PROGRAM NAME:	**Cooperative Development of SPRPS and RPS**
DOCUMENT TYPE:	**PROGRAM PLAN**
DOCUMENT TITLE:	**NuPAC QUALITY ASSURANCE PLAN**
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Summary:

This Quality Assurance Plan (QAP) establishes the plans and procedures to be used for all quality activities for the NuPAC program. "NuPAC" refers to the Safety Platform for Reactor Protection Systems (SPRPS) to be developed pursuant to the cooperative development contract between Lockheed Martin Global, Inc. (LMGI) and State Nuclear Power Automation System Engineering Company (SNPAS). This is a living document and is updated as necessary.

Revision History

Revision information for the QAP is listed below. This table will contain a listing and description of changed paragraphs for each succeeding revision.

Revision	Date	Paragraph	Description of Change
-	03/01/2011	All	RELEASE AUTH: ER.2011.00947
A	06/15/2011	19 – 34	RELEASE AUTH: ER.2011.03622 Incorporated Programmable Logic QA (Appendix A)
B	09/25/2013	Various	Updated to incorporate changes in current contract.
C	10/09/14	All	Updated to align with the Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs. Updated PLQAP portion to align with TASP.

D	3/31/15	See Description of Change	• Section 2.0 Reference Documents:
			  ○ Changed reference from SSPP to PSPP.
			• Section 3.3.2 Safety Engineering:
			  ○ Changed reference from SSPP to PSPP.
			• Section 4.3 Other:
			  ○ Changed reference from SSPP to PSPP.
			• Appendix A Reference Documents:
			  ○ Changed reference from SSPP to PSPP.
			• Appendix B Acronyms:
			  ○ Added acronym for PSPP and removed acronym for SSPP.
			• Section 16 Corrective Action:
			  ○ Updated this section to add the following exception; The NuPAC project Corrective Action procedure, PRC880000-006 will only require that the Action Owner conduct root cause analysis for Significant Conditions Adverse to Quality

E	10/02/2015	See Description of Change	Updated to align with the updated Quality Systems Manual for Commercial Nuclear Programs (D-D7210/2013P-5001 Rev C). Updated PLQAP

			portion to better align with TASPs. Updated NuPAC program references to project

Table of Contents

Introduction

The Quality Assurance Plan (QAP) defines how LMGI/SNPAS will meet the quality program requirements for the NuPAC project. The QAP also defines how LMGI/SNPAS will meet the quality process requirements defined in TASP880000-001, Technical and Support Processes (TASP). This QAP also includes the NuPAC Programmable Logic Quality Assurance Plan which is defined in Appendix "C".

This QAP will be maintained throughout the NuPAC project's duration; it will be reviewed and updated as necessary to incorporate changes in project direction.

The NuPAC project utilizes the Lockheed Martin Nuclear Systems & Solutions (NS&S) Quality Systems Manual for Commercial Nuclear Programs which addresses the implementation of the requirements of 10 CFR 50 Appendix B and ASME NQA-1-2008 with ASME NQA-1a-2009 Addenda. The list of implementing plans and procedures are in Appendix "A" of this plan and LMGI site procedures for activities performed to support this project at the Archbald, PA and Dallas, TX sites, which include the Dunmore, PA and Trinity (Fort Worth), TX facilities. Acronyms used in the QAP are listed in Appendix "B".

Normative and Informative References

Portions of the following regulatory documents were used to generate a baseline set of process requirements to govern the effort this plan is responsible for. Pertinent process requirements are traced to the applicable process procedures or work products.

Document #	Title
10 CFR	Title 10 Energy
10 CFR Part 21	Reporting of Defects and Noncompliance
10 CFR Part 50	Domestic Licensing of Production and Utilization Facilities
10 CFR Part 50 Appendix A	General Design Criteria for Nuclear Power Plants
10 CFR Part 50 Appendix B	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
Regulatory Guide 1.28	Quality Assurance Program Criteria (Design and Construction), Rev. 4, 2010
Digital Instrumentation and Controls Digital I&C-ISG-06	Task Working Group #6: Licensing Process, Rev. 1, 2011
BTP 7-14	Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems, Rev. 5, 2007
NUREG-0800	Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition, 2007
Standards	
ASME NQA-1-2008	Quality Assurance Requirements for Nuclear Facility Applications
ASME NQA-1a-2009	Addenda to ASME NQA-1-2008, Quality Assurance Requirements for Nuclear Facility Applications

Document #	Title
EPRI TR-106439	Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications,1996

1 Organization

The NuPAC project utilizes the Lockheed Martin Nuclear Systems & Solutions (NS&S) Quality Systems Manual for Commercial Nuclear Programs.

