Enclosure
Attachment 5
PG&E Letter DCL-13-028

Invensys Operations Management Document "993754-1-813, Revision 2, Validation Test Plan" (Non-Proprietary)

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Project:	**PG&E PROCESS PROTECTION SYSTEM REPLACEMENT**
Purchase Order No.:	3500897372
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PACIFIC GAS & ELECTRIC COMPANY

NUCLEAR SAFETY-RELATED PROCESS PROTECTION SYSTEM REPLACEMENT DIABLO CANYON POWER PLANT

VALIDATION TEST PLAN (VTP)

Document No. 993754-1-813 (-NP)

Revision 2

December 18, 2012

Non -Proprietary copy per 10CFR2.390
- Areas of Invensys Operations Management proprietary information, marked as [P], have been redacted based on 10CFR2.390(a)(4).

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1. Purpose and Scope

1.1. Purpose

The purpose of this Validation Test Plan (VTP) is to prescribe the scope, approach, and resources of the testing activities that are required to be performed for the V10 Tricon portion of the Diablo Canyon Power Plant (DCPP) Process Protection System (PPS) to support the following:

- To detail the activities required to prepare for and conduct the system integration tests.
- To identify the tasks for responsible teams to perform and the schedule to be followed in performing the tasks.
- To define the sources of the information used to prepare the plan.
- To define the test tools and environment needed to conduct the system test.

1.2. Scope

The DCPP PPS system is classified as nuclear safety related (Class 1E), and all project nuclear safety related activities shall comply with the applicable requirements of Invensys Operations Management Nuclear Quality Assurance Manual (IOM-Q2) [Ref 2.4.1] and any additional quality requirements specified in the Project Management Plan (PMP) [Ref 2.4.5], Project Quality Plan (PQP)[Ref 2.4.6], Software Quality Assurance Plan (SQAP) [Ref 2.4.7], and Software Verification and Validation Plan (SVVP) [Ref 2.4.8].

This VTP will address safety concerns during the development of Protection Set software test specifications, procedures and test cases, Pre- Factory Acceptance Test (Pre-FAT) and Factory Acceptance Test (FAT). Software-contributed hazards will be tracked and mitigated adequately throughout the development lifecycle (via the Project Traceability Matrix (PTM) and Hazard Tracking List). The performance of assessments of the software safety mitigation effort and their effectiveness shall be addressed in each phase summary report and final report.

This VTP is prepared in accordance with PPM 6.0 (Test Control), PPM 7.0 (Application Program Development), and follows the guidelines described in IEEE 1012-1998 "IEEE Standard for Software Verification and Validation" [Ref 2.1.1].

The PPS is composed of four separate Protection Sets: Protection Set I, Protection Set II, Protection Set III, and Protection Set IV, each comprising the V10 Tricon, the Westinghouse Advanced Logic System (ALS) platform, and the Maintenance Workstation (MWS). The ALS and MWS are not within scope of supply of this project.

The test scope of this project will include hardware of all four V10 Tricon Protection Sets and their related TriStation Application Projects (TSAP). MWS and the communication peripherals (Media converters and NetOptics Port aggregator Taps) will be utilized as test tools for complete interface tests between V10 Tricon Protection Set and MWS. FAT for all four V10 Tricon Protection Sets and FAT for all MWS computers will be executed by different project teams and

coordinated within the same time frame to ensure all project requirements for IOM FAT will be covered.

ALS 4-20 milliamp resistance temperature detector (RTD) inputs to the V10 Tricon will be simulated during the Factory Acceptance Test (FAT). Refer to the Hardware Requirements Specification (HRS) [Ref 2.4.9] for additional information.

From here on, the V10 Tricon portion of the Protection Set will be referred to as V10 Tricon Protection Set and the safety related TriStation Application Project will be denoted as TSAP.

