

0037112

WHC-SD-EN-QAPP-007
Revision 1

Quality Assuring Configuration Management Plan for the Baseline Analysis Matrix Version 3.1

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management



Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930



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ENGINEERING CHANGE NOTICE

Page 1 of 2

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7. Abstract

This document contains the software quality assurance plan and configuration management plan for the Baseline Analysis Matrix software.

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9. Impact Level 4

QUALITY ASSURING CONFIGURATION
MANAGEMENT PLAN FOR THE
BASELINE ANALYSIS MATRIX VERSION 3.1

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November 1, 1993

Approved by
SAT *Rafael K. Scott for*
R.F. Cote, Manager
ER Program Self-Assessment and Development

1.0 Purpose and Scope

This plan provides the configuration management and quality assurance requirements for the Baseline Analysis Matrix (BAM) software - designated as an impact level 4 system according to WHC-CM-1-3 Management Requirements and Procedures, MRP 5.43. The contents of this plan are written in accordance with ANSI/IEEE Std. 730-1989, IEEE Standard for Software Quality Assurance Plans (ANSI/IEEE 1989), WHC-CM-3-10 Software Practices, and WHC-CM-3-6 Uniform Publications System. Configuration Management and Quality Assurance are discussed in combination at the discretion of software developers and are in compliance with WHC-CM-6-1, Standard Engineering Practices and IEEE Std 828-1990, IEEE Standard for Software Configuration Management Plans.

This quality assuring configuration management plan will be reviewed on a continuing basis as software is revised to meet future needs.

1.1 Overview and Background

Westinghouse Hanford Company (WHC) is a major participant in the Environmental Restoration program at the Hanford Site. WHC and other participating companies and their subcontractors must comply with multiple and sometimes overlapping requirements as part of their daily operations at the Hanford Site. To appropriately manage this regulatory compliance process, Environmental Restoration Standards/Requirements Identification Documents are developed that identify which requirement source documents apply to a given functional area. These documents also synthesize requirements from multiple documents into a single, more concise requirement document for linking to participating companies' policies, plans, and procedures.

To assist in the management of the complex relationships between multiple requirements and pages of implementing procedures, WHC has developed the Baseline Analysis Matrix. The BAM is a set of software programs utilizing relational databases designed to assist management in the overall processing of documentation into an automated matrix for analyzing requirements. The software maintains and tracks information relative to the appropriate requirements.

The first generation prototype of the software was developed in 1989 to meet the needs of the Environmental Restoration program at the Hanford Site. As hardware and software capabilities changed the BAM software evolved to provide the best tools possible.

1.2 Definitions

Definitions and terminology used in this plan follow the requirements of ANSI/IEEE 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology, (ANSI/IEEE 1990). Additional terminology is defined in Section 14.0 of this document.

2.0 References

ANSI/IEEE 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology, (ANSI/IEEE 1990).

ANSI/IEEE Std. 730-1989, IEEE Standard for Software Quality Assurance Plans (ANSI/IEEE 1989).

ANSI/IEEE Std. 828-1990, IEEE Standard for Software Configuration Management Plans (ANSI/IEEE 1990).

ANSI/IEEE Std 1008-1987, IEEE Standard for Software Unit Testing (ANSI/IEEE 1987).

ANSI/IEEE Std 1012-1986, IEEE Standard for Software Verification and Validation Plans (ANSI/IEEE 1986).

ASME NQA-2a-1990, Addenda to ASME-NQA-2-1989 Edition, Quality Assurance Requirements for Nuclear Facility Applications.

DOE Order 1330.1D, Computer Software Management.

DOE Order 1360.1A, Acquisition and Management of Computing Resources.

DOE Order 1360.3B, Automatic Data Processing Standards.

DOE Order 1360.4B, Scientific and Technical Computer Software.

DOE-RL-90-28, Rev. 1, Environmental Restoration Program Quality Assurance System Requirements for the Hanford Site.

WHC-CM-1-3 Management Requirements and Procedures.

WHC-CM-3-6 Uniform Publications System.

WHC-CM-3-10 Software Practices.

WHC-CM-4-2, Quality Assurance Manual.

WHC-CM-6-1 Standard Engineering Practices.