The Lockheed Martin NS&S Quality Systems Manual, Section 1, Paragraph 1.1; Scope states in part "The following description of organization and responsibilities applies to Lockheed Martin (LM) employees who perform work in accordance with this Manual". However, the structure, roles, responsibilities and the organizational controls of the NuPAC project are described in the NuPAC Project Management Plan listed in Appendix "A" of this plan, which also includes SNPAS and Contract personnel that are working to this plan.

The Lockheed Martin NS&S Quality Systems Manual, Section 1, Paragraph 1.3.1.1.2; Line of Business (LOB)/Program Area/Program states in part "LOB/Program Area/Program interfaces are defined and implemented by the Commercial Nuclear Product Life Cycle Process (CN-PLP), as necessary, to reflect agreed upon responsibilities." The Program Area interfaces for the NuPAC project are defined and implemented by the Technical and Support Processes (TASP).

2 Quality Assurance Program

The NuPAC quality assurance program is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix "A" of this plan and LMGI site procedures.

Personnel assigned to the NuPAC project are trained appropriately to perform their functions in accordance with the minimum training criteria specified in the departmental training matrix. Further details related to training for the NuPAC project can be found in the NuPAC Training Project Plan listed in Appendix "A".

The Lockheed Martin NS&S Quality Systems Manual, Section 2, Paragraph 2.4, Indoctrination and Training, states in part "Records of indoctrination and training are to be documented in the appropriate Training Record in the MyLearning system maintained by Human Resources". Records of indoctrination and training for the NuPAC project are maintained in accordance with the NuPAC Training Project Plan listed in Appendix "A" of this plan.

Individuals responsible for quality functions such as inspection and test personnel are trained and /or evaluated in accordance with documented procedures. Lead Quality Auditors are trained and qualified using LMGI procedures.

3 Design Control

The design control process is defined in the TASP, the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix "A" of this plan and LMGI site procedures.

The Lockheed Martin NS&S Quality Systems Manual, Section 3, Paragraph 3.8 Design Release states in part, "After design verification activities are complete and following Technical Operations manager signature…." The NuPAC project follows NuPAC_CDM610000-014 for release of design data.

The Lockheed Martin NS&S Quality Systems Manual, Section 3, Paragraph 3.11 Software Design Control refers to the use of Engineering Practice Manuals (EPM). The NuPAC project does not use EPM documents.

4 Procurement Document Control

The procurement document control process is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

The Lockheed Martin NS&S Quality Systems Manual, Section 4, Paragraph 4.3 Procurement Document Preparation and Content states in part that suppliers shall be evaluated by LM prior to use.

Lockheed Martin business units and service suppliers working on the NuPAC project will be audited prior to the start of work or as soon as practical after the start of work to assure effective implementation of NS&S processes.

5 Instructions, Procedures and Drawings

The preparation and control of instructions, procedures and drawings is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

6 Document Control

The document control process is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

The Lockheed Martin NS&S Quality Systems Manual, Section 6, Paragraph 6.2 General describes the general control of records. These controls and the controls described in Section 17, Quality Assurance Records will be used by the NuPAC project to control records generated by the project.

The Lockheed Martin NS&S Quality Systems Manual, Section 6, Paragraph 6.2 General describes the document types to be controlled. The NuPAC project considers this list document types as a minimum. Additional document types identified by the project will be controlled in accordance with the implementing plans listed in Appendix “A” of this plan and LMGI Site procedures.

7 Control of Purchased Materials, Equipment and Services

The control of purchased materials, equipment and services is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

8 Identification and Control of Items

The identification and control of items is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

9 Control of Special Processes

The control of special processes is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

10 Inspection

The inspection process is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

11 Test Control

Test Control is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

12 Control of Measuring and Test Equipment

The control of Measuring and Test Equipment (M&TE) is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures

13 Handling, Storage and Shipping

The methods used for handling, storage, cleaning, packaging, preservation and shipping of items are defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

14 Inspection, Test and Operating Status

The inspection, test and operating status of items is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

15 Nonconforming Material, Parts or Components

The control of nonconforming items is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

16 Corrective Action

The corrective action process is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

17 Quality Assurance Records

The process for the identification and control of quality assurance records is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

18 Audits and Evaluations

The audit process is defined in the Lockheed Martin NS&S Quality Systems Manual, implementing plans listed in Appendix “A” of this plan and LMGI site procedures.