1.3. Test Plan Overview

This VTP covers a full system test for the V10 Tricon four (4) Protection Sets. This includes application functions, system interfaces, and system performance (e.g., response time). This VTP addresses only the safety related TSAP V10 Tricon Protection Set application code developed using TriStation 1131 Developer's Workbench Software (TS 1131). This VTP does not include V&V of the TS1131 programming tool, which will be used to develop the TSAP software. Hardware and software procured by vendors other than Invensys Operations Management will be verified and validated by the originating organization under separate programs. For specific system requirements, refer to the Software Requirement Specifications (SRS) [Ref 2.4.10] and HRS [Ref 2.4.9].

Testing is performed to ensure satisfactory hardware, software and integration system performance in accordance with Tricon SRSs and HRSs. Measurement and Test Equipment (M&TE) calibration shall be performed before testing activity and traceable to National Institute of Standards and Technology (NIST). Measures will be taken to establish that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within acceptable limits. Tests performed as part of system integration include:

- Pre-Factory Acceptance Test (pre-FAT)
- Hardware Validation Test (HVT)
- Factory Acceptance Test (FAT)

1.3.1. Pre-Factory Acceptance Test (pre-FAT)

The purpose of the Pre-Factory Acceptance Test (pre-FAT) is to ensure that the FAT procedure is developed properly in accordance with the V10 Tricon Protection Set for PPS hardware, TSAP, and associated components function as designed in an operating integrated system environment.

The Pre-Factory Acceptance Test (Pre-FAT) informally executes the Factory Acceptance Test procedures to determine their suitability, correctness, completeness, and efficiency of the test procedures. Results from the Pre-FAT may be used to identify integration deficiencies. However, the primary goal of the Pre-FAT is to improve the test procedures themselves prior to the initial run of the FAT.

1.3.2. Hardware Validation Test (HVT)

The purpose of the Hardware Validation Test (HVT) is to validate that the V10 Tricon Protection Set hardware and interfacing hardware components function as designed in an operating integrated system environment prior to FAT.

The HVT is developed in accordance with Project Procedures Manual (PPM) 6.0. In order to complete the HVT, each test item must be initialed by test personnel and at the end of each test section an initial and date is required from test personnel, QA, and a Pacific Gas and Electric representative.

The HVT will be performed by simulating Analog Inputs (AI) and Digital Inputs (DI) using M&TE at the terminal blocks which are processed and made available to the non safety-related MWS via the media converters and NetOptics Port Aggregator Taps. The CAPE Software and applicable I/O modules together with hardware test software TSAP and TriStation laptop will be utilized to manipulate point values and display status as necessary.

1.3.3. Factory Acceptance Test (FAT)

The purpose of the Factory Acceptance Test (FAT) is to validate that:

- The TSAP properly working with V10 Tricon Protection Set hardware and associated components function as designed in an operating integrated system environment.
- Complete Interface between V10 Tricon with Field I/O and MWS (via media converters and NetOptics Port Aggregator Taps).

Note that V10 Tricon System software verification testing will be conducted prior to the FAT as part of verification and validation (V&V) of the V10 Tricon Protection Set software application under separate procedures. Software verification testing is conducted during the Implementation Phase of the project lifecycle – see the Software Verification and Validation Plan [Ref 2.4.8] for additional information.

FAT procedures are developed to validate the system requirements as described in HRS, SRS, and System Design Drawings that have been verified and documented in the PTM. Systematic testing will be based on the functional diagrams series drawings [Ref 2.3.5] and will provide for documented check-off of each step. The TSAP is loaded into the V10 Tricon system and the test procedures implemented. Pacific Gas & Electric will approve the test procedures prior to starting FAT and have the opportunity to witness FAT. At the highest level, each Protection Set functions as follows:

- Perform a system service routine, which initializes, syncs, and establishes the system staging.
- Process input signals read from Tricon analog input and digital input signals.
- Perform computations for the programs.
- Process program results and send output data from the Tricon analog and digital output modules.

- Verify the interface (bidirectional communication) between Tricon and MWS via the media converters and NetOptics Port Aggregator Taps.
- Verify that the NetOptics Port Aggregator Taps will not allow any inbound signal from the Port 1 to Port A and B.