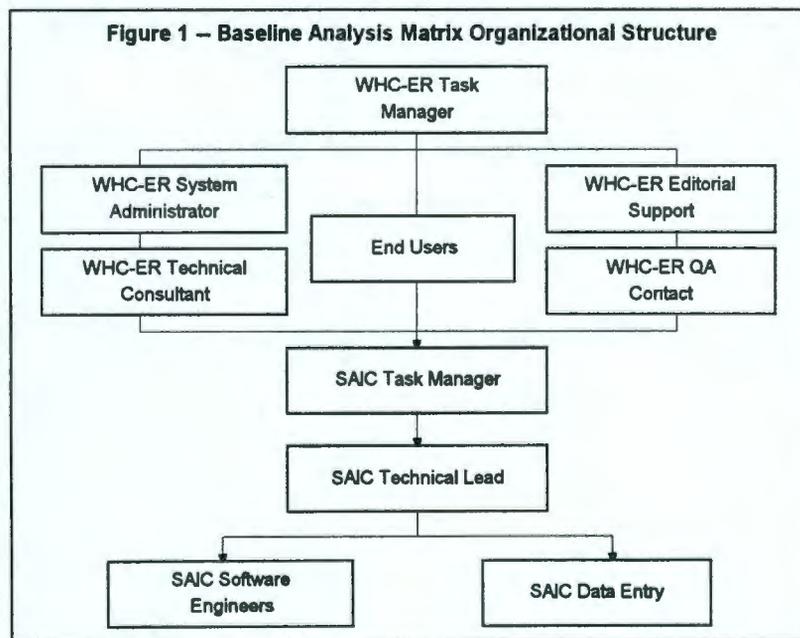
WHC-IP-0952, Environmental Restoration Commitment Management System Management Plan.

3.0 Management

In the development of a software system cycle, good overall results are possible only by achieving responsible and traceable end results that assure the quality, reliability, and successful completion of the project. Each staff member contributes to quality assurance. Standards and criteria must be defined so that acceptable levels of quality may be demonstrated against accepted standards. Supervision and management must understand the full array of quality criteria better than subordinates. Project leadership must assist staff members in achieving quality products through good management and supervisory techniques. Staff members must be able to produce quality results and understand the sequence and reasons behind quality activities. The goal of quality is only achievable by a competent, conscientious team. The start of a quality project requires careful selection and placement of people augmented by adequate training on a continuing basis.

3.1 Organization

The organizational structure to be employed during the software development and operation of the Baseline Analysis Matrix is illustrated in Figure 1.



3.2 Tasks

This section defines the major tasks and the organization responsible for producing a quality software system.

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Software Requirements	WHC
System Concept Specification	SAIC
System Design Description	SAIC
Program Synthesis	SAIC
System Test Plan	SAIC
System Testing	WHC/SAIC
System Test Report	SAIC
System Installation	WHC
Software Training	WHC/SAIC
System Configuration Management	SAIC
System Maintenance	SAIC
Problem Reporting and Corrective Action	WHC/SAIC

3.3 Responsibilities

Quality assurance is the responsibility of every staff member and represented organization involved in system software development. System software includes all documentation, plans, specifications, design, test procedures, computer code and the reports they generate, reviews, problem reports and corrective action procedures, and configuration management. The primary organizations involved in the configuration management of the BAM are WHC Environmental Restoration Program (WHC-ER) and Science Applications International Corporation (SAIC). Specific quality assurance and configuration management responsibilities for the BAM project members are as follows:

WHC-ER Task Manager - This individual has overall responsibility for the activities of the BAM project and manages all aspects of the system software development efforts that affect the quality program. The WHC-ER Task Manager is responsible for directing the WHC-ER and SAIC staff in quality affecting activities.

WHC-ER System Administrator - This individual has the responsibility of providing the WHC and SAIC project staff with technical guidance that will ensure the quality of system software products. This staff member is responsible for WHC-ECM Document Control number assignment for BAM related documents, interfacing with other WHC staff in local area network installation clearance, and may also conduct surveillances of system development facilities.

WHC-ER Technical Consultant - WHC-ER staff member who presides over and directs the proper implementation of commitment management system directives. This staff member may also conduct audits and surveillances of all end user sites/facilities and system development facilities.

WHC-ER Editorial Support - WHC-ER staff member providing editorial support for BAM documentation review process.

WHC-ER QA Contact - WHC-ER staff member providing quality assurance overview, surveillances, and audits.

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SAIC Task Manager - This individual is responsible for proper development of defined tasks.

SAIC Technical Lead - SAIC staff member responsible for analysis and proper implementation of task requirements, including scheduling, assignment, verification, and documentation. This staff member will also preside over and direct the activities of programmers and data entry personnel.

SAIC Software Engineers - SAIC staff members responsible for system design and coding.

SAIC Data Entry - These staff members will enter and edit data contained in BAM databases. They are responsible for verification and quality assurance of data.

End Users - These individuals are responsible for verifying that an effective quality program is established and maintained at their site/facility where the BAM is in use. These individuals act as consultants and advisors to the WHC System Administrator on software quality issues in an independent oversight capacity.

3.4 Interface Control

Changes to BAM programs will be implemented by means of a Quality Improvement Notice. All changes to controlled data must be initiated through a BAM Change Request (WHC-IP-0952, Appendix J, Section 6.2).

3.5 Implementation

This Quality Assuring Configuration Management Plan is effective on 10/01/93.

3.6 Policies and Procedures

WHC-CM-3-10, Software Practices and WHC-IP-0952, Environmental Restoration Commitment Management System Management Plan are used in implementation of this plan.

4.0 Documentation

This section identifies the documentation governing the development, adequacy, use, testing, and maintenance of the BAM.