LMGI QA conducts audits as an independent, functional group while evaluations are performed by the NuPAC project Quality team (independent QEs on project). All areas are subject to review for compliance. The criteria for the audits and evaluations include compliance to applicable contractual requirements and adherence to applicable LMGI policies and procedures that implement the requirements of 10 CFR Part 50 Appendix B and NQA-1.

With reasonable advance notification and in accordance with any applicable security restrictions, SNPAS will be entitled to send a representative(s) to the LMGI facility where the contract work is performed to conduct audit and inspection activities. In the event either company’s government regulatory agency (i.e., NRC or National Nuclear Safety Administration (NNSA)) desires to conduct an audit or inspection of the other company’s facility, the companies will support this activity.

Appendix A - Reference Documents

QAP Section	Document #	Title
1	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_PMP610000-001	NuPAC Project Management Plan
	PRC880000-008	Stop Work Order Procedure
	Various	LMGI Site Procedures
2	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	ITP880000-001	Individual Training Plan
	PRC880000-001	Training and Qualification of Inspectors and Test Technicians
	Various	LMGI Site Procedures
3	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_CMP610000-001	NuPAC Configuration Management Plan
	NuPAC_SEMP610000-001	NuPAC Systems Engineering Management Plan
	NuPAC_RPP610000-001	NuPAC Reliability Project Plan
	NuPAC_ROMP610000-001	NuPAC Risk and Opportunity Management Plan
	NuPAC_SSP610000-001	NuPAC System Security Plan
	NuPAC_SYS610000-001	NuPAC System Description
	NuPAC_PSPP610000-001	NuPAC Platform Safety Project Plan
	NuPAC_HDP610000-001	NuPAC Hardware Development Plan
	NuPAC_PLDP610000-001	NuPAC Programmable Logic Development Plan
	NuPAC_PLRS610400-001	NuPAC Programmable Logic Requirement Specification-Core PLCI
	NuPAC_PLDS610400-001	NuPAC Programmable Logic Design Specification-Core PLCI
	NuPAC_PLDP610000-005	NuPAC Software Tool Evaluation Plan
	NuPAC_TPL610400-001	NuPAC Programmable Logic Test Plan – Core PLCI
	NuPAC_TPL610800-001	NuPAC Test Equipment Integration, Verification and Validation Plan
	NuPAC_ED610000-041	NuPAC Vulnerability Assessment
	NuPAC_FVVP610000-001	NuPAC FPL Verification and Validation Plan
	NuPAC_MTP610000-001	NuPAC Master Test Plan
	NuPAC_TEDP610000-001	NuPAC Test Equipment Development Plan
	NuPAC_SDP610820-001	NuPAC Test Equipment Software Development Plan
	NuPAC_CGDP610000-001	NuPAC Commercial Grade Item/Service Dedication Plan
	NuPAC_FRACAS610000-001	NuPAC Failure Reporting, Analysis and Corrective Action System (FRACAS) Plan

	PRC880000-009	Product and Implementation Quality Evaluations
	NuPAC_CDM610000-009	NuPAC Document Numbering Procedure
	NuPAC_CDM610000-010	NuPAC Programmable Logic Configuration Management Procedure
	NuPAC_CDM610000-011	NuPAC Programmable Logic Problem/Change Request (P/CR) Procedure
	NuPAC_CDM610000-012	NuPAC Release Candidate (RC) Procedure
	NuPAC_CDM610000-014	NuPAC Document Control Procedure for Design Data
	NuPAC_CDM610000-015	NuPAC CM Release and Distribution Procedure
	NuPAC_CDM610000-020	NuPAC Configuration Data Management of Supplier Deliverables Procedure
	NuPAC_ANOM610000-001	NuPAC I-V&V Anomaly Tracking and Closeout Procedure
	NuPAC_DP610000-001	NuPAC Creating a Circuit Card Assembly Procedure
	NuPAC_DP610000-002	NuPAC Mentor Graphics Expedition Librarian Part Request Form Procedure
	NuPAC_DP610000-003	NuPAC Mentor Graphics Librarian Management Procedure
	NuPAC_DP610000-004	NuPAC Procedure for Creating a New Part or Assembly Object in PTC Creo
	NuPAC_DP610000-005	NuPAC Data Set Rating for Models and Drawings Procedure
	NuPAC_DP610000-006	NuPAC PTC CREO Model Comparison Procedure
	NuPAC_PLPRC610000-001	NuPAC Programmable Logic Design and Implementation Procedure
	NuPAC_PLPRC610000-002	NuPAC Programmable Logic Test Procedure – Core PLCI
4	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_PMP610000-001	NuPAC Project Management Plan
	NuPAC_SMP610000-001	NuPAC Subcontract Management Plan
	Various	LMGI Site Procedures
5	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_PMP610000-001	NuPAC Project Management Plan
	Various	LMGI Site Procedures
6	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_CMP610000-001	NuPAC Configuration Management Plan
	NuPAC_PMP610000-001	NuPAC Project Management Plan

