

Waste Isolation Pilot Plant
Compliance Certification Application
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**U.S. DEPARTMENT OF ENERGY
CARLSBAD AREA OFFICE**

**WIPP WASTE INFORMATION SYSTEM
SOFTWARE QUALITY ASSURANCE PLAN**

CAO-95-1108

REVISION 0



MAY 1995

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WIPP Waste Information System Software Quality Assurance Plan

1. INTRODUCTION

1.1 Purpose

The purpose of this Software Quality Assurance Plan (SQAP) is to identify and define the standards and methodologies required to ensure conformance to accepted quality standards during the development and maintenance of the WIPP Waste Information System (WWIS). In addition, the standards and methodologies provide adequate confidence that the products conform to established technical requirements. This document will be developed in the concept phase to be used throughout the WWIS software life cycle as depicted in Figure 1.

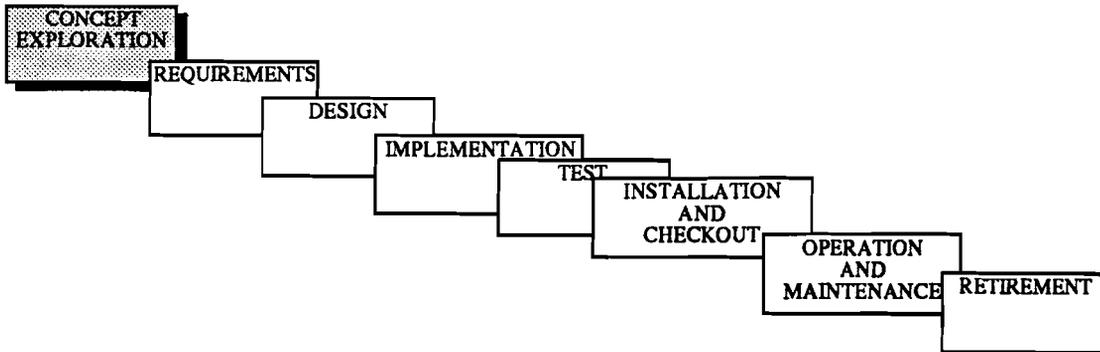


Figure 1. Software life cycle

1.2 Scope

The WWIS SQAP provides a systematic approach to all actions necessary to ensure the WWIS conforms to established technical requirements. This SQAP describes quality assurance standards used in developing and maintaining WWIS, which includes the database, software, and hardware.

1.3 System Description

The new WWIS will be used to gather, store, and process information pertaining to TRU waste destined for or disposed at the WIPP. The system will support those organizations who have responsibility for managing TRU waste by collecting information into one source and providing data in a uniform format that has been verified or certified as being accurate. The WWIS will be a reliable, secure and accurate system to store all information pertaining to characterization, certification, and emplacement of waste at WIPP. Information for this system will be supplied by the generator sites of TRU waste and the WIPP facility.

1.4 Acronyms and Definitions

This section lists the acronyms and defines terms necessary for accurate interpretation for this plan. The acronyms and definitions within this plan conform to the common usage by the WWIS Project personnel and *American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) Standards*.

1.4.1 Acronyms

ANSI	American National Standards Institute
CASE	Computer Aided Software Engineering
DMP	Data Management Plan
IEEE	Institute of Electrical and Electronics Engineers
INEL	Idaho National Engineering Laboratory
SCCB	Software Configuration Control Board
SCMP	Software Configuration Management Plan
SDD	Software Design Description
SP	Security Plan
SQA	Software Quality Assurance
SQAO	Site Quality Assurance Officer
SQAP	Software Quality Assurance Plan
SQAS	Software Quality Assurance Specialist
SRS	Software Requirements Specification
STP	Software Test Plan
SUD	Software User Documentation
SVVP	Software Verification and Validation Plan
TRU	Transuranic
WIPP	Waste Isolation Pilot Plant
WWIS	WIPP Waste Information System