4.1 Review and Approval

Each document produced in support of the BAM system will undergo software engineering and SAIC Task Manager review before being submitted for review and approval by the WHC-ER Task Manager. All significant design and test documentation serves as input to verification and validation reviews. This requirement guarantees review before approval and distribution.

**QUALITY ASSURING CONFIGURATION
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November 1, 1993**4.2 Minimum Documentation Requirements**

Statement of Work	WHC-ER
Quality Assuring Configuration Management Plan	SAIC
System Concept Specification	SAIC
System Design Description	SAIC
System Test Plan	SAIC
System Test Report	SAIC
System User's Manual	SAIC
Software Code Listing	SAIC

5.0 Standards, Practices, and Conventions**5.1 Purpose**

Monitoring compliance of the BAM with standards shall be an integral part of the review process and part of the QA overview function. This section shall identify the standards, practices, and conventions to be applied and state how compliance is to be monitored. It should be understood that this plan has been developed to fulfill the requirements of a wide array of guidance documents and standards; therefore, identical QA activities may be referenced in various standards by different terminology.

BAM documentation shall be written in compliance with the requirements of WHC-CM-4-2, Quality Assurance Manual, WHC-CM-6-1 Standard Engineering Practices, and WHC-CM-3-6 Uniform Publications System. The American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineer (IEEE) standards shall provide the primary guidance for format and content of the BAM technical documentation. Adoption of ANSI/IEEE standards provides analysts, designers, engineers, and programmers with a comprehensive set of standards that give consistent guidance throughout the system software development cycle. Using IEEE standards ensures compliance with WHC-CM-4-2 and WHC-CM-6-1.

The IEEE's policy requires that standards be reviewed at least once every five years. This aspect of IEEE standards will provide the project with updated methodology. However, an evaluation must be conducted when a revision is made to an adopted standard to determine the impact on previous work. All IEEE standards referenced in the next subsection are the current editions.

5.2 Content

The technical conventions and techniques for coding, programming languages, logic structure, commentary standards, etc., are already in place for the BAM and are in compliance with current IEEE Standards.

The following standards are applicable to the BAM software development effort:

ANSI/IEEE 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology, (ANSI/IEEE 1990).

ANSI/IEEE Std. 730-1989, IEEE Standard for Software Quality Assurance Plans (ANSI/IEEE 1989).

ANSI/IEEE Std. 828-1990, IEEE Standard for Software Configuration Management Plans (ANSI/IEEE 1990).

ANSI/IEEE Std. 983-1986, IEEE Guide for Software Quality Assurance Planning (ANSI/IEEE 1986).

ANSI/IEEE Std. 1008-1987, IEEE Standard for Software Unit Testing (ANSI/IEEE 1987).

ANSI/IEEE Std. 1012-1986, IEEE Standard for Software Verification and Validation Plans (ANSI/IEEE 1986).

ANSI/IEEE Std. 1016-1987, IEEE Recommended Practice for Software Design Descriptions (ANSI/IEEE 1987).

ANSI/IEEE Std. 1063-1987, IEEE Standard for Software User Documentation (ANSI/IEEE 1987).

ANSI/IEEE-ANS-7-4.3.2-1982, American National Standard Application Criteria for Programmable Digital Computer Systems in Safety Systems of Nuclear Power Generating Systems (ANSI/IEEE 1982).

6.0 Reviews and Audits

A sequence of reviews, surveillances, and audits will be conducted on the BAM to ensure that quality is maintained throughout the software development cycle. Reviews shall be scheduled and conducted as appropriate to ongoing work. This action is necessary to provide management with insight to the progress and acceptability of system software products. This section defines how these actions are to be accomplished.

6.1 Control Criteria

Measures shall be established to control development activities for the BAM. This plan will define the governing documents that control the following activities:

- Establishment of design criteria,
- Review and approval of design documents,
- Verification of designs,
- Change of designs, and
- Control of equipment and facility interfaces.

In addition to the requirements of this plan, guidance to accomplish required quality controls will be contained in the BAM Verification and Validations document(s).

6.2 Minimum Requirements

Reviews shall be appropriately documented using checklists, review comment records, and review summaries. Format and content of the review records shall fulfill the requirements of WHC-CM-4-2, Quality Assurance Manual, QI 10.4.

The minimum number and types of reviews, surveillances, and audits to be conducted on software are described below.

6.2.1 Surveillances

Surveillances shall be conducted by the WHC-ER QA contact to verify whether software items and activities conform to specified requirements. Surveillances are to be held as determined by the designated inspector assigned to the BAM. If possible, surveillances should be conducted prior to reviews and audits to assist the project in making a determination of required additional effort. The procedures to be followed during the BAM surveillances will be in accordance with this plan and shall fulfill the requirements of WHC-CM-4-2, Quality Assurance Manual, QI 10.4, Section 4.0.

6.2.2 Software Requirements Review

A software requirements review shall be held by WHC-ER personnel and SAIC management and task lead to ensure the adequacy of the requirements stated in the review. This review will result in the production of the System Concept Specification.