	NuPAC_CDM610000-017	NuPAC Document Control Procedure for Non-Design Data
	Various	LMGI Site Procedures
7	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_SMP610000-001	NuPAC Subcontract Management Plan
	NuPAC_CGDP610000-001	NuPAC Commercial Grade Item/Service Dedication Plan
	Various	LMGI Site Procedures
8	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_CMP610000-001	NuPAC Configuration Management Plan
	Various	LMGI Site Procedures
9	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	Various	LMGI Site Procedures
10	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_PMP610000-001	NuPAC Project Management Plan
	NuPAC_IP610100-001	NuPAC Chassis Assembly Inspection Procedure
	NUPAC_IP610300-001	NuPAC GLM Assembly Inspection Procedure
	NUPAC_IP610900-001	NuPAC TSC Inspection Procedure
	Various	LMGI Site Procedures
11	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_MTP610000-001	NuPAC Master Test Plan
	NuPAC_TEDP610000-001	NuPAC Test Equipment Development Plan
	NuPAC_SDP610820-001	NuPAC Test Equipment Software Development Plan
	NuPAC_TPL610400-001	NuPAC Programmable Logic Test Plan – Core PLCI
	NuPAC_TPL610800-001	NuPAC Test Equipment Integration, Verification and Validation Plan
	Various	LMGI Site Procedures
12	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	PRC880000-002	Control of Measuring and Test Equipment
	Various	LMGI Site Procedures
13	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	PRC880000-003	Handling, Storage and Shipping
	Various	LMGI Site Procedures

14	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_MTP610000-001	NuPAC Master Test Plan
	Various	LMGI Site Procedures
15	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	PRC880000-004	Control of Nonconforming Items
	Various	LMGI Site Procedures
16	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	NuPAC_FRACAS610000-001	NuPAC Failure Reporting, Analysis and Corrective Action System (FRACAS) Plan
	NuPAC_FMCA610000-001	NuPAC Failure Management and Corrective/Preventive Action Plan
	PRC880000-006	Corrective Action Procedure
	PRC880000-008	Stop Work Order Procedure
17	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	PRC880000-005	Quality Assurance Records
	PRC880000-007	Quality Assurance Master Records Table
	Various	LMGI Site Procedures
18	D-D7210/2013P-5001	Nuclear Systems & Solutions Quality Systems Manual for Commercial Nuclear Programs
	Various	LMGI Site Procedures

Appendix B - Acronyms

The following abbreviations and acronyms are defined to allow an understanding of their use within this document.