1.4.2 Definitions

Audit	An independent evaluation of software products or processes to ascertain compliance to standards, guidelines, specifications, and procedures based on objective criteria that include documents that specify 1) the form or content of the products to be produced, 2) the process by which the products shall be produced, and 3) how compliance to standards shall be measured. ¹⁰
Conventions	Requirements employed to prescribe a disciplined, uniform approach to providing consistency in a software product, that is, uniform patterns or forms for arranging data. ⁶
Customer	The organization or person who provides funding for the product and defines the requirements. See user.
Development Team	The team who produces software products for the customer.
Operational	(1) Pertaining to a system or component that is ready for use in its intended environment. (2) Pertaining to a system or component that is installed in its intended environment. ¹
Practices	Requirements employed to prescribe a disciplined, uniform approach to the

software development process.⁶

Project Team	The team who produces a product for the customer.
Records	A set of related data items treated as a unit. ¹ All documents associated with a particular project, including agreements, contracts, correspondence, specifications, design documents, user documentation, training plans and procedures, test plans and procedures, and configuration control documentation (i.e., software configuration management plans, software trouble reports, change requests and orders, change reports, and software status reports).
Review	A process or meeting during which a work product or set of work products is presented to project personnel, managers, users, customers, or other interested parties for comment or approval. ¹
Standards	Mandatory requirements employed and enforced to prescribe a disciplined, uniform approach to software development, that is, mandatory conventions and practices are standards. ⁶ See practices.
Techniques	Technical and managerial procedures that aid in the evaluation and improvement of the software development process. ⁶
Tools	A computer program used to help develop, test, analyze, or maintain another program or its documentation.
User	The person or organization who operates or interacts directly with the product.

2. REFERENCES

1. ANSI/IEEE Standard 610.12-1990, *IEEE Standard Glossary of Software Engineering Terminology*, Institute of Electrical and Electronics Engineers.
2. ANSI/IEEE Standard 730-1989, *IEEE Standard for Software Quality Assurance Plans*, Institute of Electrical and Electronics Engineers.
3. ANSI/IEEE Standard 828-1990, *IEEE Standard for Software Configuration Management Plans*, Institute of Electrical and Electronics Engineers.
4. ANSI/IEEE Standard 829-1983, *IEEE Standard for Software Test Documentation*, Institute of Electrical and Electronics Engineers.
5. ANSI/IEEE Standard 830-1984, *IEEE Guide for Software Requirements Specifications*, Institute of Electrical and Electronics Engineers.
6. ANSI/IEEE Standard 983-1986, *IEEE Guide for Software Quality Assurance Planning*, Institute of Electrical and Electronics Engineers.
7. ANSI/IEEE Standard 1008-1987, *IEEE Standard for Software Unit Testing*, Institute of Electrical and Electronics Engineers.

8. ANSI/IEEE Standard 1012-1987, *IEEE Standard for Software Verification and Validation*, Institute of Electrical and Electronics Engineers.
9. ANSI/IEEE Standard 1016-1987, *IEEE Recommended Practice for Software Design Descriptions*, Institute of Electrical and Electronics Engineers.
10. ANSI/IEEE Standard 1028-1988, *IEEE Standard for Software Reviews and Audits*, Institute of Electrical and Electronics Engineers.
11. ANSI/IEEE Standard 1042-1987, *IEEE Guide to Software Configuration Management*, Institute of Electrical and Electronics Engineers.
12. ANSI/IEEE Standard 1063-1987, *IEEE Standard for Software User Documentation*, Institute of Electrical and Electronics Engineers.
13. ANSI/ASME NQA-1-1994, *Quality Assurance Program Requirements for Nuclear Facilities*.
14. *Evaluation & Recommendation for the WIPP Waste Information System*, CAO-95-1081.
15. *Quality Assurance Program Description*; CAO-94-1012, Rev 0, June 1994; U.S. Department of Energy Carlsbad Area Office.
16. *WIPP Waste Information System Data Management Plan*, WWIS-DMP-001.
17. *WIPP Waste Information System Functional and Operational Requirements Document*, CAO-95-1080.
18. *WIPP Waste Information System Security Plan*, WWIS-SP-001.
19. *WIPP Waste Information System Software Configuration Management Plan*, CAO-95-1110.
20. *WIPP Waste Information System Software Design Description*, INEL-95/0241.
21. *WIPP Waste Information System Software Requirements Specification*, CAO-95-1082.
22. *WIPP Waste Information System Software Test Plan*, WWIS-STP-001.
23. *WIPP Waste Information System Software User Documentation*, WWIS-SUD-001.
24. *WIPP Waste Information System Software Verification and Validation Plan*, CAO-95-1109.