6.2.3 Preliminary Design Review

A preliminary design review shall be held to evaluate the technical adequacy of the preliminary design of the software. The primary document to be reviewed is the System Concept Specification. This review will be a formal review and will be conducted in a manner that fulfills the requirements of WHC-CM-6-1, Standard Engineering Practices, EP 4.1.

6.2.4 Critical Design Review

A critical design review shall be held to determine the adequacy of the software design in satisfying the requirements of the System Concept Specification. The primary document to be reviewed is the System Design Description. This review will be a formal review and will be conducted according to the requirements of WHC-CM-6-1, Standard Engineering Practices,

EP-4.1. The results of the software requirements review and the preliminary design review referenced in Sections 6.2.2 and 6.2.3 will serve as a primary input to the critical design review process.

6.2.5 Final System Test Plan Review

A final system test plan review shall be performed to evaluate the adequacy and completeness of the Verification and Validation methods defined in the System Test Plan.

6.2.6 Software Functional Inspection

A software functional inspection shall be held jointly by the WHC-ER and SAIC organizations before the software is turned over to WHC-ER to verify that all requirements specified in the software requirements review have been met. The System Test Report will serve as a primary input to this inspection.

6.2.7 Software Physical Inspection

A software physical inspection shall be held by the WHC-ER QA contact to verify that the software and associated documentation are internally consistent and are ready for delivery. Software inventory sheets shall be part of the procedures, and, when filled out, will serve as a primary input to this inspection.

6.2.8 In-Process Audits

In-process audits of design samples may be held by the WHC-ER QA contact to verify consistency of the BAM designs, including the following:

- Code versus design documentation,
- Software interface specifications,
- Design implementation versus the functional requirements, and
- Functional requirements versus test descriptions.

Audits shall be conducted by a certified lead auditor in accordance with WHC-CM-4-2, Quality Assurance Manual, QR 18.0, and may be performed on a team basis if that approach better serves the audit scope. The frequency and scope of audits shall be appropriate to ongoing work. Audits shall be performed with prepared checklists and results reported to management.

6.2.9 Management Reviews

Management reviews shall be held at least annually to assess the adequacy and effectiveness of the BAM QA program as executed through this plan. These reviews shall be held by joint organizational elements independent of the group being audited or by a qualified third party.

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Guidance on how to conduct management reviews may be found in ANSI/IEEE 983-1986, Guide for Software Quality Assurance Planning, Section 5. A record shall be made of such reviews and resulting corrective action.

7.0 Software Configuration Management

Please refer to Section 3.3 of this document for configuration management responsibilities of each component of the organizational structure.

7.1 Software Configuration Management Activities

The activities involved in BAM Software Configuration Management will include configuration identification, configuration control, status accounting, audits and reviews, interface control, and subcontractor/vendor control.

7.1.1 Configuration Identification

Documents will be identified in accordance with WHC-CM-3-10, Software Practices, SP-6.1. Documentation is provided in excess of that required for an impact level 4 program as defined in WHC-CM-6-1, Standard Engineering Practices, EP-2.1. The Software Configuration Management Plan and Software Quality Assurance Plan are united in this document in accordance with WHC-CM-6-1, Standard Engineering Practices, EP-2.1, Section 5.4 and IEEE Std 828-1990, IEEE Standard for Software Configuration Management Plans, Section 2.

Software will be identified in accordance with WHC-CM-3-10, Software Practices, SP-6.2.

7.1.1.1 Identifying Configuration Items

The following configuration items are controlled and maintained within this plan:

<u>Configuration Item</u>	<u>Document Type</u>
Quality Assuring Configuration Management Plan	WHC Supporting Document
System Concept Specification	WHC Supporting Document
System Design Description	WHC Supporting Document
System Test Plan	WHC Supporting Document
System Test Report	WHC Supporting Document
System User's Manual	WHC Miscellaneous Report
Software Executable Code	Program
Software Code Listing	Hard Copy Source Code Listing

The developmental configuration of the BAM software is established in the finalization of the System Design Description. Changes to the developmental configuration are controlled through revision of the statement

of work. The WHC-ER Task Manager and the SAIC Task Manager must be in joint agreement on any revision of the statement of work.

Software verification and validation is established when the System Test Report is issued following BETA testing.