Acronym	Definition
ADR	Architecture Design Review
CAB	Corrective Action Board
CI	Configuration Item
CMP	Configuration Management Plan for NuPAC
DDR	Detailed Design Review
FRACAS	Failure Reporting, Analysis and Corrective Action System
FVVP	NuPAC Field Programmable Logic Verification and Validation Plan
IMS	Integrated Master Schedule
ITP	NuPAC-RPS Training Plan
I-V&V	Independent Verification and Validation
LM	Lockheed Martin
LMGI	Lockheed Martin Global Inc.
M&TE	Measurement & Test Equipment
MP	NuPAC and RPS Measurement Plan
NNSA	National Nuclear Safety Administration
NRC	Nuclear Regulatory Commission
NS&S	Nuclear Systems and Solutions
PLDP	NuPAC Programmable Logic Development Plan
PLQAP	Programmable Logic Quality Assurance Plan
PMP	NuPAC Project Management Plan
PRC	Peoples Republic of China
PSPP	NuPAC Platform Safety Project Plan
QAM	Quality Assurance Manager
QAP	Quality Assurance Plan
QE	Quality Engineer
QSSE	Quality Systems Software Engineer
ROMP	Risk and Opportunity Management Plan
SCCB	Software Change Control Board
SCMP	Software Configuration Management Plan
SCMPR	Software Configuration Management Plan Review
SDD	Software Design Description
SEMP	Systems Engineering Management Plan for the RPS
SMP	NuPAC Supplier Management Plan
SNPAS	State Nuclear Power Automation System Engineering Company
SPRPS	Safety Platform for Reactor Protection Systems
SRD	Software Requirements Description
SSR	Software Specification Review
STEP	Nuclear Protection and Control Software Tool Evaluation Plan
STP	Software Test Plan
TASP	Technical and Support Processes

Appendix C – Programmable Logic Quality Assurance Plan (PLQAP)

1.0 Purpose

The PLQAP defines how LMGI/SNPAS will meet the software quality program requirements for the NuPAC project. Programmable Logic is considered software Exception to IEEE Std. 730-2002 is taken: (1) that actual revisions of the project planning documents are not listed since these are living documents that are updated frequently; (2) this plan is an appendix to the QAP and thus formatting does not match; and (3) significant content is deferred to other project documentation in many areas.

2.0 Reference Documents

Table 1: Non-Regulatory Documents

Document #	Title
NuPAC_CMP610000-001	Configuration Management Plan for NuPAC (CMP)
NuPAC_PLDP610000-001	NuPAC Programmable Logic Development Plan (PLDP)
NuPAC_FVVP610000-001	NuPAC Field Programmable Logic Verification and Validation Plan (FVVP)
NuPAC_MP610000-001	NuPAC Development Measurement Plan (MP)
NuPAC_ROMP610000-001	Risk and Opportunity Management Plan (ROMP)
NuPAC_SEMP610000-001	Systems Engineering Management Plan for the RPS (SEMP)
NuPAC_PSPP610000-001	NuPAC Platform Safety Project Plan (PSPP)
NuPAC_PLDP610000-005	NuPAC Software Tool Evaluation Plan (STEP)
NuPAC_PMP610000-001	NuPAC Project Management Plan (PMP)
NuPAC_SMP610000-001	NuPAC Supplier Management Plan (SMP)
ITP880000-001	NuPAC-RPS Training Plan (ITP)
PRC880000-009	Product and Implementation Quality Evaluations

3.0 Management

3.1 Organization

The project's quality organization is described in the project's NuPAC Project Management Plan (PMP).

Quality Systems and Software Engineer (QSSE) detailed responsibilities:
This role consists of performing evaluations as detailed in Section 9.0, participation on the Software Change Control Board (SCCB) as a voting member, participation in the Corrective Action Board (CAB) as detailed in Section 8.0, and test witnessing/reviewing/approving. The QSSE organization is part of the Quality Engineering organization and may appoint a technical reviewer expert if the content is such that they are not able to understand it adequately for review. QSSEs and Quality Engineers (QEs) may provide role support for each other in order to maintain an efficient allocation of resources.

3.2 Tasks

The QSSE tasks are identified throughout this plan. The program's Integrated Master Schedule (IMS) contains the sequence of program tasks. QSSE creates and executes an evaluation schedule based on program task occurrence and degree of importance. Product evaluations are performed as items are submitted for review.

3.3 Roles and Responsibilities

3.3.1 Independent Verification & Validation Effort

The PMP and NuPAC Field Verification and Validation Plan (FVVP) describe the role/responsibility of the independent verification and validation effort.

3.3.2 Programmable Logic Engineering Effort

The PMP and NuPAC Programmable Logic Development Plan (PLDP) describe the role/responsibilities of the Programmable Logic Effort.

3.3.3 Quality Assurance Manager

The PMP describes the role of QAM.

3.4 Quality Assurance Estimated Resources

The PMP describes how resources are estimated.

4.0 Documentation

4.1 Purpose

This section identifies the documentation that controls the development, verification and validation, use, and maintenance of the software configuration items. It also provides the expected content and how this is verified.