1.4. V10 Tricon portion of the PPS

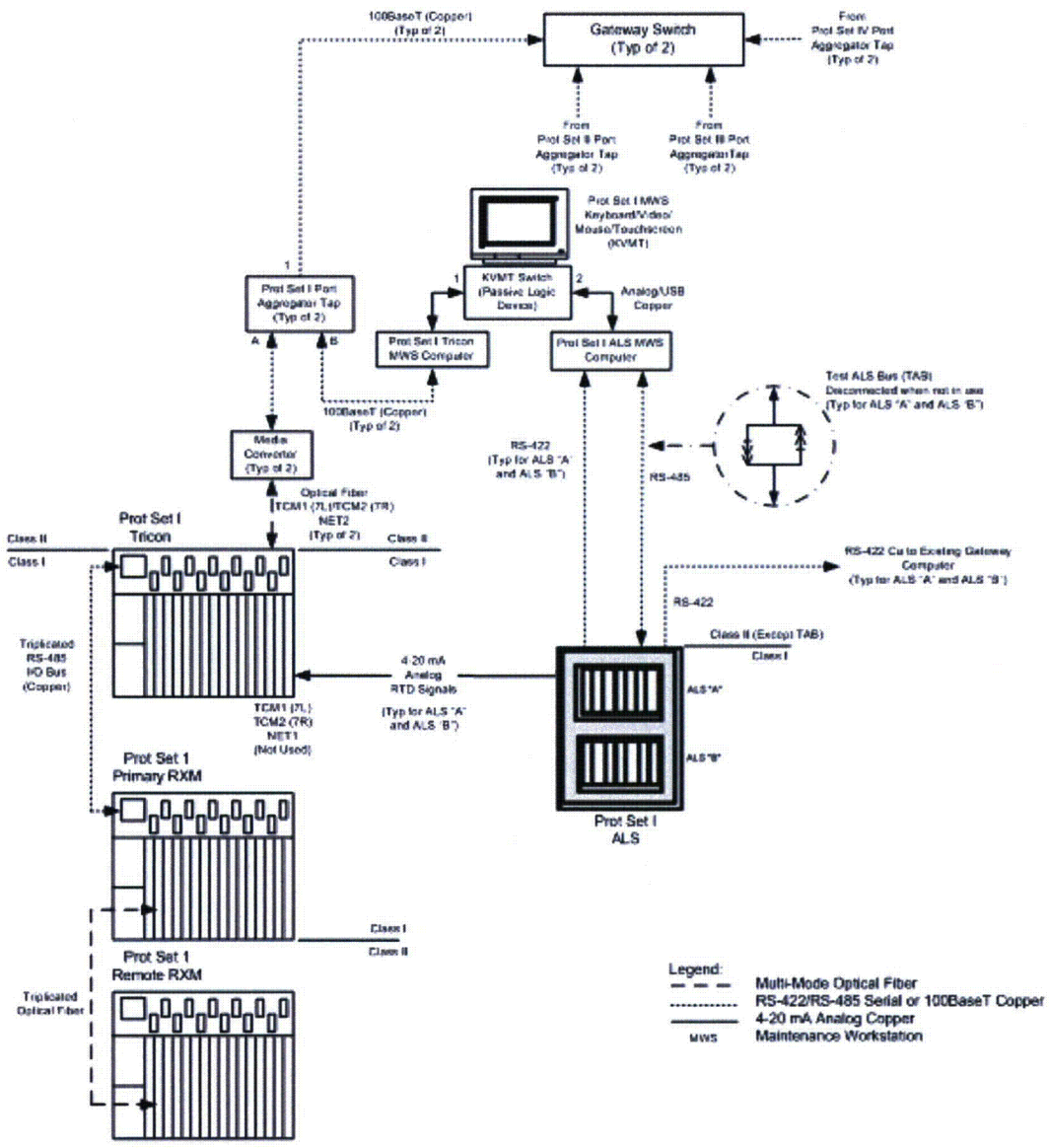

Figure 1: Tricon Protection Set and its Class II Communication.

