inVensys

Project:	PG&E PROCESS PROTECTION SYSTEM REPLACEMENT
Purchase Order No.:	3500897372
Project Sales Order:	993754

PACIFIC GAS & ELECTRIC COMPANY

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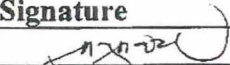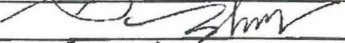
PROTECTION SET II

FACTORY ACCEPTANCE TEST REPORT

Document No. 993754-12-854-1 (-NP)

Revision 0

December 12, 2014

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).

	Name	Signature	Title
Author:	Myla Montellano		IV&V Engineer
Reviewer:	Son Phan		IV&V Engineer
Reviewer:	Michael Shyu		Project QA Engineer
Approval:	Kevin Vu		IV&V Manager

Document Change History			
Revision	Date	Change	Author
0	12/12/14	Initial issue for review	M. Montellano

TABLE OF CONTENTS

1.0 PURPOSE

The purposes of this Factory Acceptance Test Report are:
- To list all executed test documents related to the FAT of the safety-related V10 Tricon System Protection Set II.
- To provide a summary of the FAT test results
- To document any test failures from the FAT document
- To document the review and approval of the FAT

2.0 TEST OBJECTIVE

The objectives of the Factory Acceptance Test (993754-12-902-1 Rev 0) [Ref. 8.1.3] are:

- To confirm that the test configuration is correct and that the system performs properly.
- The intent of the validation test is to demonstrate that the software correctly implements the functional requirements as specified in the Software Requirements Specification (SRS) [Ref. 8.1.4] and as described in the Software Design Description (SDD) [Ref. 8.1.5]

3.0 DESCRIPTION OF THE TEST SYSTEM

The FAT testing was conducted in a controlled environment at the Invensys Facility in Lake Forest, CA.

The test system used in system and FAT testing was as follows:
- V10 Tricon System Protection Set II.
- TriStation Laptop with Windows 7™ , TriStation v 4.9.0
- HMI Maintenance Workstation (MWS)

More information on the test system used is provided in the Validation Test Plan (993754-1-813 Rev 3) [Ref. 8.1.1].

4.0 TEST SET-UP AND INSTRUMENTATION

P

calibration traceable to the National Institute of Standards and Technology (NIST). For details on the actual M&TE used including serial numbers and calibration dates, refer to the executed FAT test document.

Additional information on the test set-up and instrumentation is provided in the Validation Test Plan [Ref. 8.1.1].

5.0   TEST PROCEDURE

The FAT procedures demonstrate the compliance of the integrated V10 Tricon System Protection Set II with the functional requirements as described in Section 2.0 Test Objective. The executed versions of the test are listed in Section 6.4 Test Results Summary.

P

6.0   TEST RESULTS

6.1   TEST DOCUMENT EXECUTED

The table below provides a list of the test sections executed as defined in the Factory Acceptance Test Procedure [Ref. 8.1.3]. The information in the table is organized by Document Number, Revision, and Section, referred to hereafter as Test Document Section. The Interim Change Notice (ICN) column lists the ICN(s) that apply to the Test Document Section. The Completion column lists the sign off date for the Test Document step or section. The Anomaly Report column lists the System Integration Deficiency Report(s) (SIDR) written against the Test Document Section. For test details, refer to the FAT procedure in the executed test binders.

Note: One SIDR may have resulted in any number of ICNs. One ICN may have been initiated by any number of SIDRs. SIDRs are listed only against the Test Document

Section(s) that they were written against (i.e. where the anomaly occurred). ICNs are listed only against the Test Document Section(s) to which they were written and apply.

For details and traceability between SIDRs and ICNs, refer to Sections 6.2 Anomalies and 6.3 Interim Changes. Not all SIDRs initiated during system and acceptance level validation can be directly attributed to test procedure execution. (Refer to Section 6.2 Anomalies, for a complete list of SIDRs)