4.2 Minimum Documentation Requirements

4.2.1 Software Requirements Description (SRD)

The TASP's Software Development Process specifies a Software Requirements Specification work product. QSSE performs work product evaluations as required.

4.2.2 Software Design Description (SDD)

The TASP's Software Development Process specifies a Software Design Document work product. QSSE performs work product evaluations as required.

4.2.3 Verification and Validation Plans

The TASP's I-V&V Process specifies an Independent Verification & Validation Plan (IVVP) work product. The I-V&V team develops the IVVP (known as the FVVP for this project).

QSSE performs plan evaluations of the FVVP and or process evaluations of the I-V&V TASP.

4.2.4 Verification Results Report and Validation Results Report

Execution of the FVVP is documented in activity summary reports, task reports, anomaly reports, and a verification & validation final report.

4.2.5 User Documentation

User documentation specifies and describes the required data and control inputs, input sequences, options, program limitations, and other activities or items necessary for successful execution of the software. All error messages are identified and corrective actions are described. The TASP and NuPAC Programmable Logic Development Plan (PLDP) specify the work products that provide this information.

QSSE performs plan evaluations of the PLDP and or process evaluations of the Software Development TASP.

4.2.6 Software Configuration Management Plan (SCMP)

The TASP's Configuration Management Process specifies a Configuration Management Plan work product which includes software. QSSE ensures compliance by performing a product evaluation of the NuPAC Configuration Management Plan (CMP). QSSE performs plan evaluations of the CMP and/or process evaluations of the Configuration Management TASP process.

4.3 Other

The TASP's Software Development Process specifies a Software Architecture Design Document work product.

The TASP's Software Development Process specifies a Source Code work product.

The TASP's Software Development Process specifies a Version Description Document work product.

The TASP's Software Development Process specifies a Software Development Plan work product which is the PLDP for the NuPAC platform.

The TASP's Software Development Process specifies a Software Test Plan (STP) work product.

The TASP's Software Development Process specifies a Measurement Plan work product.

QSSE performs work product evaluations and implementation/process evaluations as required.

5.0 Standards, practices, conventions, and metrics

5.1 Purpose

This section identifies the standards, practices, conventions, and metrics to be applied; as well as how compliance with these items is to be monitored and assured.

5.2 Content

a) Software Documentation Standards: Instructions, procedures, and drawings include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. QSSE or delegates verify by review and use of these items as part of test preparation and witnessing.
b) Logic Structure Standards: QSSE ensures compliance to these standards by performing the activities described in step 5.2 c) shown below.
c) Coding standards are identified by the PLDP. It identifies the lifecycle phase to which coding standards apply. QSSE verifies compliance by verifying that evidence of code reviews has been performed.
d) Commentary Standards:
QSSE ensures compliance to these standards by performing the activities described in step 5.2 c) shown above.
e) Testing Standards and Practices:
The Software Test Plan and the actions of QSSE are described in Section 4.3 in this plan.
f) Any software metrics used are prescribed in the program's MP, FVVP, and PLDP.

5.2.1 United States Nuclear Regulatory Commission Guidance (NRC)

These references are provided in the NS&S Quality Systems Manual for Commercial Nuclear Programs.

5.2.2 Industry Standards

These references are provided in Table 1 of this appendix.

6.0 Software Reviews

6.1 Purpose

This section defines the technical and managerial audits; states how the reviews and audits are accomplished; and provide further actions that are required and how they are to be implemented and verified.

6.2 Minimum Requirements

The following reviews and audits are performed. All reviews identify the participants and their specific review responsibilities.

6.2.1 Detailed Design Review (DDR)

The DDR (also known as a critical design review) is described in the PMP. QSSE ensures this review occurs by either direct participation in the review itself and/or by evaluating the review package.

6.2.2 Verification and Validation Plan Review

This is known as the Test Readiness Review and is described in the PMP. QSSE ensures this review occurs by either direct participation in the review itself and/or by verifying the review package.

6.2.3 Functional Audit

An audit performed to verify all requirements specified in the SRD have been met prior to software delivery will be performed. The CMP provides further details as to how the review is accomplished. QSSE ensures this review occurs by either direct participation in the audit itself and/or by verifying the audit results.

6.2.4 Physical Audit

In terms of software, this section requires Configuration Management to verify that the software and its documentation are internally consistent and ready for delivery. The CMP provides further details as to how the review is accomplished. QSSE ensures this review occurs by either direct participation in the audit itself and/or by verifying the audit results.