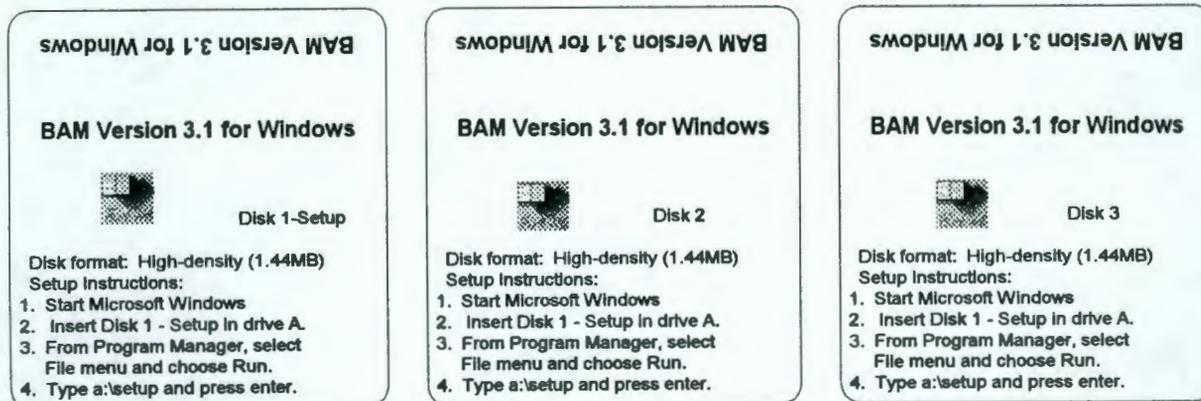
7.1.1.2 Naming Configuration Items

Documents will be identified in accordance with WHC-CM-3-10, Software Practices, SP-6.1. Documents produced in accordance with this plan will acquire the next consecutive revision number of the original BAM document.

<u>Document Title</u>	<u>Document Reference</u>
Quality Assuring Configuration Management Plan	WHC-SD-EN-QAPP-007, Rev. 1
System Concept Specification	WHC-SD-EN-CDR, Rev. 0
System Design Description	WHC-SD-EN-SDS-001, Rev. 1
System Test Plan	WHC-SD-EN-OTP-004, Rev. 1
System Test Report	WHC-SD-EN-OTR-004, Rev. 1
System User's Manual	WHC-MR-0439, Rev. 1

Software will be identified in accordance with WHC-CM-3-10, Software Practices, SP-6.2. The software and accompanying databases will be distributed on three disks (3 1/2 inch high density) with a setup program for installation. The disks will be identified with labels shown in Figure 2 below.

FIGURE 2 - Software Disk Labels



7.1.1.3 Acquiring Configuration Items

Copies of all documents assigned WHC Engineering Configuration Management Document Control numbers will be maintained in task order files at two SAIC locations. In addition, a copy of all documentation will be maintained by the SAIC Technical Lead. An original and an electronic file of

each document will be delivered to the WHC-ER System Administrator. All documentation will be made available through the WHC-ER Document Control program and within the Westinghouse organization through their own internal controls.

Five master copies of the software disks sets will be prepared as deliverables to WHC. Two sets will be prepared and stored at the location of software development.

Uncompiled program code is stored at the location of software developers. This code is accessible on the PC network server and the lead programmer's PC. Both computers are CMOS password protected and are stored in locked offices with controlled access. Backup disk sets of uncompiled program code are stored in the lead programmer's office. A second set of backup disks containing uncompiled program code is transported to another location weekly. These backup sets are logged at the end of each week.

Databases containing regulatory requirement document breakdown data are stored on the SAIC Technical Lead's PC. Compressed file backups of these databases are also stored on the PC network server and on a backup disk in the SAIC Technical Lead's office. A second backup disk containing these databases in compressed format is transported to another location whenever data is edited, deleted, or added to these databases.

7.1.1.4 Control of Nonconforming Items

The BAM Quality Assuring Configuration Management Plan contains provisions for the control of nonconforming items in accordance with WHC-CM-4-2, Quality Assurance Manual, QR 15.0. The methods specified will ensure that software that does not conform to specifications will not be installed on computer systems. Nonconformance controls shall provide for identification, documentation, evaluation, segregation, and disposition of nonconforming items. Evaluation of items and their fitness for use shall be accomplished only by personnel cognizant in the specific technical area being evaluated. Technical justification shall be provided for the acceptance of nonconforming items.

7.1.2 Configuration Control

Any request for developmental configuration adjustment whether for error correction or enhancement shall be in writing with signatures of either the WHC-ER Task Manager or SAIC Task Manager approving the request. Any component of the organizational structure may generate a change request. These change requests shall be in the form of Quality Improvement Notices and shall be routed through WHC-ER Document Control as established in WHC-IP-0952, ER-CMS Management Plan, Appendix H.

7.1.2.1 Requesting Changes

Any person requesting a change to any of the configuration items shall file a Quality Improvement Notice as noted in Section 7.1.2 of this plan.

7.1.2.2 Evaluating Changes

Any change requested through a Quality Improvement Notice shall be evaluated by qualified personnel. Each change will be evaluated not only for error correction or enhancement but also for impact on scheduled deliverables and project resources.

7.1.2.3 Approving or Disapproving Changes

All Quality Improvement Notices must contain the signature of the WHC-ER Task Manager or designee before changes are implemented.

7.1.2.4 Implementing Changes

Software Revision Records will be produced to track changes to software configuration. These records must contain, as a minimum, the associated Quality Improvement Notice number, the names and versions of the affected items, verification date and responsible party, release or installation date and responsible party, and the identifier of the new version. These records must also contain statements of intent to deliver a new developmental configuration if applicable.

7.1.3 Configuration Status Accounting

Configuration status will be tracked through the Software Revision Records and the ER-Document Control Program.