3. MANAGEMENT

This section describes the organization, tasks, and responsibilities for the implementation of this SQAP.

3.1 Organization

The following subsections describe the roles for the control of software quality assurance (SQA) activities. See Figure 3.1-1 for the relationship between these roles and the various teams and boards these roles participate on.

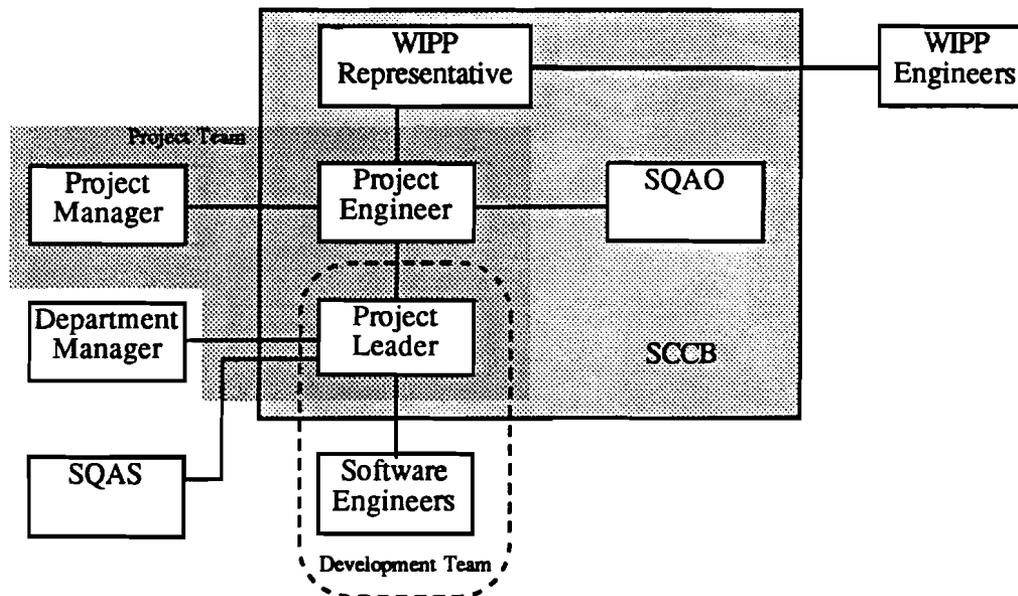


Figure 3.1-1 SQA Relationships

A Software Configuration Control Board (SCCB) is established for the software configuration management of the system. This board is responsible for monitoring, reviewing, and approving additions and requested changes to the WWIS. The board is also responsible for the approval of documentation based on software quality assurance activities described in this document. The SCCB will consist of a WIPP Representative, Project Engineer, Project Leader, and Site Quality Assurance Officer.

The Project Team is composed of personnel that are responsible for the project planning and quality activities. This team consists of the Project Manager, Project Engineer, and Project Leader.

The Development Team is composed of software personnel that evaluate hardware and software alternatives, design and develop the software, and document the software development effort. The Development Team consists of the Project Leader and supporting Software Engineers.