6.2.5 In-Process Audits

Code versus design documentation:
QSSE verifies that the source code has been reviewed by appropriate technical personnel by participation in the actual review itself and/or by inspection of review package.

Interface specifications (hardware and software):
QSSE verifies that interface specifications have been reviewed by appropriate technical personnel by participation in the actual review itself and/or by inspection of review package.

Design implementations versus functional requirements:
QSSE performs the actions described in Section 4.2.5 of this plan to ensure compliance such that delivered software contains adequate documentation.

Functional requirements versus test descriptions:
QSSE ensures traceability from requirements to tests by performing the actions described in Section 7.0 of this plan.

The software design process is documented in the TASP and PLDP and includes or references the identification of software requirements, software design, software design implementation, software design verification, and software testing. QSSE verifies by performing product evaluations of the PLDP and process evaluations of the TASP.

6.2.6 Managerial Reviews

The PMP addresses management reviews.

6.2.7 Software Configuration Management Plan Review (SCMPR)

QSSE evaluates the software portion of the CMP as stated in Section 4.2.6 of this plan.

7.0 Test

The acceptance testing activity is documented in the project FVVP (NuPAC_FVVP6100000-001). QSSE may designate a representative from Quality Assurance to perform witnessing as necessary.

8.0 Problem Reporting and Corrective Action

Any findings from the plan/process evaluations that are not resolved in a timely manner are elevated to the Corrective Action Board as defined in PRC880000-009, Product and Implementation Quality Evaluation

QSSE is a signing member of the Software Configuration Control Board (SCCB), where all Problem Change Requests (PCRs) are reviewed.

9.0 Tools, techniques, and methodologies

Section 11.0 of this plan provides details for the software acquisition methods for controlling the acquisition of software and software services. Section 5.0 of this plan provides details for standards, conventions, and other work practices.

Software tools used to support software development processes and verification and validation processes are controlled under configuration management. Software tools used to develop and independently test the programmable logic are documented in the PLDP and FVVP.

The PLDP and FVVP provide the details of the types of development tools, the techniques to be used by the program, and responsibilities of each of the tools respectively.

QSSE's methodology consists of: (1) Scheduling and performing plan and process evaluations at using created checklists that are derived from the program plans. (2) Scheduling and performing TASP evaluations at least once for each process area using checklists that are derived from the TASP. QSSE has the responsibility to ensure that these are created and then uses them to verify the software quality aspects of the program. Program plan and TASP evaluations assess the program's ability to execute its planning documentation and identify areas in need of improvement. Each step must have objective evidence that is assessed and approved by QSSE. Product evaluations also may be performed as part of the plan or process evaluations or may be performed separately. They may also be performed as part of reviewing artifacts for release. (3) QSSE uses SharePoint on the SNPAS network to record any QSSE specific instructions, program plan and process evaluation schedules, program plan and process evaluation checklists, and corresponding evaluation results.

QSSE provides weekly status inputs to the QAM and/or to the program area via status meetings or email. The inputs are combined with the program's QA status reports.

10.0 Media Control

Any media control is addressed in the CMP.

11.0 Supplier Control

The NuPAC Supplier Management Plan (SMP) addresses supplier control. The NuPAC Software Tool Evaluation Plan (STEP) addresses software tool evaluations.

12.0 Records collection, maintenance, and retention

As stated in Section 9.0, QSSE evaluation records are maintained in the SNPAS network SharePoint and are managed as stated in this QAP.

13.0 Training

Training requirements for Quality personnel are detailed in ITP (NuPAC-RPS Training Plan).

14.0 Risk Management

The NuPAC Risk and Opportunity Management Plan (ROMP) addresses risk and opportunity management.

15.0 Glossary

Table 2: Terms Unique to PLQAP

Term	Definition
Program Plan Evaluation	Program plan evaluations assess the program's ability to execute its planning documentation and identify process areas in need of improvement
Product Evaluation	Product evaluations also may be performed as part of the plan or process evaluations or may be performed separately and determine a given product's compliance to the criteria documented in the TASP.
Process Evaluation	Process Evaluations assess the program's ability to execute a documented process from the TASP.

16.0 SQAP Change Procedure and History

This document is controlled in accordance with the CMP. See the Revision History page for a change history listing.