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LICENSING TOPICAL REPORT

ESBWR I&C SOFTWARE CONFIGURATION MANAGEMENT PLAN

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1 Introduction

This Software Configuration Management Plan (SCMP) describes the Software Configuration Management (SCM) activities to be implemented during the development of software-based products {see SMP [1.3.1.2(1)]¹} produced for Instrumentation and Control Systems². This plan shall be used in conjunction with Software Management Plan (SMP) [1.3.1.2(1)], Software Verification and Validation Plan (SVVP) [1.3.1.2(2)], and Software Safety Plan (SSP) [1.3.1.2(6)].

1.1 Purpose and Scope

This Plan (SCMP) provides the direction necessary to implement the configuration management activities required for the software engineering process {see SMP [1.3.1.2(1)]}. This Plan (SCMP) establishes a formal set of standards and methodology used to administer and control the configuration of all software-based products {see SMP [1.3.1.2(1)]}.

This Plan is to remain in effect throughout the entire life cycle of the I&C software-based products. GEEN will maintain configuration control of the items placed under configuration control for the life of the plant.

This Plan addresses:

1. Definition. The scope of the definition includes:
 - a. the organizational responsibilities for software configuration management, and
 - b. the configuration items (CI) subject to this Plan, including:
 - i) all design specifications, documentation, reports, and test results,
 - ii) support software {see SMP [1.3.1.2(1)]},
 - iii) third party software {see SMP [1.3.1.2(1)]},
 - iv) previously developed software {see SMP [1.3.1.2(1)]},
 - v) software design documentation,
 - vi) software (i.e., source, object, and executable codes), support software, third party software, and previously developed software,
 - vii) I/O, FX, Setpoint value data,

¹ Section numbers referenced in this manner refer to the codes and standards documents listed in the Applicable Documents section (Section 1.3) of this document.

² The functions of I&C are the same as MMIS as defined in the Overall Requirements section (Section 3) of the MMIS and HFE Implementation Plan [1.3.1.1(3)].

- viii) design interfaces (Project Teams and vendors), and
 - ix) review results to evaluate the compliance of software design activities with the requirements of the SMP [1.3.1.2(1)].
2. Identification: Each CI has a unique identity.
 3. Control: This plan specifies the method, timing, and responsibility for the implementation of changes to each CI. Control also ensures conformance of each CI with the defined baseline. This includes:
 - a. processing formal change requests and corrective actions to resolve deviations identified in
 - i) software design and design documentation,
 - ii) software (i.e., source, object, and executable codes), support software, third party software, and previously developed software, including notification to the affected participants,
 - b. maintaining status of design interface documentation and developed software design documentation, and
 - c. designating and controlling software revision status.
 4. Reporting: This plan maintains the accurate, current status of each CI, and the provides visibility and traceability of all identified, applied CI changes. This includes:
 - a. methods for tracking and reporting software errors,
 - b. status of reviews and audits of Baseline Review Records, and
 - c. methods for design record collection and retention.

1.2 Definitions, Acronyms, and Abbreviations

The PDM [2.1.1(2)] specifies the valid Information Management System (IMS) codes, component function codes (CFCs), equipment/service acronyms, and abbreviations for the Project.

Acronyms and Abbreviations

The following Acronyms and Abbreviations are used in this document:

ASME American Society of Mechanical Engineers

BRR	Baseline Review Record
BRT	Baseline Review Team
CI	Configuration Item
CM	Configuration Management
DRF	Design Record File
ECN	Engineering Change Notice
EDMS	Electronic Document Management System
EOP	Engineering Operating Procedure
EPRI	Electrical Power Research Institute
ERM	Engineering Review Memorandum
ESBWR	Economic Simplified Boiling Water Reactor
FX	Functional
GEEN	GE Energy Nuclear
HFE	Human Factors Engineering
HSI	Human System Interfaces
HSS	Hardware/Software Specification
I/O	Input/Output
IEEE	Institute of Electrical and Electronic Engineers
IP	Installation Plan
ISO	International Standards Organization
MMIS	Man-Machine Interface System
NI	Nuclear Island
NUMAC	Nuclear Measurement Analysis and Control
P&ID	Piping & Instrumentation Diagram

PDM	Project Design Manual
PDMS	Product Data Management System
PMM	Project Management Manual
PP	Project Plan
PPM	Project Procurement Manual
PRM	Process Radiation Monitor
QA	Quality Assurance
Reg. Guide	Regulatory Guide
RCCE	Responsible Configuration Control Engineer
RE	Responsible Engineer
RETL	Responsible Engineering Technical Lead
RSSE	Responsible Software Safety Engineer
RTPE	Responsible Technical Project Engineer
SBD	System Block Diagram
SCM	Software Configuration Management
SCMP	Software Configuration Management Plan
SDD	System Design Description
SDP	Software Development Plan
SIntP	Software Integration Plan
SMP	Software Management Plan
SOMP	Software Operation and Maintenance Plan
SPR	Software Problem Report
SRS	Software Requirements Specification
SSA	Software Safety Analysis

SSP	Software Safety Plan
STrngP	Software Training Plan
SVVP	Software Verification and Validation Plan
US NRC	United States Nuclear Regulatory Commission
V&V	Verification and Validation

The following definitions apply throughout this document:

Anomaly	- Anything observed in the documentation or operation of software that deviates from expectations based on previously verified software products or reference documents.
Baseline	- A specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures.
Baseline Review	- A formal review, conducted at the end of each process step of the software engineering design process, and requested by the Design Team's Responsible Technical Project Engineer. The baseline review process is under the control of Software Project Engineering (SPE). The Baseline Review Team (appointed by the BRT Task Lead) performs the review. These reviews are intended to confirm adherence to the project SDP, SMP, SVVP, and SCMP (this plan). All Baseline Reviews are performed and documented in accordance with the Software Configuration Management Plan (this plan)..
Baseline Review Team	- The BRT is responsible for judging the adherence to the process for the work products being baselined. The BRT Task Lead appoints the members of this team. For safety related software, the team members must not work for the same manager as the person who generated the work to be reviewed.

- Baseline Review Team Task Lead** - The person responsible for organizing the baseline review process. This person is appointed by the Manager / Technical Lead, Control / Electrical Systems.
- Classifications of Safety-Related (Q) and Nonsafety-Related (N) Hardware and Software** - Reference EOP 65-2.10. GEEN classifies any Software that performs a nonsafety-related function, or whose common mode software failure cannot defeat a safety-related function, as Nonsafety-Related (N). GEEN applies IEEE Standard 1012 integrity level 2 processes to Quality Class N software. GEEN classifies any software that performs a safety-related function, or whose common mode software will defeat a safety-related function, as Safety-Related (Q). GEEN applies IEEE Standard 1012 integrity level 3 to Quality Class Q software. See Appendix A of SQAP for a breakdown of software systems.
- Code Review (Code Analysis)** - Software source code presented to project personnel for comment or approval.
- Configuration Item** - A CI is an item or a set of items of hardware, software, design documents, or procedures that is designated for configuration management and treated as a single entity in the configuration management process.
- Design Record File** - The DRF is the formal controlled information record for in-progress and completed engineering work which is retained and from which information can be retrieved.
- Design Reviews** - Formal, design adequacy evaluations which are performed by knowledgeable persons other than those directly responsible and accountable for the design in accordance with GEEN EOP 40-7.00 [1.3.1.2(3g)]. For Quality Class Q systems, the reviewers must not work for the same manager as the person who generated the work to be reviewed. Design reviews are used to verify that product designs meet functional, contractual, safety, regulatory, industry codes and standards, and company requirements.
- Design Walkthrough** - An informal review process or inspection to find defects (such as omissions, unwanted additions, and contradiction) in design documentation and to consider alternative functionality, performance objectives, or representations.