3.1.1 WIPP Representative

The WIPP Representative is from the customer organization, which interfaces with and uses the WWIS. The WIPP Representative may participate in gathering requirements, developing user acceptance criteria, and data collection through interface with the Project Manager.

3.1.2 Project Manager

The Project Manager is responsible for resolving requirements-related conflicts, overall project activities, and project reports. The Project Manager performs planning and budget activities, interfaces with Customer Representatives and Site Quality Assurance Officer, and manages work packages and Task Baseline Agreements and participates on the Project Team.

3.1.3 Project Engineer

The Project Engineer is responsible for data collection and entry, and assures quality requirements are applied to this activity. The Project Engineer interfaces with the Project Manager, and Project Leader. The Project Engineer also serves as the chairperson of the SCCB and participates on the Project Team. The Project Engineer will also be responsible for ensuring that the configuration control procedures outlined in the *WWIS Software Configuration Management Plan (SCMP)* are implemented.

3.1.4 Project Leader

The Project Leader is responsible for the SQA implementation. The Project Leader ensures that the tasks documented within the SQAP are performed at the appropriate points in the life-cycle. The Project Leader is the liaison between the Project Engineer and the software development and maintenance team. The Project Leader is responsible for resolving design-related conflicts. In addition, the Project Leader tracks work status, budgets, schedules, and deliverables and reports to the Project Engineer and SCCB. The Project Leader is also a member of the SCCB, the Development Team, and the Project Team.

3.1.5 Site Quality Assurance Officer

The Site Quality Assurance Officer is responsible for providing the independent quality assurance for the WWIS Project and is supported by the SQA Specialist for specific software quality assurance issues. The Site Quality Assurance Officer participates on the SCCB as an independent reviewer of the Project.

3.1.6 Software Engineer

The Software Engineer is responsible for all physical activities relating to the analysis, design, development, implementation, and preliminary testing of the computer software applications. The Software Engineer performs the coding and documentation of the computer system and is part of the Development Team.

3.1.7 Software Quality Assurance (SQA) Specialist

The SQA Specialist is designated by the Department Manager as an independent reviewer of the documentation at the software development level before it is released for project level review. SQA Specialist is responsible for the activities and reports verifying that the SQA guidelines are followed throughout the project life-cycle. The SQA Specialist performs these tasks as an independent participant to provide the required degree of objectivity during the verification and validation tasks.

3.1.8 Department Manager

The Department Manager is responsible for overseeing the software development personnel, such as Software Engineers and the Project Leader. The Department Manager guides and ensures that the software engineering process is implemented, plans resource availability, and evaluates the performance of the individual contributors.

3.2 Software Quality Assurance (SQA) Tasks

This section describes the relationship of the SQA tasks to each of the software life-cycle phases. These SQA tasks are described in Sections 4 through 15 of this plan. Each software life-cycle phase has common SQA tasks that include: documentation (Section 4), standards, practices, & conventions (Section 5), reviews and audits (Section 6), problem reporting & corrective action (Section 8), tools, techniques, & methodologies (Section 9), records collection, maintenance, & retention(Section 13), and risk management (Section 15). The following table lists other SQA tasks to be performed during the appropriate software life-cycle phase.

Table 3.2-1 Relationship of Software Life-Cycle Phases, and SQA Tasks

Software Life-Cycle Phase	SQA Tasks
All Phases	Documentation Standards, Practices, & Conventions Reviews and Audits Problem Reporting & Corrective Action Tools, Techniques, & Methodologies Records Collection, Maintenance, & Retention Risk Management
Concept	Training
Requirements	-
Design	-
Implementation	Test
Test	Test
Installation	Code Control Media Control Supplier Control
Maintenance	Test Code Control Media Control Supplier Control Training

3.3 Responsibilities

This section identifies the specific role responsible for each SQA task described in Section 3.2, SQA Tasks. The responsibilities are identified by letters within the matrix, Table 3.3-1, key 2. These letters correspond to the appropriate role (Table 3.3-1, key 1) responsible for that SQA task.

