test the Component Interface Module (CIM) and the implementing documents to demonstrate that the CIM meets the below listed life cycle stages:

a. Design requirements phase, may be referred to as conceptual or project definition phase
b. System definition phase
c. Hardware and software development phase, consisting of hardware and software design and implementation
d. System integration and test phase
e. Installation phase

The methodology used to develop the CIM life cycle process is based on Institute of Electrical and Electronics Engineers (IEEE) Standard 1074-1995 (Reference 2) (as endorsed by Regulatory Guide 1.173, Revision 0, "Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants"). The CIM life cycle process defines the required plans / procedures needed to develop CIM and inputs and outputs of each phase of development (i.e., life cycle stages).

The life cycle processes were applied to the Component Interface Module (CIM/ Field Programmable Gate Array (FPGA) based), the Safety Remote Node Controller (SRNC / FPGA based) and associated hardware (e.g., Transition Panels) since they are an integral part of the CIM.

Attachment 2 provides a summary of each phase, the processes used and key outputs resulting from each phase.

During the planning / project definition phase, process plans were developed for each stage of the life cycle, including an Independent Verification and Validation (IV&V) plan using IEEE Standard 1012-1998 (Reference 3). At each phase of the project, an inspection was performed of the applicable phase outputs per the CIM-SRNC IV&V plan to verify that the requirements of each phase have been met. At the completion of CIM development, an IV&V Summary Report was issued showing that CIM-SRNC was developed using the approved processes.

CIM qualification was performed in accordance with the methods described in the VCS Unit 2 & 3 Updated Final Safety Analysis Report, Appendix 3D, "Methodology for Qualifying AP I000 Safety-Related Electrical and Mechanical Equipment" (Reference 4). Review of equipment qualification documentation concluded that the qualification was completed in accordance with the AP1000 Equipment Qualification Methodology as documented in ITAAC 2.5.02.14: Component Interface Module Design Process Technical Report (Reference 5).

The results of inspection are documented in Reference 5 and conclude that CIM meets the following life cycle stages:

a. Design requirements phase, may be referred to as conceptual or project definition phase
b. System definition phase
c. Hardware and software development phase, consisting of hardware and software design and implementation
d. System integration and test phase
e. Installation phase testing

ITAAC Finding Review

In accordance with plant procedures for ITAAC completion, SCE&G performed a review of ITAAC findings pertaining to the subject ITAAC and associated corrective actions. This review found four (4) Notices of Nonconformance (NON) associated with this ITAAC:

1. Notice of Nonconformance 99900404/2014-201-01
2. Notice of Nonconformance 99900404/2014-201-02
3. Notice of Nonconformance 99901404/2011-201-04
4. Notice of Nonconformance 99901404/2011-201-05

The corrective actions for each finding have been completed and each finding is closed. The review is documented in the V.C. Summer Unit 3 ITAAC completion package for ITAAC 2.5.02.14 (Reference 6), which is available for NRC inspection.

ITAAC Completion Statement

Based on the above information, SCE&G hereby notifies the NRC that ITAAC 2.5.02.14 was performed for VCSNS Unit 3 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 Ryder Thompson at (803) 941-9812.

Sincerely,

April R. Rice
Manager
Nuclear Licensing
New Nuclear Deployment

RT/AR/hz

cc. Document Control Desk
William Jones- NRC
Tomy Nazario – Senior Resident
Patrick Heher - NRC
Thomas R. Fredette – NRC
Billy Gleaves – NRC
James Reece – NRC
Michael Ernstes – NRC
Marion Cherry – Santee Cooper
Stephen A. Byrne – SCE&G
Jeffrey B. Archie – SCE&G
Ronald A. Jones – SCE&G
Alan Torres – SCE&G
Ryder Thompson – SCE&G
Nick Kellenberger – SCE&G
April Rice – SCE&G
Justin Bouknight – SCE&G
Alvis J. Bynum – SCE&G
Kyle Young – SCE&G
Cynthia Lanier – SCE&G
Kathryn M. Sutton – Morgan Lewis
Carl Churchman – Westinghouse
William Macecevic – Westinghouse
Brian McIntyre – Westinghouse
Curtis Castell – WECTEC
Chuck Baucom – WECTEC
Peter Leroy – WECTEC
vcsummeremail@westinghouse.com
vcsummer2&3project@westinghouse.com
DCRM-EDMS@SCANA.COM

Attachment 1

References (available for NRC inspection):

1. NEI 08-01, “Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52.”

2. IEEE Std. 1074-1995, “IEEE Standard for Developing Software Life Cycle Processes”

3. IEEE Std. 1012-1998, “IEEE Standard for Software Verification and Validation”

4. V.C. Summer Unit 2 & 3 Updated Final Safety Analysis Report, Appendix 3D, “Methodology for Qualifying AP1000 Safety-Related Electrical and Mechanical Equipment”