- Independence** - For Quality Class Q work, 10 CFR 50 Appendix B defines Independence as being someone who did not perform, or direct the performance or methods, used to implement the artifact being reviewed. For software, the NRC views this as insufficient, and requires the reviewer to work for a manager (defined as someone having fiduciary duties, and inviolate budget, schedule, and resources for the review activities) different than the manager of the person implementing the artifact to be reviewed. This level of independence is not required for non-critical For Quality Class N software, the level of independence defined in 10 CFR 50 Appendix B is sufficient. GEEN will determine, on an individual case basis, the requirements for independence in Quality Class N software where failures challenge Quality Class Q systems.
- I&C Software Library** - A software library containing computer readable and human readable information relevant to a software development effort.
- Instrument** - A hardware device used for analytical or control functions and usually containing an embedded microprocessor(s).
- Responsible Configuration Control Engineer** - The person assigned responsibility for the configuration management of the I&C software-based products.
- Responsible Engineer** - The person responsible for a given technical item (e.g., the design and development of the documentation).
- Responsible Engineering Technical Lead** - A person with the overall responsibility for a set of I&C software-based products. Each I&C software-based product is assigned a RETL, including those developed by vendors.
- Responsible Software Safety Engineer** - The person with responsibility for ensuring the safety qualities of the software being developed for I&C, including the integration of the software with the final hardware platform {see SSP [1.3.1.2(6)]}.
- Responsible Technical Project Engineer** - The person with overall technical responsibility for ensuring that the hardware and software design of a software-based product meets the requirements.

Responsible Verifier	The Responsible Verifier(s) is an individual who meets the independence as described in GEEN EOP 42-6.00 [4.1.2(3b)] for verifications or EOP 42-6.10 for deferred verifications of design process and the accompanying documents.
Software Life Cycle	- The period that begins when a software product is conceived and ends when the software is no longer available for use. (See the SMP.)
Software Module	- The smallest segment of code (also called routine, procedure, function, or subprogram).
Software Package	- A collection of software modules (e.g., subroutines and main control tasks) brought together to form a single software product.
Software Source Code	- Computer instructions and data definitions expressed in a form suitable for input to an assembler, compiler, or other translator.
Traceability Matrix	- This matrix or matrices trace requirements and their implementation between two or more phases of the software process. The matrices document implementation of requirements from design documentation into detailed design, code, and test documents.
Validation	- The testing process that ensures that software-based products meet their intended uses and are compliant with system functional, performance and interface requirements.
Verification	- Activities performed by knowledgeable personnel independent of those responsible for the software design process to ensure that design and process outputs meet specified requirements. For Quality Class Q systems, the reviewers must not work for the same manager as the person who generated the work to be reviewed. Design and process outputs may include software development plans, software specifications and manuals, safety analyses. Verification activities include audit, inspection, independent verification, testing, and review of operating experience.

- Verification and Validation** - The V&V activities performed in accordance with GEEN EOPs 40-7.00 (Design Reviews) [4.1.2(3a)] or 42-6.00 (Independent Design Verification) [4.1.2(3b)] or equivalent to ensure the quality of the design process and the associated documents produced. These V&V activities performed by software project engineering (SPE) in accordance with the design process (SVVP) to ensure the quality of the associated documents produced.

1.3 Applicable Documents

1.3.1 Supporting and Supplemental Documents

1.3.1.1 Supporting Documents

The following supporting documents were used as the controlling documents in the production of this plan. These documents form the design basis traceability for the requirements outlined in this plan.

Document Title	Document Number
1. Project Design Manual (PDM)	
2. NP-2010 COL Demonstration Project, Project Management Manual (PMM)	NEDC-33216
3. Man-Machine Interface System and Human Factors Engineering Implementation Plan	NEDO-33217
4. NP-2010 COL Demonstration Project Quality Assurance Plan	NEDO-33181
5. Project Procurement Manual (PPM)	
6. Composite Specification (26A6007)	A11-5299

1.3.1.2 Supplemental Documents

Supplemental documents are those documents that are used in conjunction with this document.

Document Title	Document Number
1. Software Management Plan	NEDO-33226
2. Software Verification and Validation Plan	NEDO-33228
3. GEEN Engineering Operation Procedures	NEDE-21109

Document Title	Document Number
a. 42-6.00 Independent Design Verification	
b. 42-8.00 Document Initiated or Change by ERM/ECN	
c. 42-10.00 Design Record File	
d. 55-2.00 Engineering Change Control	
e. 60-3.20 Quality-Related Computer Data	
f. 30-3.40 Product Data Management System (PDMS)	
g. 40-7.00 Design Review	
h. 40-3.00 Engineering Computer Programs	
i. 30-3 Product Definition	
j. 45-2.00 Procurement of Engineering Services	
4. Project Configuration Management Plan	
5. Software Development Plan	NEDO-33229
6. Software Safety Plan	NEDO-33230
7. Software Quality Assurance Plan	NEDO-33245
8. Software Installation Plan	NEDO-33247
9. Software Integration Plan	NEDO-33246
10. Software Operation and Maintenance Plan	
11. Software Training Plan	
12. Software Conventions and Guidelines Document	

1.3.2 Codes and Standards

The following codes and standards are applicable to the Software Configuration Management activity, only to the extent specified in this plan. The applicable date/revision of the code or standard is specified in the Composite Specification [1.3.1.1(6)].

- 1.3.2.1 American Society of Mechanical Engineers (ASME) Codes**
 - 1. None
- 1.3.2.2 Electrical Power Research Institute (EPRI)**
 - 1. EPRI TR-106439, Guidelines on Evaluation and Acceptance of Commercial Grade Digital Equipment in Nuclear Safety Application
- 1.3.2.3 Institute of Electrical and Electronic Engineers (IEEE) Standards**
 - 1. IEEE 610.12, Standard Glossary of Software Engineering Terminology
 - 2. IEEE 828, IEEE Standard for Software Configuration Management Plans
 - 3. IEEE 1042, IEEE Guide to Software Configuration Management
 - 4. IEEE 7-4.3.2, Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations
- 1.3.2.4 International Standards**
 - 1. ISO-9000-3, Quality management and quality assurance standards - Guidelines for the application of ISO 9001 to the development, supply and maintenance of software
- 1.3.2.5 U.S. Nuclear Regulatory Commission (NRC) Regulatory Guides (Reg Guide)**
 - 1. Reg. Guide 1.169, Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants
 - 2. Reg. Guide 1.152, Criteria for Digital Computers in Safety Systems of Nuclear Power Plant
 - 3. NRC SER for EPRI TR-106439, Review of EPRI Topical Report TR-106439, Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Application, TAC No. M94147
- 1.3.2.6 NUREG**
 - 1. NUREG/CR-6421, A Proposed Acceptance Process for Commercial Off-the-Shelf (COTS) Software in Reactor Applications
 - 2. NUREG/CR-6101, Software Reliability and Safety in Nuclear Reactor Protection Systems
 - 3. NUREG-0800, Chapter 7, Branch Technical Position HICB-14, for Software Safety Plans

2 Configuration Management Structure

2.1 Organization

The hierarchy of individuals responsible for implementing the configuration management of I&C software-based product is identified in the overall organization chart located in the SMP. The Responsible Engineering Technical Lead (RETL) shall request that a Responsible Configuration Control Engineer (RCCE) be assigned and ensure that an assignment is made.