Table 3.3-1 SQA Responsibility Matrix

SQA Task	^a WR	PM	PE	PL	SQAO	SE	SQAS	DM
Documentation	^b A	I	E	E	A	E	R	I
Standards, Practices & Conventions	—	—	—	E	I	E	I	—
Reviews and audits	A	I	E	E	A	I	E	I
Test	A	I	E	E	A	E	R	I
Problem Reporting & Corrective Action	A	I	A	A	A	E	C	I
Tools, Techniques, & Methodologies	—	—	—	E	—	E	—	—
Code Control	—	—	—	I	—	E	—	—
Media Control	—	—	—	I	—	E	—	—
Supplier Control	—	—	—	I	—	E	—	—
Records Collection, Maintenance, & Retention	—	I	I	E	R	E	—	—
Training	—	A	—	E	—	E	—	A
Risk management	I	A	E	E	—	C	—	I

a. Key 1 WR = WIPP Representative, PM = Project Manager, PE = Project Engineer, PL = Project Leader, SQAO = Site Quality Assurance Officer, SE = Software Engineer, SQAS = SQA Specialist, DM = Department Manager.

b. Key 2

- A=Approve The role is responsible for the review and approval of SQA activities and deliverables. This action requires a formal signature for sign off.
- E=Execute The role is responsible for the work performed on SQA activities and deliverables. This action represents the person who performs the work.
- R=Review The role is responsible for the review of SQA activities and deliverables; approval is not required. Reviewers participate in the review process and provide input to the SQA process.
- C=Consult The role is consulted for information pertaining to SQA activities and deliverables. This person may not be responsible for providing this information, but this person should be consulted before any action is taken.
- I=Inform The role is informed of information pertaining to SQA activities and deliverables. This person should be supplied and notified of SQA activities and deliverables.

4. DOCUMENTATION

As a minimum requirement, the following WWIS documentation shall be prepared. Any additional documentation shall be provided as project conditions dictate. These documents are considered quality records and will be reviewed according to specific subsection within Section 6.1, Document Reviews.

4.1 Evaluation & Recommendation

The Development Team, in conjunction with the Project Team, shall prepare an Evaluation & Recommendation Document that provides an evaluation of hardware and software configurations for the WWIS and recommends an approach for implementation.

4.2 Software Quality Assurance Plan

The Development Team shall prepare an SQAP to identify and define the standards and methodologies required to ensure conformance to accepted quality standards during the development of the WWIS. The SQAP activities ensure that products conform to established technical requirements.

4.3 Software Verification and Validation Plan

The Development Team shall prepare an SVVP detailing the procedures for verifying the WWIS compliance with the requirements outlined in the SRS. The SVVP ensures that the system implements the design requirements as specified in the SDD. The SVVP describes the criteria for verification and validation activities for the requirements, design, testing, and all necessary documentation.

4.4 Software Requirements Specification

The Development Team shall prepare an SRS explicitly defining the requirements essential to the WWIS based on the *WWIS Functional and Operational Requirements Document*. All requirements shall be internally consistent and verifiable through demonstration, analysis, or testing. The SRS describes and explains all instances of noncompliance with accepted standards or practices. The SRS serves as input to the SDD.

4.5 Software Design Description

The Development Team shall prepare an SDD describing in detail how the WWIS meets the requirements specified in the SRS. The SDD defines the major features of the WWIS, including the operating environment, databases, tables, external and internal interfaces, overall structure, sizing, modeling, and system throughput. The SDD may contain diagrams, such as data flow diagrams or entity-relationship diagrams, to assist in data or system modeling.

