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High-Level Software Requirements Specification for the TWRS Controlled Baseline Database System

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Abstract: TWRS Controlled Baseline Database, formally known as the Performance Measurement Control System, is used to track and monitor TWRS project management baseline information. This document contains the high-level software requirements of the database system.

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HIGH-LEVEL SOFTWARE REQUIREMENTS SPECIFICATION
FOR THE
TWRS CONTROLLED BASELINE DATABASE SYSTEM

Prepared for
Lockheed Martin Hanford Company

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1 INTRODUCTION

This Software Requirements Specification (SRS) is an **as-built** document that presents the Tank Waste Remediation System (TWRS) Controlled Baseline Database (TCBD) in its current state. It was originally known as the Performance Measurement Control System (PMCS).

Conversion to the new system name has not occurred within the current production system. Therefore, for simplicity, all references to TCBD are equivalent to PMCS references. This SRS will reference the PMCS designator from this point forward to capture the as-built SRS.

This SRS is written at a high-level and is intended to provide the design basis for the PMCS. The PMCS was first released as the electronic data repository for cost, schedule, and technical administrative baseline information for the TWRS Program. During its initial development, the PMCS was accepted by the customer, TWRS Business Management, with no formal documentation to capture the initial requirements.

1.1 PURPOSE

This SRS provides the as-built SRS for the PMCS. This as-built document satisfies the Hanford Site's requirements of ensuring that a SRS is documented formally for a development project. It is not intended to document the design of the application, but rather the design basis for the PMCS.

1.2 SCOPE

The existing PMCS currently consists of production functional areas including the following:

- PMCS Security
- PMCS Main Menu
- Work Breakdown Structure (WBS) Module
- Integration Module
- Milestone Module
- Engineering Change Notice (ECN) Module
- Primavera (P3)/PMCS Module.

There are also PMCS development areas that are outside the scope of this SRS and are not included.

This SRS applies to the PMCS production functional areas, but does not apply to related systems (i.e., P3, Financial Data System [FDS], etc.) that interface with the PMCS except for requirements of the interface itself. After export of PMCS generated information, further

processing is the responsibility of the receiving organization's system. Also, PMCS data *sources* are recognized as the "official" data for these outside systems (i.e., P3, FDS, etc.).

1.3 OVERVIEW

The TBCD project, formally known as the PMCS, was initiated to facilitate specific data integration processes surrounding the project scheduling system environment. The *Performance Measurement Control System Project Management Plan*, (LMHC 1997) provides a brief project history and acquisition planning information.

Lockheed Martin Hanford Company (LMHC), TWRS Business Management Organization (BMO) is designated as system owner, operator, and maintenance authority. The TWRS BMO identified the need for the PMCS. The TWRS BMO users have established all requirements for the database and are responsible for maintaining database integrity and control (after the interface data has been received). Initial interface data control and integrity is maintained through functional and administrative processes and is the responsibility of the database system owners who are providing the data.

The Master Planning Group within BMO is assigned the responsibility to continue development and maintenance of the PMCS. This group maintains information that includes identification of requirements and changes to those requirements in a PMCS project file. This group is responsible for the issuance, maintenance, and change authority of the *Software Configuration Management Plan for the TWRS Controlled Baseline Database System*, (LMHC 1998a) that controls system configuration management.

The PMCS data integration processes have been migrated into a client-server environment and contain several production and development Modules to manage TWRS information for data input and retrieval. Only production Modules are included in the scope of this SRS and are listed in Section 1.2. The TCBD data flow and Module relations are shown in the *TWRS Controlled Baseline Database User Manual*, (LMHC 1998c).

The PMCS has interface capabilities for the FDS and P3 and does not interface with any other data system. However, since the FDS will be retired in October 1998, it is planned that the PMCS may potentially interface with its replacement, the Performance Module. It is also planned for the PMCS to interface with the Central Milestone Module, the Hanford Site official milestone database.

1.4 DEFINITIONS AND ACRONYMS

1.4.1 Definitions

About Box: A display box that contains an application summary. This information usually includes application title, application or Module version, and the system owner. In addition, an "About Box" may list the development company, any copyrights, licensing information, and relevant links.

- Client/Server:** Description of a distributed computing environment where the computing load is distributed to varying degrees between the workstation and an associated Relational Database Management System (RDMS).
- Module:** A PMCS application program that provides functionality to the user. Several Modules exist and are accessible from the PMCS Main Menu. For a complete listing of production Modules, refer to Section 2.2.
- Production:** A Module that has been released for system use following acceptance by the customer.
- Scenario:** A WBS and associated information that has been assigned a title and type by a user.
- Software Requirement:** A user-defined functionality that becomes integral to the software once it is implemented. Software requirements are used as a mechanism to apply test cases to for purposes of software acceptance prior to production.
- Software Configuration Management:** A set of management disciplines within the context of the software engineering process that applies technical and administrative direction and surveillance. It identifies and documents the functional and physical characteristics of a product, controls changes to those characteristics, and records and reports the change processing and implementation.

1.4.2 Acronyms

ADP	Automatic Data Processing
BPDC	Backup Primary Domain Controller
BMO	Business Management Organization
FDS	Financial Data System
FTP	File Transfer Protocol
HLAN	Hanford Local Area Network
ID	Identification
LMHC	Lockheed Martin Hanford Company
LMSI	Lockheed Martin Services, Inc.
MCL	Milestone Control Log
P3	Primavera (P3)
PMCS	Performance Measurement Control System
RDMS	Relational Database Management System
SCMP	Software Configuration Management Plan
SQL	Structured Query Language

TWRS	Tank Waste Remediation System
WBS	Work Breakdown Structure

2 GENERAL DESCRIPTION

2.1 PRODUCT PERSPECTIVE

The PMCS was developed to provide a central database and user interface in support of project baseline data and its supporting documentation.