The design interfaces and the organization units (i.e., vendors, other project teams, etc.) responsible for the development of I&C software and microprocessor based products are identified in Figure 1.

2.1.1 Design Interfaces

The Responsible Technical Project Engineer (RTPE) is responsible for coordinating I&C design documentation and interfacing design items with design items developed by other Project Organizational Units, developed outside the scope of this Plan. Figure 1 depicts the design documentation of the software-based products under I&C scope, and the design interfaces between:

1. other GEEN Project Teams,
2. vendors internal to GEEN (i.e., other GEEN organizational units external to Project), and
3. vendors external to GEEN.

2.1.1.1 Internal Design Interfaces

To coordinate design changes with other GEEN Project Teams, the RTPE and/or RE will schedule informal design reviews or "design walkthroughs" (see SVVP [1.3.1.2(2)]) to evaluate and resolve design issues. Such meetings shall be documented, including all design decisions reached (e.g., in a Design Walkthrough Report). This documentation shall be filed in the appropriate DRFs.

2.1.1.2 Vendor Design Interfaces

All vendors participating in I&C design activities shall designate an individual within their organizations to whom all engineering design information and correspondence is to be directed.

The RTPE shall ensure that for vendors external to GEEN, project technical and quality assurance requirements, administrative requirements, and submittals are accurately defined and documented and in the procurement package {see PPM [1.3.1.1(5)]}. The procurement package shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)].

The RTPE shall ensure that for vendors internal to GEEN, project technical and quality assurance requirements, administrative requirements, and submittals are prepared in accordance with GEEN EOP 45-2.00, Procurement of Engineering Services [1.3.1.2(3j)]

Engineering design interfaces with the vendors shall be conducted and all information transmitted formally in accordance with Section 1.1.2, Project Communication, of the Project Management Manual [1.3.1.1(2)]. All project correspondence that pertains to the transmission or acceptance of project documents shall be maintained in accordance with the requirements outlined in Section 1.2, Project Document Control, of the Project Management Manual [1.3.1.1(2)].

2.1.1.3 Organizational Resources

Budget:

The financial resources necessary to carry out the work in the SCMP is proprietary and maintained by the senior manager(s) responsible for the personnel assigned to their area of responsibility.

Personnel:

The SCMP (this plan) specifies the organizational responsibilities, with respect to software configuration management activities, for each member of the project team serving in a lead capacity.

The design team shall be composed of experienced individuals whose collective expertise covers a broad range of disciplines relevant to the design and implementation process. These disciplines shall include technical project management, systems engineering, nuclear engineering, electrical engineering, software engineering, and control and instrument engineering.

Staffing plans shall be established for each work package according to EOP 25-5.00 [2.1.2(7a)]. Due to the very sensitive nature of the information, these plans will be retained for the duration of the project in Project Files as GE Company Private information.

Internal GE human resource policies define methods for obtaining, training, and retraining staff.

Methods/Tools:

The SCMP specifies the Methods and Tools for carrying out the Software Configuration Management such as:

The configuration control tools and methodologies,

The configuration control process,

The configuration change control process, and

The record collection and retention methods.

Standards:

The Supporting and Supplemental Documents section of this SCMP provides the primary international, national, industry, and company standards and guidelines to be followed.

2.2 SCM Responsibilities

The primary CM duties of the organization and staff covered by the SCMP, and of individuals within the organization are defined below. The CM duties of the Manager/Technical Lead, are defined within SDP [1.3.1.2(5)] under Project Responsibilities.

Sections 2.2.1 through 2.2.8 describe the responsibilities of the individuals and organization responsible for the configuration management activities (see Section 3.4) throughout the software engineering process.

The Project Configuration Management Plan [1.3.1.2(4)] defines how to perform notification of document issues, as well as distribution or release of documents.

2.2.1 Responsible Engineering Technical Lead

The Responsible Engineering Technical Lead shall appoint an RCCE for each system, group of systems, or for the entire project, as required by the project load.

2.2.2 Responsible Technical Project Engineer

The Responsible Technical Project Engineer (RTPE) shall:

1. determine the timing of Baseline Reviews,
2. identify the CIs to be baselined, and
3. authorize the distribution or release of baselined software, including source, object, and executable codes.

2.2.3 Responsible Engineer

The Responsible Engineer(s) (RE) shall:

1. prepare the CIs,
2. obtain the required verification documents [e.g., Independent V&V review record(s)], and
3. resolve all identified nonconformances.

2.2.4 Responsible Configuration Control Engineer

The Responsible Configuration Control Engineer shall:

1. ensure that the I&C software and associated documentation are entered into the appropriate I&C Software Libraries,
2. maintain the I&C Software Libraries, and

2.2.5 Baseline Review Team Task Lead

The BRT Task Lead shall:

1. appoint members of the Baseline Review Team,
2. establish the Baseline Review Team by assigning review responsibilities,
3. convene baseline reviews,
4. chair the baseline reviews (see Section 3.4.1),
5. document the baseline review meeting, Baseline Review Team members, and attendees, storing this information as required in this plan,
6. ensure that the Baseline Review Team performs its required function in accordance with this plan and the procedures given in the documents listed in Section 1.3 of this plan, and
7. track open baseline items.

The Baseline Review Team Task Lead may be the RCCE or an individual from the QA Organization.

2.2.6 Baseline Review Team

The Baseline Review Team members shall have sufficient skill and experience to effectively judge the adequacy of the verification of CI(s) being baselined³. The Baseline Review Team Members shall be knowledgeable in the Baseline Review process. They must meet the definition of independence provided in this plan for Quality Class Q software. The Baseline Review Team may be comprised of individuals from the QA Organization, the Configuration Management Organization or they may be members of the design team that are independent of the design and development of the CI subject to baseline. The RCCE is also a member of the Baseline Review Team.

The responsibilities of the Baseline Review Team are to:

1. assure that all CIs are properly identified, verified, and controlled,
2. assure compliance with the SMP [1.3.1.2(1)], SCMP (this plan), SVVP [1.3.1.2(2)], SSP[1.3.1.2(6)],SQAP [1.3.1.2(7)], SDP [1.3.1.2(5)], and SIntP [1.3.1.2(9)].
3. generate and review resolutions of baseline noncompliances, and

³ Software Verification and Validation (see SVVP [1.3.1.2(2)]) shall be performed on the CIs as required by the SMP prior to the baseline review.

4. review and approve all resolved nonconformance comments from baseline reviews.

2.2.7 Responsible Software Safety Engineer

The Responsible Software Safety Engineer (RSSE) shall verify that the configuration management and change control does not adversely affect the safety of the systems reviewed.

2.3 Applicable Policies, Directives, and Procedures

2.3.1 Naming and Numbering the CIs

The documents submitted to the Baseline Review Team shall have unique document identification. Documents that will be issued in the formal General Electric (GE) document control system shall be assigned an Engineering Document Number with revision numbers according to the General Electric Energy Nuclear (GEEN) Project document control system {see PDM [1.3.1.1(1)]}. Documents that will not be issued such as DRF entry items, shall be identified, by title, date, and revision number.

2.3.1.1 Issued Documents

The following shall be identified by an Engineering Document Number with revision numbers.