Test Document			Anomaly Report	ICN	Completion
Document Number / Section Title	Rev	Appendix			
993754-12-902-1 (FAT Procedure Protection Set II)	0		SIDR		
Main Body			930	596	11/20/2014
FAT-Section 4.3, Sign In Sheet		II-01	N/A	N/A	12/08/2014
FAT- Section 4.3, Test Log		II-02	N/A	N/A	12/08/2014
FAT- Section 4.3, Retest Log		II-03	N/A	N/A	N/A
FAT- Section 4.3, Cape System IO		II-04	N/A	N/A	11/20/2014
FAT- Section 4.3, Control of Removable Media		II-05	N/A	N/A	11/20/2014
FAT- Section 6.1, TSAP Configuration		II-06	None	None	11/20/2014
FAT- Section 6.2, System Diagnostic		II-07	None	None	11/20/2014
FAT- Section 6.3, Failure Alarm		II-08	None	None	11/20/2014
FAT- Section 6.4, Trouble Alarm		II-09	None	None	11/20/2014
FAT- Section 6.5, Out-of-Service Alarm Bypass Alarm		II-10	927	593	11/20/2014
FAT- Section 6.6, RTD Failure Alarm		II-11	None	None	11/21/2014
FAT- Section 6.7, Wide Range Reactor Coolant Temperature		II-12	None	None	11/21/2014
FAT- Section 6.8, DTTA		II-13	924	590	12/02/2014
			934	600	
			935	601	
			937	603	
			939	605	
			940	606	
			941	607	
			1067	614	
			1090	621	
FAT- Section 6.9, Pressurizer Level		II-14	None	None	11/22/2014
FAT- Section 6.10, Steamflow		II-15	None	None	11/25/2014
FAT- Section 6.11, Steamline Break Pressure		II-16	None	None	12/03/2014
FAT- Section 6.12, SG Narrow Range		II-17	936	602	12/04/2014

Test Document				Anomaly Report	ICN	Completion
Document Number / Section Title		Rev	Appendix			
Level				1069	616	
FAT- Section 6.13, Turbine Impulse Chamber Pressure			II-18	None	None	11/22/2014
FAT- Section 6.14, Data Retention after Power Cycle			II-19	None	None	12/05/2014
FAT- Section 6.15, System Time Response			II-20	None	None	11/21/2014
FAT- Section 6.7, WRCT			II-22	979	613	11/22/2014
				1087	617	
FAT- Section 6.8, DTTA			II-23	924	590	11/24/2014
				1067	614	
				1090	621	
FAT- Section 6.9, PZL			II-24	None	None	11/22/2014
FAT- Section 6.10, Steamflow			II-25	924	590	12/02/2014
FAT- Section 6.11, SBP			II-26	None	None	12/03/2014
FAT- Section 6.12, SG Narrow Range Level			II-27	924	590	12/03/2014
				1069	616	
FAT- Section 6.13, TICP			II-28	924	590	11/25/2014
				930	596	
				1070	619	
FAT- Section 6.16, Tunable Parameter OOR Check			II-29	924	590	12/04/2014
				930	596	
				978	612	
				1226	624	
FAT-Appendix II-30 Tunable Parameters Test Aid			II-30	N/A	N/A	N/A

6.2 ANOMALIES

The table below provides a listing of the deficiencies identified and documented on System Integration Deficiency Reports (SIDR) during the FAT testing. See SIDR binder for complete detailed description and/or attachments.

P

P

P

P

P

P

P

P

P

P

P

P

P

P

P

P

i n v e n s y s™

i n v e n s y s
Triconex

Document:	993754-12-854-1	Title:		Protection Set II Factory Acceptance Test Report	
Revision:	0	Page:	23 of 24	Date:	12/12/2014

P

6.4   TEST RESULTS SUMMARY

The testing implemented all the requirements for the Factory Acceptance Test as described in the Validation Test Specification [Ref. 8.1.2]

The FAT procedure listed below was executed successfully and met the acceptance criteria as defined in the Validation Test Specification.

Test Procedure	Document Number	Revision
Factory Acceptance Test Protection Set II	993754-12-902-1	0

7.0   CONCLUSIONS

After the execution of the FAT testing for the V10 Tricon System Protection Set II, the test results were independently reviewed by the Project Review Committee in accordance with PPM 6.0. This review ensured that the actual results met the acceptance criteria per the VTS [Ref. 8.1.2] and in accordance with the PTM [Ref. 8.1.5]

An anomaly report, (i.e. SIDR), was completed for any deficiencies found during testing. The completed anomaly reports are in the SIDR binder. There were a total of _**19**_ SIDRs generated during test execution resulting in _**19**_ ICNs. All the SIDRs listed in Section 6.2 were implemented and closed.

The FAT test and re-test results were reviewed. This review ensured that all necessary test documents were executed successfully and all tests passed after applying revisions per SIDRs/ICNs.

`

8.0 REFERENCES

8.1 INVENSYS DOCUMENTS

8.1.1 Validation Test Plan (VTP), 993754-1-813, Rev 3

8.1.2 Validation Test Specification (VTS), 993754-1-813, Rev 5

8.1.3 Protection Set II Factory Acceptance Test (FAT) Procedure, 993754-12-902-0, Rev 0

8.1.4 Software Requirements Specification (SRS), 993754-11-809, Rev 6

8.1.5 Protection Set II-IV Software Design Description (SDD), 993754-12-810, Rev 3

8.1.6 Project Traceability Matrix (PTM), 993754-1-915, Rev 12

8.1.7 TSAP Regression Analysis, 993754-2-871-2, Rev 0

9.0 ATTACHMENTS

9.1 ATTACHMENTS

9.1.1 Executed Protection Set II Factory Acceptance Test Procedures as listed in Section 6.4