5. APP-GW-GLR-611, “ITAAC 2.5.02.14: Component Interface Module Design Process Technical Report”

6. ITAAC 2.5.02.14 Completion Package

Attachment 2

CIM Life Cycle Process

Acceptance Criteria	Phase Description	Process Followed	Phase Result
a. Design requirements phase	During the concept portion of the design requirements phase, the project requirements of the CIM subsystem (CIM and Safety Remote Node Controller [SRNC]) are developed.	Strategy and Concept Exploration: - Defining overall project strategy, schedule, milestones, assurance requirements and verification strategy - Exploring conceptual approaches to new CIM/SRNC design. Considerations include budgetary data and life cycle constraints and benefits Design Reviews: - Reviewing and providing feedback on project requirements documents	- CIM-SRNC Development Project Plan - SRNC Requirements Specification - CIM Logic Specification - CIM Hardware Requirements Specification Acronyms: CIM: Component Interface Module SRNC: Safety Remote - Node Controller
	During the planning portion of the design requirements phase, planning documents created.	CIM-SRNC Project Plan: - Establishes a high level description of project, identifies key personnel and project deliverables, identifies Standards and regulatory requirements, and establishes controls for supplier control and software development CIM-SRNC Requirements Specifications: - Identifies hardware and functional requirements for the CIM and SRNC CIM Logic Specification: - Identifies the functional logic requirements for the CIM	- CIM-SRNC Software Program Manual - CIM-SRNC Management Plan - CIM-SRNC Quality Assurance Plan - CIM-SRNC Independent Verification and Validation (IV&V) Plan - CIM-SRNC Configuration Management Plan - CIM-SRNC Test Plan - CIM-SRNC Field Programmable Gate Array (FPGA) Development Plan

Acceptance Criteria	Phase Description	Process Followed	Phase Result
b. System definition phase	During the system definition phase, the software and hardware requirements are developed.	CIM-SRNC FPGA Development Plan: - Guides the development and documentation of software requirements CIM-SRNC FPGA Development Procedure: - FPGA requirements are derived from higher-level requirements CIM-SRNC IV&V Plan: - Independently reviews software requirements documents by the IV&V team	- CIM and SRNC FPGA Requirements Specifications - CIM and SRNC Requirements Traceability Matrices - CIM-SRNC Software Hazards Analysis Report - CIM and SRNC Reliability Analyses - CIM-SRNC IV&V Phase Summary Report
c. Hardware and software development phase	During the design portion of the hardware and software development phase, the software and hardware design documentation describing architecture and interface is generated.	CIM-SRNC FPGA Development Plan: - Controls the design of the CIM and SRNC software CIM-SRNC Configuration Management Plan: - Guides the production of CIM and SRNC FPGA designs and design documents CIM-SRNC IV&V Plan - Describes the techniques, procedures, and methodologies used to provide IV&V for the CIM-SRNC development	- CIM and SRNC FPGA Software Design Descriptions - CIM-SRNC IV&V Phase Summary Report
	During the implementation portion of the hardware and software development phase, software is developed and hardware is manufactured.	CIM-SRNC Design Tools: - Describes the tools approved for use in developing the software designs CIM-SRNC Test Plan: - Controls the process of verifying the CIM and SRNC designs meet functional requirements CIM-SRNC Management Plan: - Guides the production of CIM and SRNC hardware designs and design documents CIM-SRNC IV&V Plan - Describes the techniques, procedures, and methodologies used to provide IV&V for the CIM-SRNC development	- FPGA Code Binary Files - CIM-SRNC Software Hazard Analysis Report - CIM and SRNC Reliability Analyses - CIM-SRNC Hardware Drawings - CIM and SRNC Components

Acceptance Criteria	Phase Description	Process Followed	Phase Result
d. System integration and test phase	During the system integration phase, both the software and hardware are integrated and tested.	CIM and SRNC FPGA Build Procedures: - Controls the process of converting software into gate logic and flashing that logic to the target FPGAs CIM-SRNC Test Plan: - Controls engineering testing used to verify functionality and function requirements CIM-SRNC Subsystem Test Procedure: - Controls the validation testing of the FPGA Logic CIM-SRNC IV&V Plan - Describes the techniques, procedures, and methodologies used to provide IV&V for the CIM-SRNC development.	- CIM-SRNC IV&V Simulation Environment Test Report - CIM-SRNC Subsystem Test Report - CIM-SRNC IV&V Phase Summary Report
e. Installation phase	During the installation phase, the Field Programmable Gate Array (FPGA) design are installed into the hardware and verified through production testing.	FPGA Logic Loading Procedures: - Controls the installation of the FPGAs into the Printed Circuit Board Assemblies Final Acceptance Testing Procedures: - Controls the validation testing for the full CIM and SRNC assemblies CIM-SRNC IV&V Plan - Describes the techniques, procedures, and methodologies used to provide IV&V for the CIM-SRNC development	- Manufacturing Records for chip flashing, testing, inspections, etc. - CIM-SRNC IV&V Phase Summary Report