7.1.4 Configuration Audits and Reviews

Please refer to Section 7.2 regarding an overall configuration audit to be held between August 17, 1994, and September 30, 1994.

7.1.4.1. System Concept Specification

The purpose of this review is to ensure that the software requirements have been reasonably understood by all participants. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 01/10/94 and 01/11/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 01/13/94 and 01/21/94.

Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.2. System Design Description

The purpose of this review is to ensure that the software design is sufficient to meet all expectations and requirements. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 02/14/94 and 02/15/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 02/18/94 and 03/01/94.

Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.3. Quality Assuring Configuration Management Plan

The purpose of this review is to ensure that the quality assuring configuration management plan meets all expectations and requirements. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 04/06/94 and 04/08/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 04/13/94 and 04/26/94.

Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.4. System User's Manual

The purpose of this review is to ensure that the user's manual meets all expectations and requirements. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 05/20/94 and 05/25/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 05/31/94 and 06/27/94.

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Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.5. Software Development

The purpose of the software development review is to ensure adherence to the System Design Description. This review will be informal in nature but must be documented in writing by participating reviewers to include the SAIC Task Manager and representatives from WHC-ER. The review(s) shall be scheduled between July 5, 1994, and July 29, 1994.

7.1.4.6. System Test Plan

The purpose of this review is to ensure that the test plan meets all expectations and requirements. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 08/03/94 and 08/04/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 08/08/94 and 08/11/94.

Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.7. System Test Report

The purpose of this review is to ensure that the test report meets all expectations and requirements. The draft document will be provided for technical and editorial comment.

The first review cycle, by the SAIC Task Manager is scheduled between 09/02/94 and 09/06/94. The final review, by WHC-ER Task Manager, WHC-ER Technical Consultant, WHC-ER System Administrator and WHC-ER editorial support staff is scheduled between 09/08/94 and 09/14/94.

Deficiencies and corrective actions required for this document shall be noted and resolved by Review Comment Records. The Review Comment Record will be resolved in a meeting between the author and WHC-ER staff. All changes will be resolved and incorporated into the final document for delivery.

7.1.4.8. Post BETA test walk-through

The Post BETA walk-through will establish by means of checklists that all program errors and discrepancies detected during verification and validation have been corrected. Participants in this exercise shall be those involved in the testing process and WHC representatives. This walk-through is scheduled for the week of 09/26/94.

7.1.4.9. Software Installation

The software will be installed on a local area network. The WHC-ER System Administrator will make arrangements for and install the software. Software installation is scheduled the week of 09/26/94.

7.1.5 Interface Control

The Baseline Analysis Matrix software was configured and baselined to follow processes and procedures outlined in WHC-IP-0952, Environmental Restoration Commitment Management System Management Plan. Processes changing within the scope of this document, must be implemented by the software developmental configuration. Any required change to the software due to changes in these procedures will be implemented by means of Quality Improvement Notices.

Changes to this document that potentially impact the BAM software shall be discussed by all key elements of the organizational structure before a Quality Improvement Notice is generated by any component of the organizational structure.

Quality Improvement Notice numbers and forms are obtained from WHC-ER Document Control. These forms are routed and dispositioned by Document Control and corrective action results.

7.1.6 Subcontractor/Vendor Control

The following commercially available software was used in the development of the BAM software. The location of use within the programs is shown. In addition, please refer to Section 11.0 of this document for additional information.

Relational Database Management System - Software Development Tool

FoxPro 2.5 for Windows¹, Microsoft Corporation, One Microsoft Way, Redmond, WA, 98052-6399, Registered to Science Applications International Corporation.

RQBE function of the System Administration module:

¹Trademark of Microsoft Corporation

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Query Maker², Fox Windows Version 1.0w, Strategic Edge, 2062 Union Street, Suite 300, San Francisco, CA 94123, Serial Number:WG10-OCT93-00153, Registered to Westinghouse Hanford Company.

License agreement states:

Strategic Edge grants you permission to insert this software's source code into your own software application that you compile for your own use or for resale to others providing this application is not a set of programming utilities (and is not intended to compete with Query Maker). That is, no section of this software may be distributed or sold that results in competing with Strategic Edge as a programming or software development tool or utility.

As long as this software remains embedded in your noncompeting compiled application, you may distribute and sell as many copies as you like. You may not, however, duplicate and distribute copies of this software in uncompiled source-code form.

On-line Help Development Tool

Doc-To-Help³, Windows Version 1.5, WexTech Systems, Inc., 310 Madison Ave., Suite 905, New York, NY 10017, Serial Number:D2H106590, Registered to Westinghouse Hanford Company.

Even though these software programs have undergone verification and validation processes during development by the vendors, they will be subject to the verification and validation processes of the BAM software as well. Each vendor-supplied program is subjected to testing by BAM software developers before use in the development process. If errors are found to occur, vendors must be contacted to rectify the problem. If vendors can not rectify the problem within seven working days, the vendor-supplied software will be abandoned and replaced by other commercially available software. In the event that there are no other suitable commercial software packages available, programs will be written by BAM software developers to incorporate essential functions into the BAM software.