1.4.1. Hardware

Each V10 Tricon Protection Set of the PPS Replacement comprises three V10 Tricon chassis:

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1.4.2. Software

The TriStation 1131 Developer's Workbench Software (TS 1131) that runs on Microsoft Windows XP operating system will be used to develop the TSAP for the V10 Tricon Protection Sets. The four TSAPs for Protection Set I, Protection Set II, Protection Set III, and Protection Set IV will be subjected to validation of this project.

Refer to (SRS) [Ref 2.4.10] for additional details.

1.4.3. Software that is not subject to Validation

- TS 1131
- Tricon Firmware
- TS1131 Standard Libraries
- Windows 2000/XP/7™** - TriStation Laptop/Workstation OS
- MWS application specific software
- Wireshark (port monitoring software for windows)

** Windows OS, PC, and laptop (these are not tested, but functionally checked prior to test/integration activities).

1.4.4. System Communication

The Class I (safety-related) V10 Tricon Protection Set will utilize two Tricon Communication Modules (TCM) in the Main Chassis to communicate with external Class II (non-safety) devices. The fiber optic cable electrically isolates the Tricon TCMs from the external Class II devices. The NetOptics Network Port Aggregator Taps direct the network traffic between the TCM, MWS and Gateway Switches. The NetOptics device permits two-way communications between the non-safety MWS belonging to a specific Protection Set and the Tricon in that Protection Set, but allows only one-way communication to other non-safety systems (e.g., the PDN/PPC via the Gateway Switch). The non-safety media converters will be set up between the Tricon Main

Chassis and the NetOptics Network Port Aggregator Tap. The media converters convert the fiber optic medium at the output of the TCM to copper medium at the input of the NetOptics Network Port Aggregator Tap.

The MWS is a non-safety device that will be developed separately from the PPS Replacement Project under a separate Pacific Gas & Electric Purchase Order (PO), budget, and staff. PG&E will provide the MWS, NetOptics Network Port Aggregator Tap, network switches, and media converters prior to Pre-FAT to test the complete interface between the NetOptics Network Port Aggregator Tap, MWS and the V10 Tricon.

The Nuclear Delivery (ND) group will coordinate with Pacific Gas & Electric for system staging prior to turn over to Nuclear IV&V.

The Nuclear IV&V group will confirm proper operation of network communications system interfaces before beginning testing addressed in this VTP. To ensure protection against unintended operation of connected equipment and operator errors, Nuclear IV&V will verify that there is no inbound communication path from Port 1 to either Port A or B of the NetOptics Network Port Aggregator Tap.

Nuclear IV&V will also verify correct two-way communication between the V10 Tricon and the MWS via Ports A and B of the port aggregator.

For these efforts, Nuclear IV&V will include the NetOptics Network Port Aggregator Tap and MWS interface testing as part of Nuclear IV&V test scope. The NetOptics Network Aggregator Tap design specifications, network test tools, and MWS design specifications shall be generated and provided by PG&E within the required time frame for Nuclear IV&V to complete all of the Validation Test documentation.

1.4.5. System interfaces

The following is a list of the PPS system interfaces:

- Advanced Logic System (ALS)
- Plant Process Computer (PPC)
- Main Annunciator System
- Main Control Panels
- Hot Shutdown Panel
- Solid State Protection System (SSPS)
- Rod Control System
- Pressurizer Pressure Control System
- Pressurizer Level Control System
- Auxiliary Feedwater (AFW) Control System
- Reactor Vessel Level Indicating System (RVLIS)
- Low Temperature Overpressure Protection System (LTOPS)

- Residual Heat Removal (RHR) Interlocks

For additional detail refer to the Hardware Requirements Specification (HRS) [Ref 2.4.9]. The above list is only shown for overview understanding of the PPS system interfaces and they are not within the test scope of this project.

2. References

2.1. Industry Documents

2.1.1 IEEE 1012 - 1998, Standard for Software Verification and Validation.

2.2. NRC Documents

2.2.1 Branch Technical Position 7-14, Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems, U.S. Nuclear Regulatory Commission.