4.6 Software Test Documentation

The Development Team shall prepare a Software Test Plan, which includes the system, acceptance, component, and integration testing and will detail the procedures for describing the scope, approach, resources, and schedule of intended test activities. This Software Test Plan will identify test items, features to be tested, the testing tasks, who performs each task, and any risks requiring contingency planning. This test plan will also identify specific roles responsible for preparing the other software test documentation and executing the tests.

The Development Team, in conjunction with the Project Team, shall prepare the other software test documentation specified in the Software Test Plan. This documentation will be used in the testing of the system and details the specific requirements/design being satisfied and the step-by-step procedures for testing.

4.7 Software Configuration Management Plan

The Development Team shall prepare an SCMP that describes the methods used for identifying software configuration items, controlling and implementing changes, and recording and reporting change implementation status.

4.8 Data Management Plan

The Development Team, in conjunction with the WIPP Representative, shall prepare a Data Management Plan that documents the data/database management activities for data within the system. The plan also describes the data history, data problem resolutions, and general data information contained in the system.

4.9 Security Plan

The Development Team, in conjunction with the Project Team, shall prepare a Security Plan that details the information for handling the security needs of the system (data, software, and hardware). This plan will also describe the handling of classified and unclassified data, details on contingency planning, and system protection of the completed system.

4.10 Software User Documentation

The Development Team, with Project Team input, prepares the Software User Documentation for the WWIS project. This documentation provides users with information pertaining to required data control inputs, input sequences, options, program limitations, and all error messages, as well as procedures for corrective actions. This document shall also contain a section that details how to enter these data from other facilities into the system and the verification of these data before production.

5. STANDARDS, PRACTICES, AND CONVENTIONS

The purpose of this section of the SQAP is to identify standards, practices, and conventions used during the specific software life-cycles in Table 5-1. The standards for documentation delivered are specified for each activity. Software Engineers are responsible for the conformance to the standards. The SQA Specialist reviews the resulting documentation for adherence to these standards. There are no identified SQA product and process metrics.

Table 5-1 Standards, Practices, and Conventions

Software Development Phase	Standards, Practices, and Conventions
Concept	<i>IEEE Guide for Software Quality Assurance Planning</i> <i>IEEE Standard for Software Quality Assurance Plans</i> <i>IEEE Standard for Software Reviews and Audits</i> <i>IEEE Standard Software Verification and Validation Plans</i> <i>Quality Assurance Program Description</i> <i>Task Baseline Agreement</i> <i>WWIS Evaluation & Recommendation</i> <i>WWIS Functional and Operational Requirements</i> <i>WWIS Software Quality Assurance Plan</i> <i>WWIS Software Verification and Validation Plan</i>
Requirements	<i>IEEE Guide Software Requirements Specifications</i>
Design	<i>IEEE Recommended Practice for Software Design Descriptions</i> <i>WWIS Software Requirements Specification</i>
Implementation	<i>WWIS Software Design Description</i> <i>IEEE Standard for Software Test Documentation</i>
Test	<i>IEEE Standard for Software Unit Testing</i> <i>WWIS Software Test Plan</i>
Installation	<i>IEEE Standard for Software Configuration Management Plans</i> <i>IEEE Guide to Software Configuration Management</i> <i>IEEE Standard for Software User Documentation</i>
Maintenance	<i>WWIS Software Configuration Management Plan</i> <i>WWIS Software User Documentation</i> <i>WWIS Data Management Plan</i> <i>WWIS Security Plan</i>

6. REVIEWS AND AUDITS

This section defines the technical and managerial reviews and audits to be conducted. These reviews and audits are performed to evaluate the status and quality of the software development effort. Reviews provide assurance that design integrity is maintained, technical deficiencies are identified, and necessary changes have been identified and implemented. The software items are reviewed to determine the extent of progress and to evaluate the technical adequacy of the work and its conformance to system requirements. Audits provide a basis for making decisions on the status and quality of the software development effort to assure the use of required documentation. The relationship and timing of required reviews and audits is shown in Table 6-1 and the specific details for the reviews and audits are within the *WWIS Software Verification and Validation Plan*.