1. Software Configuration Management Plan,
2. Software Management Plan,
3. Software Verification and Validation Plan,
4. Software Development Plan,
5. Software Safety Plan,
6. Hardware/Software Specifications,
7. System Block Diagrams,
8. Software Requirements Specifications,
9. Instrument Performance Specifications,
10. Sub-system Schematics,
11. External Data Communication Protocol Specifications,
12. Software Integration Plan,
13. User's Manuals,
14. Software Conventions and Guidelines Document,

15. Internal Data Communication Protocol Specifications,
16. Software Quality Assurance Plan
17. Software Operation and Maintenance Plan
18. Software Installation Plan
19. Software Training Plan,
20. Software Design Specifications
21. Build Release Descriptions, and
22. Engineering Change Notices (ERM/ECN)

2.3.1.2 Design Record File Documents

The following documents shall be identified by title, date and revision number.

1. Nonsafety Project Plans,
2. Baseline Review Records (for each baseline),
3. Support Software/Tool Documentation Packages,
4. Third Party Software Documentation Packages,
5. Previously Developed Software Documentation Packages,
6. Module Test Reports,
7. Integration and Installation Test Reports,
8. Validation Test Procedures and Test Cases Specifications,
9. Validation Test Reports, and
10. I&C Software Problem Reports (SPR).

2.3.1.3 Software Configuration Items Identification

Computer-based software CIs (e.g., source code listing) shall be assigned a unique identification number and revision number in accordance to the format described in Software Conventions and Guidelines Document [1.3.1.2(13)]. Guidance for generating such identification will be provided later, after vendors are selected. The following document types may be required to be configured as a computer-based CI:

1. Source Code⁴,
2. Software Libraries, DLL's or other link objects,
3. Software binaries or executables, and
4. Any software media or documents that cannot be configured as a TIFF, PDF, or ASCII.

2.3.1.4 Physical Media Identification

All physical media shall be assigned a unique identification number and revision number in accordance to the procedures outlined in GEEN EOP 30-3 [1.3.1.2(3i)].

2.3.1.5 Vendor Documents Identification

Vendor submittals shall be assigned a unique identification and revision number in accordance with the format described in PDM [1.3.1.1(1)].

2.3.1.6 Acquired Software Identification

Acquired software such as support software, third party software, and previously developed software {see SMP [1.3.1.2(1)]} shall be assigned a unique identification and revision number in accordance with the format described in PDM [1.3.1.1(1)]. Distribution media and appropriate user documentation shall be placed under configuration control.

2.3.2 Product Measurement

Design traceability analysis and evaluation must be performed to verify the design and development of I&C software-based products. A cross reference traceability matrix and/or errors checklist may be used to manage the implementation of the software engineering process, and to record defects and errors {see SMP [1.3.1.2(1)]}.

Different test engineers may be used to perform these tests.

During module and integration testing, all errors, such as data structures errors and software and hardware interfaces errors {see SMP [1.3.1.2(1)]} shall be reported to provide the test verifier with a means of assessing design adequacy.

During module testing, all detected software module errors shall be noted on the Module Test Data Sheets. The software plans provide methods for tracking these errors to resolution.

During integration testing, all detected interface errors shall be noted on the Integration Test Data Sheets. The software plans provide methods for tracking these errors to resolution.

3 Configuration Management Activities

This section identifies all functions and tasks required to manage the configuration of I&C software-based products as specified in the supporting documentation listed in Section 1.3.1. The information requirements for each function are identified in Sections 3.1 through 3.9.

⁴ If source code is stored in an ASCII format, at the discretion of the RTPE, it can be configured and stored in an Electronic DRF, or even as a GEEN issued as document.

3.1 Software Configuration Management Plan Implementation

3.1.1 Baselines

The software engineering process is divided into eight discrete software baselines {see SMP [1.3.1.2(1)]}. At the completion of each software life cycle phase, the Baseline Review Team establishes a baseline of verified documents, which mark the completion of the phase. The documents to be baselined are defined in Section 3.3 of this plan. The following software life cycle baselines are defined in the SMP [1.3.1.2(1)]:

1. Planning,
2. Requirements,
3. Design,
4. Implementation,
5. Integration,
6. Validation,
7. Installation, and
8. Operation and Maintenance.

3.1.2 Baseline Item Definition

The baseline configuration items and the storage medium for the established baseline items are listed in Table 1. The items that must be controlled, as well as the storage of those items, are defined in this Table.

For the table, the following items define the interpretation of the “Retention Method” column:

1. “Computer Record” indicates that, if the electronic copy of the documentation exists, the baseline item is retained and controlled in the appropriate Software I&C library.
2. “DRF” indicates that a signed copy of the document is retained and controlled in the software project DRF.
3. “GEEN Issued Document” indicates that the document is retained and controlled through formal issue through the GEEN document system (see Section 2.3.1).

3.2 Configuration Control Tools and Methodologies

3.2.1 Engineering Document Management

All I&C engineering documents and drawings, including submittals from vendors, developed during the design and development of the software-based products will be maintained in the

Electronic Document Management System, as defined in the Project Configuration Management Plan [1.3.1.2(4)]. The Electronic Document Management System (EDMS) is a combination of software, hardware, and appropriate administrative controls, used for the creation, control, approval, storage, and retrieval of documents or data in electronic media.

3.2.2 Software Library for Computer-Based Configuration Items

I&C Software Library shall serve as final control point and repository for the released I&C computer-based software configuration items (i.e., source code, object code, executable code and associated data files for each released revision). Different I&C Software Libraries may be needed to control these configuration items, as I&C software-based products are developed on multiple platforms.

The software library structures shall implement a consistent naming convention, and an appropriate level of security control (e.g., password control for computer-based CIs). The tools selected for configuring and controlling the I&C library may dictate the structure and conventions used, and as such the RCCE shall generate the conventions and policies once the tools are deployed, but before any CI's are submitted to the library. The security measures implemented shall provide assurance that the integrity of the baselined CI will be maintained. Password control of the I&C Software Library accounts shall be granted to the RCCE and the alternate RCCE.

All personnel participating in the I&C project teams shall have read access to the software libraries, but changes to the software libraries shall only be made by the RCCE (or the alternate RCCE when the RCCE is not available). Changes to the configuration items shall comply with the provisions outlined in the SMP.

3.2.3 Design Record File

A Design Record File is the formal controlled information record used to document design activities and retained completed engineering work. Each software project DRF shall be assigned a unique identification number. Documents that will not be issued to the Customer, such as analyses and evaluation reports, will be maintained in the DRF. Each entry item shall be identified, by title, date and revision number. GEEN EOP 42-10.00 [1.3.1.2(3c)] defines the procedures to establish and maintain a DRF.

3.2.4 Product Data Management System

The Product Data Management System (PDMS) is a computer-based data storage and retrieval system that is used to manage data relevant to the engineering definition of products and services (i.e., engineering documents and drawings). The PDMS provides previous and current revisions of the engineering documents that are approved for issue. The PDMS also provides information regarding the status of projects and systems {see GEEN EOP 30-3.40 [1.3.1.2(3f)]}.

3.2.5 Engineering Computer Programs

Support software developed or used by the design team to produce design calculations, design bases, design data, or other data that affect the design, licensing, reliability, or operation of

software-based products shall be developed and controlled in accordance the procedures outlined in GEEN EOP 40-3.00, Engineering Computer Programs [1.3.1.2(3h)].

3.3 Configuration Items Identification

The Software Management Plan (SMP) [1.3.1.2(1)] defines the configuration items generated in each phase. The baselines presented below define the baselines for each phase.