2.2.2 NUREG-0800, Standard Review Plan, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition, Chapter 7 – Instrumentation and Controls, U.S. Nuclear Regulatory Commission.

2.2.3 U.S. NRC Regulatory Guide (RG) 1.168, Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants.

2.2.4 U.S. NRC Digital Instrumentation and Controls Interim Staff Guidance DI&C-ISG-06.

2.2.5 10CFR50, Appendix A, GDC 21 "Protection System Reliability and Testability."

2.3. Pacific Gas & Electric Documents

2.3.1 Pacific Gas & Electric Purchase Order # 3500897372.

2.3.2 Pacific Gas & Electric 08-0015-SP-001, Functional Requirements Specification.

2.3.3 Pacific Gas & Electric Process Protection System Replacement Conceptual Design Document.

2.3.4 Pacific Gas & Electric Process Protection System Replacement Interface Requirements Specification.

2.3.5 Pacific Gas & Electric Functional Block Diagrams.

2.4. Invensys Operations Management Documents

2.4.1 IOM-Q2, Invensys Operation Management Nuclear Quality Assurance Manual.

2.4.2 NSIPM, Nuclear Systems Integration Program Manual, NTX-SER-09-21.

2.4.3 Software Configuration Management Procedure (SCMP).

2.4.4 Project Procedures Manual (PPM).

2.4.5 Project Management Plan (PMP), 993754-1-905.

2.4.6 Project Quality Plan (PQP), 993754-1-900.

2.4.7 Software Quality Assurance Plan (SQAP), 993754-1-801.

2.4.8 Software Verification and Validation Plan (SVVP), 993754-1-802.

2.4.9 Hardware Requirements Specification (HRS), 993754-1-807.

2.4.10 Software Requirements Specification (SRS), 993754-1-809.

2.4.11 Quality Procedure Manual (QPM).

3. Definitions and Acronyms

3.1. Definitions

Acceptance (Pass/Fail) Criteria: Decision rules used to determine whether a software or hardware passes or fails a test.

Acceptance Testing: Formal testing conducted to determine whether or not a system satisfies its acceptance criteria and to enable the customer to determine whether or not to accept the system.

Anomaly: A condition observed in the documentation or operation of hardware and software that deviates from expectations based on previously verified hardware/software products or reference documents. A critical anomaly is one that must be resolved before the V&V effort proceeds to the next phase.

Project Traceability Matrix: A documented matrix indicating the origin of the requirements, their implementing design output documentation and the corresponding testing requirements.

Software Validation Testing: The process of evaluating software through testing at the end of the development process to determine whether it satisfies specified requirements.

Test Plan: A document describing the scope, approach, resources, and schedule of intended testing activities. It identifies test items, the features to be tested, the testing tasks, who will do each task, and any risks requiring contingency planning.

Test Procedure: A document specifying the sequence of actions for the execution of a test.

Test Specification: A specification that translates customer requirements and design features into test specifications and test approaches for validation by testing. It may add to or refine the test approaches described in the Validation Test Plan. (Also known as the Test Design Specification.)

Unit: An assembly of interconnected components that constitutes an identifiable device, instrument, or piece of equipment. A unit can be disconnected, removed as a single piece, and replaced by a spare. It has definable performance characteristics that permit it to be tested as a single assembly. Software functions that meet the requirements of this definition are also defined as a unit. By this definition, the words "unit" and "module" (hardware/software) are interchangeable.

Verification: The process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase.

Validation: The process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified requirements.