Table 6-1 Relationships and Timing of Required Reviews and Audits

Software life-cycle Phase	Software Documentation	Required Audits and Reviews
Concept	Evaluation & Recommendation SQAP SVVP	SVVP Review Other Document Reviews Managerial Review
Requirements	SRS	Software Requirements Review In-Process Audit
Design	SDD	Preliminary Design Review Critical Design Review In-Process Audit
Implementation	Software Test Documentation	Other Document Reviews Managerial Review In-Process Audit
Test	Software Test Documentation	Functional Audit
Installation	SCMP Data Management Plan Security Plan SUD	Other Document Reviews Managerial Review Physical Audit
Maintenance		Any applicable reviews and audits

6.1 Document Reviews

The Development Team shall conduct document reviews to determine the technical adequacy of the documentation approach and design as implemented within the documents. The members of the SCCB and the SQA Specialist will participate in these reviews unless otherwise stated. The SQA Specialist will analyze and evaluate the documents as outlined in the *WWIS SVVP*.

6.1.1 Software Requirements Review

The Development Team shall conduct a Software Requirements Review to evaluate the adequacy and completeness of the requirements in the SRS. This review ensures that the SRS contains enough detail to satisfactorily complete the SDD.

6.1.2 Preliminary Design Review

The Development Team shall conduct and perform a Preliminary Design Review as an internal development walk-through review. This review evaluates the technical accuracy of the design before the beginning of the detailed design; assesses the progress, consistency, and technical adequacy of the WWIS software design approach; evaluates the design compatibility with regard to the functional requirements outlined in the SRS; and verifies the compatibility of the interfaces between the software, hardware, and users.

6.1.3 Critical Design Review

The Development Team shall conduct a Critical Design Review to evaluate the technical accuracy of the design before coding is started and assesses the progress, consistency, and correctness of the WWIS software design approach. The purpose of the Critical Design Review is to evaluate the acceptability of the detailed design; to establish that the detailed design satisfies the requirements of the SRS; to review compatibility with other systems; and to assess technical, cost and schedule risks of the product design.

6.1.4 Software Verification and Validation Plan Review

The Development Team shall conduct an SVVP Review to evaluate the adequacy and completeness of the methods outlined in the SVVP.

6.1.5 Other Document Reviews

In addition to the previously listed reviews for the SRS, SDD, and SVVP, the Development Team shall conduct reviews for the following documents:

- Evaluation & Recommendation,
- Software Quality Assurance Plan,
- Software Test Documentation,
- Software Configuration Management Plan,
- Data Management Plan,
- Security Plan, and
- Software User Documentation.

The Evaluation & Recommendation shall be reviewed for adequacy and completeness of requirements criteria. The SQAP shall be reviewed to evaluate the adequacy and completeness of the quality assurance activities and tasks. The software test documentation will be reviewed to assess the test specifications, reports, and procedures outlined in the software test plan and other test documentation. The SCMP will be reviewed to evaluate the adequacy and completeness of the

configuration management methods. The Data Management Plan will be reviewed to evaluate the adequacy and completeness of the data management methods. The Security Plan will be reviewed for data access, contingency planning, and system protection. The Software User Documentation will be reviewed to validate that the software product matches the user documentation.

6.2 Managerial Reviews

Periodic Managerial Reviews are conducted by an independent party to be designated by the Department Manager and agreed to by Project Manager during the development of the WWIS. These reviews assess the adequacy of the SQAP as it relates to the project, as well as the execution of all actions and items identified in the SQAP. These reviews should be held at the completion of the project phases. The results of each review will be documented in a self-assessment report to the Project Manager summarizing review findings and recommended modifications or improvements.

6.3 Functional Audit

The Development Team shall conduct a Functional Audit during the test phase to provide an evaluation of the process by which software functionality and performance are consistent with the WWIS SRS. The tasks and personnel associated with this audit are further defined in the WWIS SVVP.