²Trademark of Strategic Edge

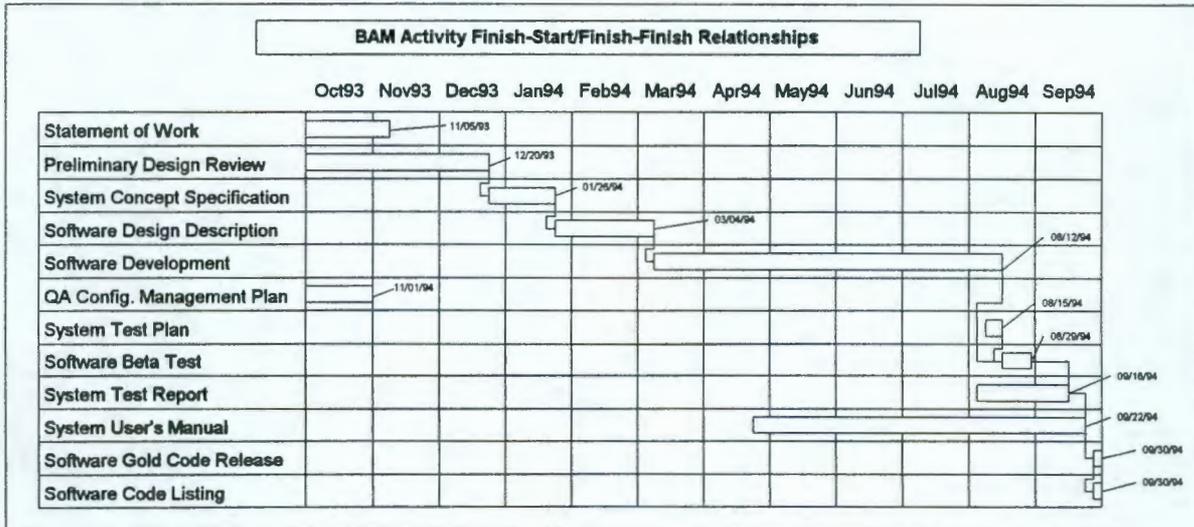
³Trademark of WexTech Systems, Inc.

7.2 Software Configuration Management Schedules

Activity/Milestone	Effective Date
Quality Assuring Configuration Management Plan	November 1, 1993
Statement of Work	November 5, 1993
Preliminary Design Review	December 20, 1993
System Concept Specification	January 26, 1994
System Design Description	March 4, 1994
Software Development	March 4-August 12, 1994
System Test Plan	August 15, 1994
Software Beta Test	August 16-29, 1994
System Test Report	September 16, 1994
System User's Manual	September 22, 1994
Software Gold Code Release	September 30, 1994
Software Code Listing	September 30, 1994

Each activity's finish/effective date is displayed in Figure 1 below. In the figure, finish-start and finish-finish logic links are displayed.

FIGURE 1 - Activity Relationships



The developmental configuration of the BAM software is established in the finalization of the System Design Description.

Change control procedures regarding the review of BAM documentation shall be at the discretion of the WHC-ER Task Manager. Normally the review will be formal and result in the production, dispensation, and closing of review comment records. In any case, the review will be documented in writing by the WHC-ER Task Manager.

A configuration audit shall be held between August 17, 1994, and September 30, 1994. This audit shall be both functional and physical in nature and shall cover all components of the BAM software and documentation.

7.3 Software Configuration Management Resources

Please refer to Section 3.3 of this document for personnel involved in the configuration management of the BAM software and accompanying documentation.

The following BAM documentation shall be authored by the SAIC Technical Lead:

- Quality Assuring Configuration Management Plan
- System Concept Specification
- System Design Description
- System Test Plan
- System Test Report
- System User's Manual
- Software Revision Records

Reviews shall be conducted by the SAIC Task Manager and by designated WHC-ER support staff.

All hard copy documentation shall conform to standards indicated by WHC-CM-3-6 Uniform Publications System. Documentation may be written using any word processing software but must be delivered to WHC-ER in WordPerfect 5.1⁴ for DOS format.

The following software development tools shall be used by SAIC Software Engineers and software development support staff:

- Software Development Tool - FoxPro 2.5 for Windows
- RQBE function of the System Administration module: - Query Maker
- On-line Help Development Tool - Doc-To-Help

Throughout the configuration management process, personnel involved in data entry shall receive sufficient training to properly perform their designated duties. Their work shall be monitored and spot checked as deemed necessary by the SAIC Technical Lead.

Personnel involved in software pre-release testing shall have a background in personal computers, DOS, FoxPro and/or relational database management programs, software testing, and data verification and validation. All software testing shall be performed in a network environment.

⁴Trademark of WordPerfect Corporation

Before August 16, 1994, when the software is scheduled for BETA release, the WHC-ER System Administrator shall complete all preliminary clearance for software BETA testing. Installing the operational software either on a local area network or make provision to acquire equipment to set up a multi-user environment for installation of the software.