3.2. Acronyms

AFW	Auxiliary Feedwater
AI	Analog Inputs
ALS	Advanced Logic System
COTS	Commercial-off-the-Shelf
DCPP	Diablo Canyon Power Plant
DRCS	Document Review Comment Sheet
DTTA	Delta Temperature & Average Temperature
ESFAS	Engineered Safety Features Actuation System
FAT	Factory Acceptance Test
FBD	Function Block Diagram
FTA	Field Termination Assembly
HRS	Hardware Requirements Specification
HVT	Hardware Validation Test
ICN	Interim Change Notice
IO, I/O	Input/Output
IRS	Interface Requirements Specification
IV&V	Independent Verification and Validation
LTOPS	Low Temperature Overpressure Protection System
M&TE	Measurement and Test Equipment
MWS	Maintenance Workstation
ND	Nuclear Delivery
NIST	National Institute of Standards and Technology
NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission
NSIPM	Nuclear Systems Integration Program Manual
OOR	Out-of-Range
OPDT	Overpower Delta-T
OPTR	Overpressure Turbine Runback
OTDT	Overtemperature Delta-T
OTTR	Overtemperature Turbine Runback
PE	Project Engineer
PG&E	Pacific Gas and Electric
PM	Project Manager
PMP	Project Management Plan
PO	Purchase Order
PPC	Plant Process Computer
PPM	Project Procedures Manual
PPS	Process Protection System
PQAE	Project Quality Assurance Engineer
PQP	Project Quality Plan
PRC	Project Review Committee
PTM	Project Traceability Matrix
QA	Quality Assurance
QPM	Quality Procedures Manual
RHR	Residual Heat Removal

RTS	Reactor Trip System
RVLIS	Reactor Vessel Level Indicating System
SCMP	Software Configuration Management Plan
SDC	Software Development Checklist
SDD	Software Design Description
S/G	Steam Generator
SIDR	System Integration Deficiency Report
SIL	Software Integrity Level
SQAP	System Quality Assurance Plan
SRS	Software Requirements Specification
SSPS	Solid State Protect System
SUT	System Under Test
SVT	Software Verification Test
SVVP	Software Verification and Validation Plan
TCM	Triconex Communications Module
TS1131	TriStation 1131
TSAP	TriStation Application Project
TTD	Trip Time Delay
V&V	Verification and Validation
VTP	Validation Test Plan
VTS	Validation Test Specification

4. Test Overview

The V&V approach as described in IEEE 1012-1998 [Ref 2.1.1] will be used for conducting project V&V activities. These activities will be planned and scheduled per Software Verification and Validation Plan (SVVP) [Ref. 2.4.8], the project schedule, the applicable PPMs [Ref 2.4.4], and the PQP [Ref 2.4.6].

The V&V effort shall be accomplished using a separate Nuclear Independent Verification & Validation (IV&V) organization not associated with the Nuclear Delivery (ND) organization as identified in the PQP [Ref 2.4.6]. This independent V&V process is consistent with the process described in Annex C.4.1 of IEEE 1012-1998 [Ref 2.1.1].

4.1. Organization

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4.1.2. Staffing and Training Needs

Test staff personnel are qualified as determined by the Nuclear IV&V Manager, in coordination with the Software Verification Validation Plan (SVVP) [Ref. 2.4.8], as documented in the Project training files, per PPM 9.0 (Personnel Training and Qualification) Test staff personnel must be current on required Project training prior to start of formal testing.

Test staff shall have completed the following:

- The TRICON/TriStation 1131 Comprehensive course
- The TriStation 1131 Standard or Comprehensive Programming Course
- Or have equivalent experience.

For additional project requirements, refer to the SVVP [Ref. 2.4.8]. The Nuclear IV&V Manager may authorize substitution of equivalent training or experience for any qualification, training, or skills requirement, where appropriate.

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4.2. Schedule

The project schedule was developed based on the life cycle defined in the NSIPM [Ref 2.4.2] as implemented by the PPM [Ref 2.4.4]. Adhering to the procedure manuals assure the required project deliverables will satisfy PG&E technical and NRC regulatory requirements, and that the necessary supporting collateral will be generated to support the safety conclusions of both ND and Nuclear IV&V. Refer to the project schedule for the latest date and duration for completion of each task. Project related validation test tasks are as follows:

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4.3. Resources

ND team members report to the PM. Nuclear QA team members report to the Nuclear QA Manager. Nuclear IV&V team members report to Nuclear IV&V Manager, who provides resource management of Nuclear IV&V staff and other resources (such as materials, equipment, work space, etc., required by the Nuclear IV&V team) to ensure that adequate resources are

assigned to the PPS Replacement Project for proper implementation. Refer to the PMP [Ref 2.4.5] for the details of the project organization and responsibilities assigned to each project team member and Nuclear IV&V team member.