6.4 Physical Audit

The Development Team shall perform the Physical Audit to verify that the software and documentation are internally consistent and ready for delivery. The tasks and personnel associated with this audit are further defined in the WWIS SVVP.

6.5 In-Process Audits

The Development Team shall conduct In-Process Audits to verify consistency of the software requirements, design, and implementation. The tasks and personnel associated with this audit are further defined in the WWIS SVVP.

7. TEST

The *WWIS SVVP* documents the WWIS verification and validation tasks to be performed during the testing process. This document describes the method and process to validate that the completed end product complies with established software and system requirements. The SVVP describes the life-cycle V&V tasks, reporting process, and required procedures.

The *WWIS Software Test Plan* documents the acceptance, system, component, and integration tasks that will be performed during the testing of the system. Additional test documentation will be written and will describe test procedures, test items and features to be tested for the system.

8. PROBLEM REPORTING AND CORRECTIVE ACTION

All procedures to be employed for WWIS problem reporting and corrective action shall conform to specific documents. Procedures for anomalies, anomaly reporting and corrective actions resulting from reviews and audits will conform to the *WWIS SVVP*. Procedures for the reporting and handling of exceptions resulting from testing will conform to *WWIS Software Test Plan*. The problem reporting and corrective actions for the production WWIS database, software and hardware

are contained in the *WWIS SCMP*. The problem reporting and corrective actions for the operational data are contained in the *WWIS Data Management Plan*.

9. TOOLS, TECHNIQUES, AND METHODOLOGIES

The Development Team shall use the following software tools, techniques, and methodologies throughout system development to support SQA activities.

9.1 Tools

Computer aided software engineering (CASE) tools shall be used during the development of the WWIS to aid in the overall quality of the system.

9.2 Techniques

All software engineering techniques employed during system development shall conform to the standards and practices outlined in Section 5, Standards, Practices, and Conventions.

9.3 Methodologies

All software engineering methodologies employed during system development shall conform to *IEEE Software Engineering Standards* and other generally accepted software engineering standards and practices.

10. CODE CONTROL

The SCMP identifies methods to be used for identifying the software product items, controlling and implementing changes, and recording and reporting change implementation status. The software configuration management tasks consist of evaluating, identifying, coordinating, approving or disapproving, and implementing changes to configuration items after formal establishment of their configuration identifications. Tasks, methodologies, standards, practices, and conventions to be used during the configuration management are described in the *WWIS SCMP* for software covered by this SQAP.

11. MEDIA CONTROL

All procedures to be used for the WWIS media control shall comply with the *WWIS SCMP* and the *WWIS Security Plan*. The *WWIS Security Plan* contains more information on the security and storage of WWIS media.

12. SUPPLIER CONTROL

All procedures to be used for the WWIS supplier control shall comply with the *WWIS SCMP*.

13. RECORDS COLLECTION, MAINTENANCE, AND RETENTION

All procedures to be used for the WWIS records collection, maintenance, and retention shall comply with policy that records be maintained in a useful condition and protected from loss, damage, and deterioration. Specific database, software, hardware, and data procedures are contained in the *WWIS Security Plan*, *WWIS SCMP*, and *WWIS Data Management Plan*.

14. TRAINING

No special training is required to meet the needs of the WWIS SQAP.

15. RISK MANAGEMENT

The Project Leader is responsible for notifying the Project Engineer of potential failure of each required task, progress of tasks, and the unavailability of each resource required to complete the task. As required, the Project Leader uses resources from the software development team to identify schedules impacts and outline alternative actions available to mitigate the risks. All changes resulting from task failure or the unavailability of a resource will be processed by the SCCB. The SCCB evaluates the impact on other schedules and selects appropriate actions to minimize impact on the total quality of the software process, delivery schedule, and budget.