3.3.1 Baseline Items for Planning Phase

1. Software Management Plan
2. Software Configuration Management Plan
3. Software Verification and Validation Plan
4. Software Development Plan
5. Software Safety Plan
6. Unincorporated ERM/ECNs
7. System Design Descriptions
8. Logic Diagrams (Including I/O, FX, and Setpoint Data)
9. Piping and Instrumentation Diagrams
10. Software Quality Assurance Plan
11. Software Integration Plan
12. Software Installation Plan
13. Software Training Plan
14. Software Operation and Maintenance Plan

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Planning Baseline Review, as required by the SMP [1.3.1.2(1)].

3.3.2 Baseline Items for Requirements Phase

1. Hardware/Software Specifications
2. Software Requirements Specifications
3. System Block Diagrams

4. Instrument Performance Specifications
5. Sub-system Schematics
6. External Data Communication Protocol Specifications
7. User's Manuals⁵
8. If applicable, support software and/or tool and its documentation package for the Requirements Phase
9. If applicable, third party software and its documentation package for the Requirements Phase
10. If applicable, Previously Developed Software Evaluation Reports
11. If applicable, supplemental documentation for previously developed software
12. Software Safety Analysis Design Definition Reports
13. Unincorporated ERM/ECNs

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Requirements Baseline Review, as required by the SMP [1.3.1.2(1)]. Baselines of support software, third party software, and previously developed software include documentation and test results.

3.3.3 Baseline Items for Design Phase

1. Software Design Specifications
2. Internal Data Communication Protocol Specifications
3. Validation Test Procedures and Test Cases Specifications⁶
4. Software Conventions and Guidelines Document
5. If applicable, support software and/or tools and its documentation package for the Design Phase
6. If applicable, third party software and its documentation package for the Design Phase
7. If applicable, supplemental documentation for previously developed software for the Design Phase

⁵ The User's Manual may evolve through the Software Design and Coding Phases (see SMP [1.3.1.2(1)]).

⁶ The Validation Test Procedure may evolve through the Validation Test Phase (see SMP [1.3.1.2(1)]).

8. Unincorporated ERM/ECNs

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Design Baseline Review, as required by the SMP [1.3.1.2(1)].

3.3.4 Baseline Items for Implementation Phase

1. Source code
2. Module Test Reports⁷
3. If applicable, support software and/or tools and its documentation package for the Implementation Phase
4. If applicable, third party software and its documentation package for the Implementation Phase
5. If applicable, supplemental documentation for previously developed software for the Implementation Phase
6. Unincorporated ERM/ECNs

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Implementation Baseline Review, as required by the SMP [1.3.1.2(1)].

3.3.5 Baseline Items for Integration Phase

1. Integration and Installation Test Reports
2. If applicable, support software and/or tools and its documentation package for the Integration Phase
3. Software Safety Analysis Integration Test Evaluation Reports
4. Unincorporated ERM/ECNs

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Integration Baseline Review, as required by the SMP [1.3.1.2(1)].

3.3.6 Baseline Items for Validation Phase

1. Validation Test Reports

⁷ Module Test Reports document the results of Code Reviews and Module Testing.

2. If applicable, support software and/or tools and documentation for the Validation Phase
3. Unincorporated ERM/ECNs
4. Build Release Description

All baseline items shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)] prior to the Validation Baseline Review, as required by the SMP [1.3.1.2(1)].

3.3.7 Baseline Items for Installation Phase

The formal design activities end at the validation phase, and as such there are no CI's that are considered as part of the formal baseline procedure for the Installation Phase. CI's for this phase are verified and issued as specified by the Software Installation Plan (SIP).

3.3.8 Baseline Items for Operations and Maintenance Phase

1. SPRs
2. ERM/ECNs
3. Applicable revised documentation
4. Software Safety Analysis Summary Change Report

The revised documentation {see SVVP [1.3.1.2(2)]} shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and SSP [1.3.1.2(6)]. Baseline review(s) shall be re-performed for any affected life cycle phases.

3.4 Configuration Control Process

3.4.1 Baseline Review

A baseline review shall be performed at the completion of each software life cycle phase. The purpose of the baseline review is to establish that:

1. The design information developed during the software life cycle phase adheres to the software engineering process outlined in the SMP [1.3.1.2(1)].
2. The verification and validation performed adheres to the procedures outlined in the SVVP [1.3.1.2(2)].

The baseline review shall be performed as follows:

1. Upon completion of all design activities within the software life cycle phase, including all required Independent V&V, the RTPE shall notify the Baseline Review Team Task Lead that the design activity of the specific software life

cycle phase is complete, and that the work is ready for baseline review. The Baseline Review Team Task Lead shall schedule the baseline review and notify the Baseline Review Team.

2. The RTPE or their designate shall provide the Baseline Review Team with the copies of the items, or the document location of the items in the appropriate configuration management system to be baselined, including the associated V&V documentation, before the baseline review meeting. The documents shall be provided with sufficient time for the BRT to review the documents before the meeting.
3. The BRT will decide whether to approve or disapprove the CIs provided. The BRT will document all nonconformances in the Baseline Review Record (BRR) (see Section 3.4.3). The RE shall be responsible for resolving these nonconformances, and if necessary, revising the CI(s). The BRT will document final resolution and disposition of all identified nonconformances in a revised version of the BRR.
4. A Baseline Review is not complete until all discrepancies in the disapproved CIs have been resolved. However, if the RTPE can justify that the discrepancies discovered will not impact the next phase of the design work to be performed, the BRT may grant an exception to proceed with the design process. The BRT must document their justification for this exception in the BRR or as an attachment to the BRR.
5. Upon approval by the Baseline Review Team, the Baseline Review Team Task Lead shall prepare the Baseline Review Record (BRR). The RCCE shall prepare a Configuration Management Report. A copy of the BRR and Configuration Management Report shall be filed in the appropriate configuration control library.

3.4.2 Baseline Items Approval Process

All configuration items to be baselined must be reviewed by the Baseline Review Team to confirm that:

1. the CIs adhere to the SMP [1.3.1.2(1)], SCMP (this plan), SVVP [1.3.1.2(2)], and SSP [1.3.1.2(6)],
2. all required documents have been completed and verified,
3. the verification scope and approach is reasonable,
4. any comments made during the review process have been adequately documented,

5. all nonconformances have been resolved,
6. all required testing has been completed, and results documented and verified,
7. and that all open issues have been resolved and approved by the Baseline Review Team.

3.4.3 Baseline Review Record

The Baseline Review Team Task Lead shall prepare a Baseline Review Record for each Baseline Review. Appendix A, Section A.1 provides a suggested BRR format. The BRR shall:

1. identify all meeting attendees, and
2. contain a Configuration Management Report which documents:
 - a. the baseline review objectives,
 - b. the scope of the baseline review,
 - c. any nonconformances identified as outlined in Section 3.4.1 of this plan, and
 - d. all items baselined and their revision levels for the specific baseline.

The BRR shall contain a specific statement of results of the review. The RCCE shall store the Baseline Review Record in the appropriate configuration control library.

3.5 Configuration Change Control

The Change Control Process commences with the identification of a discrepancy or deficient condition detected in a configuration item. The RE is informed of the discrepancy or deficient condition by formal transmittal of any of the following forms:

1. I&C Software Problem Report (SPR)
2. Engineering Change Notice (ERM/ECN)⁸
3. Engineering Tool Problem Report

A I&C Software Problem Report is used to report discrepancies or errors discovered in the baselined software package. If such discrepancies or errors result in a design change, the baselined requirement and design specifications shall be revised through the Engineering Change Notice process. Each I&C Software Problem Report shall be assigned a unique identification number and will be maintained in a I&C Software Library. I&C Software Problem Reports are closed by a notation in the Baseline Review Record. A sample SPR form is given in Appendix

⁸ ERM/ECNs are used to change documents bearing a GE Corporate identity (issued CIs).