4.4. Responsibilities

1. **Nuclear IV&V Manager** is responsible for staffing the Nuclear IV&V group and approving All Nuclear IV&V generated documents.
2. **Project Engineer** is responsible for providing support to the Test Director, as needed.
3. **Project Quality Assurance Engineer** is responsible for observing the testing activities, as directed by the applicable test procedures.
4. **Nuclear IV&V Team** is responsible for developing, review, and release all Nuclear IV&V generated documents and conducting tests in accordance with the system Software Verification and Validation Plan (SVVP), [Ref 2.4.8].
5. **Test Director** is responsible for coordinating and executing all tests that are in accordance to related test procedures.
6. **Test Engineer or Test Technician** is responsible for hardware and software test setup, and supporting all associated tests as needed under the direction of the PE or Test Director, as appropriate.

4.5. Tools, Techniques, and Methodologies

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5. Test Requirements

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5.1.1. Hardware

The HRS [Ref 2.4.9] lists the V10 Tricon hardware modules that will be used in the V10 Tricon Protection Set system. These hardware modules connect the program stored in the main processor to the field I/O and communication channels. V10 Tricon equipment includes:

- Main Chassis, Nuclear (8110N2).
- Primary Remote Chassis (8112N).
- Remote Chassis (8112).
- Main Processor, Nuclear (3008N).
- 120VAC/DC Power Module, Nuclear (8310N2).
- 120VAC/DC Power Module, non-Nuclear (8310).
- TCM-FO Triconex Communications Module, Nuclear (4352AN).
- Analog Input Modules: Differential Nuclear (3721N) and Isolated, Nuclear (3703EN).
- Analog Output Modules: Nuclear (3805HN) and non-Nuclear (3805E).
- Discrete Input Modules: Nuclear 24 VAC/DC (3503EN2), Nuclear 115VAC/DC (3501TN2), and non-Nuclear 115VAC/DC (3501E).
- Discrete Output Modules: Nuclear 115 VAC (3601TN), and non-Nuclear Relay Output (3636T).

Additional chassis and cabinet descriptions can be found in the Hardware Requirements Specification (HRS), [Ref 2.4.9].

5.1.2. Software

The Tricon application software (TSAP) will be developed separately for each V10 Tricon Protection Set. The TSAPs shall be independently verified and validated by Nuclear IV&V.

Table 2. Protection Set Functions

	Title	Description	Protection Set
1.	System Diagnostics including System Alarms-	Gathers system, chassis, slot, I/O module diagnostic status, signal processing and power supply alarms into variables that can be accessed by the other application functions and the MWS.	I II III IV
2.	Reactor Coolant Flow	ALS scope	
3.	Wide Range Reactor Coolant Temperature	Input to Low Temperature Overpressure Protection System (LTOPS) provides protection against over pressurization at low plant temperature.	I II