7.4 Software Configuration Management Plan Maintenance

This software configuration management plan will be monitored by the SAIC Technical Lead. Updates to the plan will be performed on an as-needed basis dependent upon quality improvement notices and new technological availabilities. Any changes to this plan shall be implemented by the SAIC Technical Lead and approved by the SAIC Task Manager and the WHC-ER Task Manager. Any document revision shall cause the revision number to increment by one. Revised documents shall be forwarded to all components of the organizational structure and shall be supplemented by an attachment noting the scope of the revision.

8.0 Problem Reporting

In addition to a requirement for a predefined preventive maintenance methodology, the personnel operating the BAM must have a means of reporting actual software defects and initiating a rapid problem-solving response that will result in corrective action. As such, a problem reporting and corrective action system has been established and maintained for the BAM. This system is the Quality Improvement Notice. Quality Improvement Notice numbers and forms are obtained from WHC-ER Document Control. These forms are routed and dispositioned by Document Control and corrective action results.

8.1 Organizational Responsibilities

Conditions that have a significant adverse effect on the QA program shall be reported to the SAIC Technical Lead for immediate actions. In the case of a significant condition adverse to quality, the SAIC Technical Lead shall direct that the root cause be determined and corrective action be taken to prevent recurrence.

Software difficulties discovered during the system development will be defined in software trouble reports provided to the WHC-ER Task Manager and the SAIC Task Manager by the SAIC Technical Lead.

8.2 Software Trouble Reports

Software trouble reports will be initiated in the form of Quality Improvement Notices. These notices will be tracked through WHC-ER Document Control. If a software maintenance action results in software configuration change, a software revision record will be generated, reviewed, and approved (by the SAIC Task Manager in the event of an interim software release or the WHC-ER Task Manager in the event of an official software release) and shall transfer applicable information to the configuration management files.

9.0 Tools, Techniques, and Methodologies

The BAM shall be developed using proven software design tools that result in an increase in overall system software quality and/or a decrease in cost. Tools will be evaluated and determined before beginning detailed design. The primary selection criteria for these aids will be proven efficiency and their ability to comply with system software development standards.

10.0 Impact Levels

Impact levels are to be identified during the design phase and included in design documents. Quality assurance activities applied to any task covered by this plan and the degree of verification against that task shall be consistent with impact levels 1-3 requirements specified in WHC-CM-1-3 Management Requirements and Procedures, MRP 5.43. Although the BAM software is currently classified at an impact level 4, the applicable standards for level 3 shall be applied in anticipation of a wider scope of use.

11.0 Commercially Available Software

Software procurement activities shall be planned and documented to ensure a systematic approach to the procurement process. Commercially available software and supporting documentation shall be evaluated to the maximum extent possible before purchase. All procured software that is integrated into the BAM program structure shall undergo verification and validation.

12.0 Records Collection, Maintenance, and Retention

A records management system has been established based on WHC-IP-0952, ER-CMS Management Plan, Appendix H, "Document Control and Records Management". The procedure applies to ER-CMS documents, records (hard copy and electronic), and reports produced under the requirements of WHC-IP-0952 and processed through the ER-Document Control System. Supporting Documents and Miscellaneous Reports are further controlled by WHC Engineering Configuration Management Document Control.

13.0 Testing Requirements

The quality assurance involvement and control of testing shall be specified in the BAM Test Plan. This document shall provide a detailed description of required reviews of test procedures, test personnel qualification, and training requirements for testers, test equipment requirements, test methodology, and test acceptance criteria. The Test Summary Report shall provide test result documentation, and test result review requirements. The BAM Test Plan shall fulfill the requirements of WHC-CM-4-2, Quality Assurance Manual, ANSI/IEEE Std 1012-1986, IEEE Standard for Software Verification and Validation Plans, and ANSI/IEEE Std 1008-1987, IEEE Standard for Software Unit Testing (ANSI/IEEE 1987).

14.0 Glossary

ARCHIVE	Storage area for data that is no longer in use
ASCII/DOS TEXT FILE	File with control characters removed
CLIENT	A PC on a network that accesses the server to obtain program and/or data access
COMPRESSION	Algorithm applied to data to decrease the physical size (HD storage)
DATABASE	File structure wherein information is organized in a table-like fashion
DIALOG BOX	Message to the user asking for confirmation of an action
DOCUMENT TIER	Document levels for purposes of linking
DOS	Disk Operating System
HD	Hard disk storage
INPUT PROGRAM	A program to assist in breaking down ASCII/DOS Text files for input to databases
LINKING	Relating a many-to-many relationship between two databases by means of a third database
Mb.	Megabyte=1 million bytes, byte=8 characters (8 bits)
PROCESSOR	Physical board in a computer with speed designated by number (i.e., 386, 486, etc.)
RAM	Random Access Memory usually (SIMMS)
RQBE	Related Query by Example
SERVER	Computer equipment designated for storage of data and/or programs for access by other PCs on a network

DISTRIBUTION SHEET

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		Date 06/13/94
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