A, Section A.2. The output log and test results generating the SPR shall be attached to the SPR form.

An Engineering Change Notice (ERM/ECN) is the mechanism used to control, authorize, and implement changes to engineering controlled documents (i.e., design disclosure documents bearing a GE corporate identity), and shall be implemented in accordance with GEEN EOP 55-2.00 [1.3.1.2(3d)], Engineering Change Control. Each ERM/ECN will be assigned a unique identification number and will be controlled by the GEEN Product Data Management System (PDMS) (see Section 3.2.4). The PDMS system will maintain the current status of all issued ERM/ECNs including ERM/ECN sequence number, date issued, documents affected, and date the ERM/ECN is incorporated. An electronic copy of the ERM/ECN form is produced in eMatrix under ERM/ECN.

A staff member reports any engineering problem, such as document or software tool deficiency, on an Engineering Problem Report form. The Engineering Problem Report shall follow the same process as the SPR. Appendix A, Section A.3 provides a sample Engineering Problem Report form.

An electronic copy of the SPR and Engineering Problem Report forms shall be available in the location defined in Table 1, and shall be accessible to all system users. If a problem report tool is used, the problem report form shall include all items identified in the sample forms shown in Appendix A, Sections A.2 and A.3.

3.5.1.1 Change Approval

All changes made to the baselined CIs must be approved by the RTPE using the standard GEEN Engineering Change Control process, based on the authorizing signature on an ERM/ECN.

3.5.1.2 Change Notification

For installed software-based products, the Responsible Engineering Technical Lead shall:

1. notify the end users and appropriate engineering staff of any detected nonconformances, and
2. supply the end user and appropriate engineering staff the revised software-based product.

3.5.1.3 Design Interfaces Control

If the design or the design change activities affect the interfacing organizations, the RTPE shall assure that the proposed changes are reviewed by the participants of the interfacing organizations (see Figure 1).

If the interfacing organization is a vendor external to GEEN, the RTPE shall ensure that the corrective action change control process used by the vendor conforms with the requirements outlined in this plan and applicable requirement standards (see Appendix B).

3.5.2 Change Control Process

Subsections 3.5.1.1 through 3.5.1.3 define the responsibilities of the responsible individuals and the corrective actions necessary to coordinate the change control process of the CIs.

3.5.2.1 Responsible Individuals

3.5.2.1.1 Originator

A change request may be initiated by the user, or by anyone observing a problem with an I&C software-based product. The originator shall:

1. initiate the change request by opening a I&C Software Problem Report (SPR) or writing of an ERM/ECN, and
2. identify the RE, and
3. forward the SPR or ERM/ECN to the RE.

3.5.2.1.2 Responsible Engineer

The RE shall:

1. validate the reported problem,
2. identify the root cause and propose corrective actions,
3. determine the organizational interfaces affected (see Section 2.1.1) by the problem, and if necessary, notify the interfacing organizations (see Subsection 3.5.1.3) and the RTPE,
4. evaluate the technical impact of the proposed change and approved changes,
5. for each approved change, identify which software life cycle phases {as specified in the SMP[1.3.1.2(1)]} are affected,
6. identify affected software and documentation,
7. document the corrective actions taken, and
8. perform re-evaluation and test after corrections have been made.

3.5.2.1.3 Responsible Software Safety Engineer

The RSSE shall:

1. perform the software safety analysis verification and document any issues as part of the CI verification,
2. determine if there is any safety impact from the proposed change,

3. if applicable, identify the necessary re-evaluation of the software safety analysis, and
4. document any re-evaluation performed.

3.5.2.1.4 Responsible Technical Project Engineer

The RTPE shall:

1. approve the change request,
2. assure that the change request is implemented,
3. assure that all interfacing organizations have been informed of the change,
4. assure that each affected CI is reviewed or verified for design adequacy,
5. assure that each revised CI is identified with a revision number,
6. assure that each affected CI is approved as described in the Configuration Control Process of the Baseline Items section (Section 3.4) of this plan, and
7. close out the problem reports.

3.5.2.1.5 Responsible Configuration Control Engineer

The RCCE shall:

1. ensure that the revised I&C software and associated documentation are entered into the appropriate I&C Software Library after the approval of the Baseline Review Team.

3.5.2.1.6 Baseline Review Team

The BRT shall:

1. ensure that the change vehicle (e.g., the SPR or ERM/ECN) has been assigned a unique identification and revision number,
2. review the change control process for procedural compliance and clarity of the technical presentation, and
3. monitor and document the status of the change process.

3.6 Status Accounting

The following configuration status reports may be used as supporting information to the Project Progress Report, to ensure timely reporting of project progress and status {see Software Development Plan [1.3.1.2(5)]}.

1. The System(s) development status is a current listing and status of all CIs being developed.

This report can be generated via:

- a. DRF (see Section 3.2.3), which records data and progress of the design activities,
 - b. the Baseline Review Record which records the status of items baselined, and
 - c. Product Data Management System (see Section 3.2.4).
2. CI change request status
 - a. Document change request report. This report lists the outstanding engineering documents undergoing engineering change request that have not yet been resolved. This report may be generated via PDMS (see Section 3.2.4) and ERM/ECN (see Section 3.5).
 - b. Software change request report. This report lists the outstanding deficient software items (i.e., source code) that have not yet been resolved. This may be generated via SPR (see Section 3.5).

As a minimum, the project shall track and report on the following CI elements:

1. initial approved (dated) version,
2. proposed change completion date,
3. status of requested changes,
4. change approved date,
5. implementation status of approved changes and completion date, and
6. traceability of the requested changes to the controlled documentation.

3.7 Configuration Reviews and Audits

Formal configuration reviews shall be conducted by the SQA Unit (See SMP organization chart) during the design and development process in accordance with the schedule and procedures defined in the Project Configuration Management Plan [1.3.1.2(4)]. Records of the reviews shall be maintained as required by Table 1 of this plan.

Formal functional and physical configuration audits by the SQA Unit (See SMP organization chart) shall be performed on all software CIs to ensure the completeness of the software-based products. There are two types of configuration audits:

3.7.1 Functional Configuration Audit

A functional configuration audit is performed on the Quality Class Q software CIs after Validation Testing is complete, to ensure that each software CI has satisfied the requirements or functions defined in the specifications. A functional configuration audit will be performed as part of the Baseline Review for the Validation Test Phase. The Validation Test Report shall be audited, by comparing the test results (i.e., test data) against the Validation Test Procedures and the acceptance criteria. The Validation Test Report shall be reviewed for completeness and accuracy. Deficiencies shall be documented in the Functional Configuration Audit Minutes and maintained as an attachment to the Baseline Review Record. Records of the audit shall be maintained as required by Table 1 of this plan.

3.7.2 Physical Configuration Audit

A physical configuration audit will be performed as part of the Baseline Review for the Validation Test Phase. The system build description of the Essential Controls Software is documented in the validation test phase {see SMP [1.3.1.2(1)]}. The System Build Description shall be audited to ensure that the "system build" description accurately and completely describes the "build" parameters of the software, such that a duplicate version of the object and executable code can be recreated. Deficiencies shall be documented in the Physical Configuration Audit minutes and maintained as an attachment to the Baseline Review Record. The RTPE is responsible to ensure that all deficiencies are corrected. Records of the audit shall be maintained as required by Table 1 of this plan.