	Title	Description	Protection Set
4.	Wide Range Reactor Coolant Pressure	Input to LTOPS provides protection against over pressurization at low plant temperature. Input to Residual Heat Removal (RHR) valve interlock circuit provides protection against improper operation of RHR isolation valves.	III IV
5.	DTTA	Delta Temperature & Average Temperature Overtemperature Delta-T (OTDT) Reactor Trip provides DNB protection. The setpoint for the OTDT reactor trip and Overtemperature Turbine Runback (OTTR)are continuously calculated by the PPS for each of the four reactor coolant loops. Overpower Delta-T (OPDT) Reactor Trip provides protection against excessive power (fuel rod rating protection). The setpoint for the OPDT reactor trip and Overpower Turbine Runback (OPTR) are continuously calculated by the PPS for each of the four reactor coolant loops.	I II III IV
6.	Pressurizer Level	Pressurizer High Water Level Reactor Trip provides backup protection to the Pressurizer High Pressure Reactor Trip and prevents the pressurizer from becoming water solid during low worth and low power rod withdrawal accidents.	I II III
7.	Pressurizer Pressure	ALS scope.[2]	
8.	Pressurizer Vapor Temperature	Pressurizer Vapor Space Temperature Low signal provides an RHR valve V-8701 interlock circuit input.	IV
9.	Steam Generator Steam Flow	Provide safety-related outputs for post-accident monitoring (S/G 1 thru 4). Steamflow is an input for the pressure-compensated steamflow calculation.	I II
10.	Steamline Break Protection	Steamline Pressure Low SI and Steamline Isolation initiate the automatic starting of boron injection and decay heat removal systems and to provide protection against steamline break accidents. Steamline Pressure High Negative Rate Steamline Isolation provides protection in the case of a steamline break when Pressurizer Pressure is less than the P-11 setpoint and Low Steamline Pressure SI is blocked.	I II III IV

[2] The Tricon is providing instrument power for Pressurizer Pressure. Pressurizer Pressure is an input to DTTA for all protection sets. However, all safety functions associated with Pressurizer Pressure will be assigned to ALS.

	Title	Description	Protection Set
11.	Steam Generator Narrow Range Level	Steam Generator (S/G) High-High Level Turbine Trip and Feedwater Isolation (P-14, S/G High Level Permissive) provide protection against S/G overfills and damage to the main steamlines or main turbine. S/G Low-Low Level Reactor Trip and Auxiliary Feedwater (AFW) Pump Start protects the reactor from loss of heat sink in the event of loss of feedwater to one or more S/Gs or a major feedwater line rupture. The signals to actuate reactor trip and start AFW pumps are delayed through the use of a Trip Time Delay (TTD) for reactor power levels below 50% of rated thermal power. The use of the TTD allows added time for natural S/G level stabilization or operator intervention to avoid an inadvertent protection system actuation.	I II III IV
12.	Turbine Impulse Chamber Pressure	Chamber Pressure High to P-13 Interlock. The purpose of the P-13 permissive is to provide an input to P-7 indicative of low turbine power when less than the setpoint. The purpose of the P-7 permissive is to disable selected Reactor Trip signals while operating at low power levels. Turbine Impulse Chamber Pressure Low Interlock C-5 blocks control rod withdrawal. The purpose of the C-5 interlock is to prevent automatic outward rod motion when power is less than the design limit for Rod Speed and Direction.	I II
13.	Containment Pressure	ALS scope	
14	Online Test and Calibration	The V10 Tricon TSAP allows on-line testing of the Protection Set from the MWS. This is to be accomplished by using safety related hardware Out-Of-Service (OOS) switch inputs to a safety related Tricon DI. These inputs are used to initiate the transition of the TSAP Protection Set into its test/diagnostics functions.	I II III IV
15	Maintenance	The Tricon TSAP provides a method for placing a PPS channel out-of-service (e.g. manual OOS switch) for the purpose of performing maintenance activities via MWS without requiring that the Protection Set be declared inoperable.	I II III IV

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5.4. Approvals

5.4.1. Validation Test Plan Approvals

This Validation Test Plan is required to be reviewed by the Nuclear IV&V Engineer, and approved by the Nuclear IV&V Manager.

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6. Test Implementation

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7. Acceptance Criteria

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8. Test Implementation and Documentation

These documents are quality records as defined in QPM 16.0, Quality Records [Ref 2.4.11], and shall be controlled per PPM 4.0 (Project Document and Data Control). The specific documents shall be developed and processed in accordance with the controlling Project Procedure.

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8.1. Test Summary Reports

A Test Report is required to be developed per PPM 6.0, to summarize the results of the tests performed. The required V&V reports are as described in the SVVP. The Test Report may be referenced in the Test Phase summary report and other applicable V&V reports. The Test Report may also incorporate other reports (SIDRs) as attachments.

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