3.8 Configuration Items Release Procedures

The Responsible Technical Project Engineer (RTPE) or appointee is responsible for the authorization of each software CI release. The software CI shall be recreated in accordance with the procedures outlined in the System Build Description {see SMP [1.3.1.2(1)]}. The RTPE shall ensure that the recreated software CI satisfies the requirements or functions defined in the requirements specifications.

3.9 Product Release

The Engineering Manager has the final authority for the release of the final I&C software-based products. Products shall not be shipped without completion of all software safety activities {see SMP [1.3.1.2(1)] section 5.1.2.4}. Products shall not be released without completion of all software life cycle activities.

4 Vendor Control

4.1 Software Developed by Vendors for the Project

I&C software-based products designed and developed by the vendors external to GEEN shall be developed and controlled based on the requirements outlined in this plan. GEEN will evaluate existing vendor procedures for compliance to this plan. GEEN will then:

- accept the vendor plans, or

- work with the vendor to define appropriate modifications to their plans and procedures to meet the requirements of the GEEN software plans, or
- GEEN will implement appropriate compensatory actions for the vendor.

Compensatory actions shall not be required for vendors supplying Quality Class N systems. At the minimum the vendor configuration management program will contain the following:

1. the vendor shall prepare and implement a software configuration management plan in accordance with the requirements outlined in this plan and the SMP [1.3.1.2(1)] or the applicable requirement standards (see Appendix B).
2. a formal records retention and retrieval procedure shall be established for the non-electronic in-progress and completed engineering activities records (e.g., integration test results),
3. all submittals (i.e., engineering design documentation) shall be reviewed and approved by GEEN {see SVVP [1.3.1.2(2)]},
4. configuration reviews and audits (see Section 3.7) shall be performed by GEEN or the organization representing GEEN, at the agreed upon project milestones to monitor for compliance,
5. change control and corrective actions shall conform to the requirements outlined in Section 3.5 of this plan or an equivalent change control process approved by GEEN,
6. all changes made by the vendors shall be reviewed (e.g., via test reports) and approved by the RTPE, and
7. proprietary information (e.g., copyright, licensing) shall be adequately protected and transferred to GEEN for security of ownership.

The Project Management Manual [1.3.1.1(2)] defines maintenance and control procedures for the vendor submittals files.

5 Acquired Software

Acquired software refers to:

1. support software {see SMP [1.3.1.2(1)]}, such as commercially available software and development tools (i.e., compiler and databases),
2. third party software {see SMP [1.3.1.2(1)]}, and
3. previously developed software {see SMP [1.3.1.2(1)]}.

Acquired software must be reviewed and approved to establish the adequacy of such software for the intended use {see SVVP [1.3.1.2(2)]}. Documents such as the following may be useful references for performing support and/or third party software evaluation:

1. EPRI TR-106439, Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Application [1.3.2.2(1)],
2. NRC Safety Evaluation Report: Review of EPRI Topical Report TR-106439, Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Application, TAC No. M94147, and
3. NUREG/CR-6421, A Proposed Acceptance Process for Commercial Off-the-Shelf (COTS) Software in Reactor Applications [1.3.2.6(1)].

The evaluation and test results of the acquired software shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)] and documented as required by Table 1 of this plan.

The acquired software shall be maintained and controlled in accordance with the procedures outlined in Section 3.

5.1 Configuration Change Control of Acquired Software

Acquired software may be modified by the supplier to:

- correct discrepancies or deficient conditions, or
- improve performance.

The RE shall reapply the evaluation process outlined in the SMP [1.3.1.2(1)] to the modified acquired software, to the extent required by the extent and severity of the correction.

After the required evaluation has been performed, the revised evaluation report and test results shall be verified in accordance with the methods outlined in the SVVP [1.3.1.2(2)]. When the verification is complete, the acquired software, with its associated documentation package, shall be:

- assigned a new revision number (see Section 2.3.1),
- baselined and placed under configuration control (see Section 3.4),
- the new version of the software used for all on-going work, and
- existing uses of the software evaluated to determine if the system must be reworked to use the new software version.

6 Record Collection and Retention

All baselined configuration items stored on a magnetic medium shall undergo periodic archival backup in accordance with GEEN EOP 60-3.20 [1.3.1.2(3e)]. GEEN EOP 60-3.20 prescribes

the requirements, procedures, and responsibilities for the control, retention, and retrieval of computer-based data maintained within the central computing facility of GEEN. At least the last two revisions of such items shall be stored in the project library, as specified in Table 1 of this plan.

All configuration items shall contain a direct indication of the item's revision status.

Table 1 Storage Medium for Established Baseline Items

Configuration Items	Retention Medium
Planning	
1. Software Management Plan	GEEN Issued Document
2. Software Configuration Management Plan	GEEN Issued Document
3. Software Verification and Validation Plan	GEEN Issued Document
4. Software Development Plan	GEEN Issued Document
5. Software Safety Plan	GEEN Issued Document
6. Software Installation Plan	GEEN Issued Document
7. Software Training Plan	GEEN Issued Document
8. Software Operation & Maintenance Plan	GEEN Issued Document
9. Software Integration Plan	GEEN Issued Document
10. Software Quality Assurance Plan	GEEN Issued Document
11. Planning Baseline Review Records	DRF
Requirements	
1. Hardware/Software Specifications	GEEN Issued Document
2. System Block Diagrams	GEEN Issued Document
3. Software Requirements Specifications	GEEN Issued Document
4. Instrument Performance Specifications	GEEN Issued Document
5. Applicable Support Software/Tool ² and its Documentation Package	DRF, Computer Record ³
6. Applicable Third Party Software ² and its Documentation Package	DRF, Computer Record ³
7. Applicable Previously Developed Software Evaluation Report	DRF
8. Applicable Supplemental Documentation for Previously Developed Software	DRF
9. Sub-system Schematics	GEEN Issued Document
10. User's Manuals	GEEN Issued Document
11. External Data Communication Protocol Specifications	GEEN Issued Document
12. Design Definition Baseline Review Records	DRF

Table 1 Storage Medium for Established Baseline Items (Continued)

Configuration Items	Retention Medium
Design	
1. Software Design Specifications	GEEN Issued Document
2. Internal Data Communication Protocol Specifications	GEEN Issued Document
3. Validation Test Procedures and Test Cases Specifications	DRF
4. Software Conventions and Guidelines Document	GEEN Issued Document
5. Applicable Support Software/Tool ² and its Documentation Package	DRF, Computer Record ³
6. Applicable Third Party Software ² and its Documentation Package	DRF, Computer Record ³
7. Applicable Supplemental Documentation for Previously Developed Software	DRF
8. Software Design Baseline Review Records	DRF
Implementation	
1. Source code	DRF or Computer Record
2. Module Test Reports	DRF
3. Applicable Support Software/Tool ² and its Documentation Package	DRF, Computer Record ³
4. Applicable Third Party Software ² and its Documentation Package	DRF, Computer Record ³
5. Applicable Supplemental Documentation for Previously Developed Software	DRF
6. Implementation Baseline Review Records	DRF
Integration	
1. Integration and Installation Test Reports	DRF
2. Applicable Support Software/Tools ² and its Documentation Package	DRF, Computer Record ³
3. Integration Test Baseline Review Records	DRF
Validation	
1. Validation Test Reports	DRF
2. Applicable Support Software/Tools ² and its Documentation Package	DRF, Computer Record ³
3. Build Release Description (BRD)	GEEN Issued Document
4. Validation Test Baseline Review Records	DRF
Installation	
1. Software Installation Test Summary, Data Sheets, and Installation Report	DRF
2. Customer Approval	DRF

Table 1 Storage Medium for Established Baseline Items (Continued)

Configuration Items	Retention Medium
Operations and Maintenance 1. SPR 2. ERM/ECN 3. Applicable revised documentation	DRF GEEN Issued Document GEEN Issued Document, or DRF (as appropriate)

² The test results shall be filed in the DRF.

³ If the documentation resides in a removable medium such as CD-ROM or electronic tapes, it may not be necessary or applicable to store this documentation in an electronic I&C Software Library. The RTPE shall specify a secured storage location for such CIs, and add reference records to that storage location to the I&C Software Library. This information shall be documented as a Computer Record.

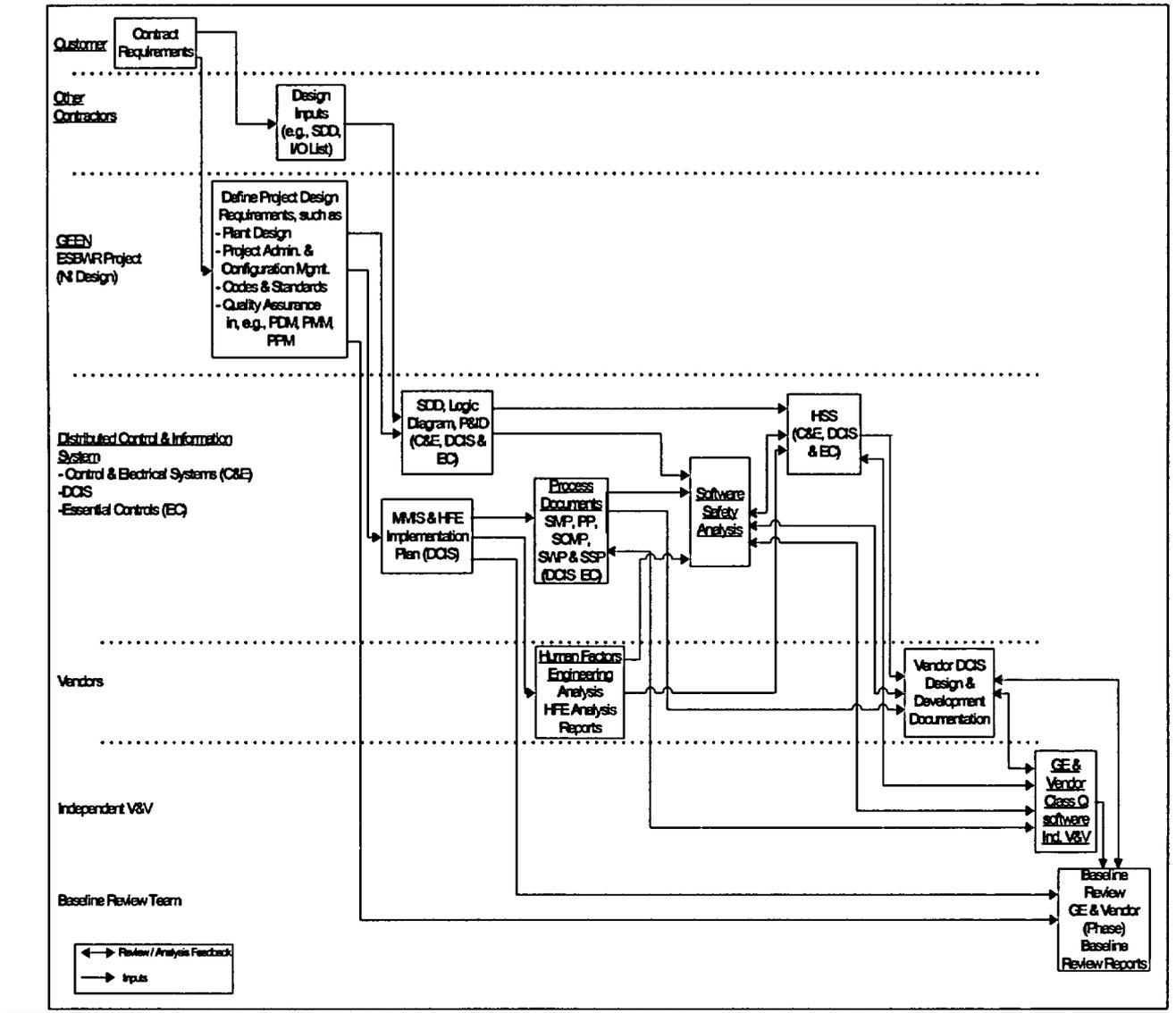


Figure 1 I&C Design Relationship and Baseline Review Interface

Appendix A: Sample Forms to be Used

A.1 Baseline Review Record

This is an example of the form to be used for the Baseline Review Record.

PLANNING BASELINE REVIEW RECORD
1st BASELINE
Revision 0

PROJECT:	Essential I&C Safety Control Software		
PRODUCT:		DATE:	

CONFIGURATION MANAGEMENT REPORT:	
OBJECTIVES:	
SCOPE:	
ITEMS TO BE BASELINED	APPROVED DATE
1.	
2.	
3.	
4.	
5.	

BASELINE REVIEW TEAM MEMBERS:
COMMENTS:
CONCLUSION:

Verification that All Open Issues are Resolved:

(name) RTPE

(name) RCCE

Baseline Approved By Baseline Review Team:

(name) RCCE

A.2 I&C Software Problem Report

This is an example of the form to be used when reporting software problems with a I&C software-based product.

I&C SOFTWARE PROBLEM REPORT			NO.
DATE:			
PROJECT:			
PRODUCT:		REV:	
SAFETY RELATED:	<input type="checkbox"/> Yes <input type="checkbox"/> No	CRITICALITY*:	<input type="checkbox"/> HI <input type="checkbox"/> LO
SOFTWARE MODULE:		FUNCTION:	
INITIATOR:			

PROBLEM/CHANGE DESCRIPTION:			
CORRECTIVE ACTIONS:			
APPROVED BY:		DATE:	

AFFECTED BASELINE	ERM/ECN NO.

* See definition at the end of this appendix.

A.3 Engineering Problem Report

This is an example of the form to be used when reporting engineering problems related to a I&C software-based product.

ENGINEERING PROBLEM REPORT			NO.
DATE:			
PROJECT:			
PRODUCT:		REV:	
SAFETY RELATED:	<input type="checkbox"/> Yes <input type="checkbox"/> No	CRITICALITY*:	<input type="checkbox"/> HI <input type="checkbox"/> LO
FUNCTION:			
INITIATOR:			

PROBLEM DESCRIPTION:	
CORRECTIVE ACTIONS:	
APPROVED BY:	DATE:

AFFECTED BASELINE	ERM/ECN NO.

HI (High) Criticality - Immediate corrective action required to mitigate the consequences of a problem. Example of high critical problem is error that may impact the safety of the product.

* See definition at the end of this appendix.

LO (Low) Criticality - Normal processing time is assumed to be adequate to process the corrective action.

Appendix B: Requirement Standards

Application	Requirement Standards
1. Quality Class Q Application or Systems	<ul style="list-style-type: none"> • Reg. Guide 1.152, Criteria for Digital Computers in Safety Systems of Nuclear Power Plant [1.3.2.5(2)] • Reg. Guide 1.169, Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants [1.3.2.5(1)]
2. Quality Class N Application or Systems	<ul style="list-style-type: none"> • Conform to accepted commercial practices. • Use of same tools and databases for configuration management activities as a used in Quality Class Q applications and systems