The PMCS project development was started in 1993 by the Westinghouse Hanford Company, TWRS division and ICF-Kaiser Hanford to facilitate specific data integration processes of the FDS, Kaiser Engineering Management System, Kaiser Financial System, including but not limited to the project scheduling system environment. Since contractor changeover, the Westinghouse Hanford Company portion has been assumed by Lockheed Martin Hanford Company, TWRS, and the ICF-Kaiser information has been assumed by Fluor Daniel Northwest (FDNW).

The system data integration processes have since been migrated to a client-server environment, containing several production Modules to manage TWRS information for activity planning data input and retrieval. Input areas managed by the system include security, PMCS navigation, WBS for work scope planning, milestone control log, integration of data tables, Engineering Change Notice management, and P3/PMCS schedule data management.

PMCS will allow retrieval of selected data elements by offsite U.S. Department of Energy personnel and Washington State Department of Ecology personnel and their contractors.

The primary software for the project will be Microsoft Windows NT Server and Microsoft Structured Query Language (SQL) Server. This project will process large amounts of data between the mainframe and the servers, and provide for the retrieval of that data from the local servers to the workstations. The NT/SQL database provides the ability to simultaneously process data allowing the servers to process transactions at a rate consistent with data retrieval goals. Servers will process multiple concurrent users, who are updating the database throughout the work day and moving work plan data to and from FDS during day and evening hours.

The PMCS consists of the functional production areas discussed in Section 2.2.

2.2 PRODUCT FUNCTIONS

The PMCS currently consists of the following functional production areas:

- PMCS Main Menu
- PMCS Security
- Work Breakdown Structure (WBS) Module

- Integration Module
- Milestone Module
- ECN Module
- P3/PMCS Module.

Each function is discussed in Section 3.0.

2.3 USER CHARACTERISTICS

The PMCS users are those individuals and organizations needing data or information from the PMCS as authorized by the LMHC BMO. Typically, these individuals will be project controls personnel, schedulers, estimators, project managers, and activity managers. Usage of the PMCS is expected to be occasional due to Site transitions.

It is expected that the skill level of the user will be such that: 1) the user can negotiate common Windows, graphical icons, and menu commands; 2) the user understands the semantics involved with PMCS; and 3) the user can perform simple data entry including radio buttons, data table fill-in, and drop-down list selection.

All personnel shall be trained in the proper use of the system per a formal training session. Personnel will also be expected to report any system problems or suggestions for improvement through the PMCS configuration management process.

2.4 GENERAL CONSTRAINTS

Currently, there are no constraints on design due to the fact that the system is already in production. However, in general, for future and on-going development the impacts of the HANDI 2000 Passport product must be evaluated.

2.5 ASSUMPTIONS AND DEPENDENCIES

2.5.1 Assumptions

The following assumptions have been made:

- The only system interfaces shall be to FDS, P3, and the ECN Module.
- For future development, the retirement of FDS shall be considered in requirements or design modifications.
- The HANDI 2000 will have an undetermined impact on this system and should be considered in requirements or design modifications.

- The PMCS shall be based on Windows NT, and Personal Computer (PC-Pentium class) hardware, file servers, and site communications infrastructure, including Hanford Local Area Network (HLAN).
- A test environment shall be provided "off-line" to allow for pre-production testing that will not affect system operational users.

2.5.2 Dependencies

The following dependencies have been made:

- The system is dependent upon P3 to capture scheduling data.
- The system is dependent upon FDS to provide rates, organizational and schedule information.
- The system is dependent upon the ECN Module to provide associated ECN document information.
- The system, due to its client-server architecture, is dependent upon the network (i.e., HLAN), file servers, and communication interfaces.
- The system is dependent upon tables being populated with valid data for pre-operational testing and test case performance.
- The system is dependent upon users to provide accurate feedback with regard to operational usage, areas for improvement and error reporting to the PMCS Administrator.

3 GENERAL REQUIREMENTS

The requirements in this section are written at a high-level to support documentation of an as-built production PMCS. The current production of PMCS was released without a set of formal requirements to serve as a design basis for the current design. Therefore, this section will provide the core set of functional requirements in essential terms, without regard for implementation or design.

Although the project name has changed to the TCBD, the original baseline applications and forms still have PMCS nomenclature. Since this document is as-built, the use of PMCS applies.

3.1 FUNCTIONAL REQUIREMENTS

3.1.1 PMCS Security Module

The PMCS Security Module requirements include several levels of security to protect PMCS configuration and operating data:

- 3.1.1.1 Access control for PMCS is via a logon function. The logon function is started from the operating system (e.g., Windows 98) on user command (e.g., selecting the PMCS icon from the Windows 98 desktop).
- 3.1.1.2 Access to the server shall be transparent to the user. However, the user has the ability to select from a list of different servers during logon.
- 3.1.1.3 Server access is handled via an embedded encrypted Identification Number (ID) and password that the client module on the desktop shall forward to the server. After the server de-encrypts the ID and password, then the logon process is completed.
- 3.1.1.4 Access to the PMCS Main Menu shall be handled via prompting for user name and user password.
- 3.1.1.5 A user shall be allowed to cancel the logon process and exit back to their operating system.
- 3.1.1.6 Passwords shall be at least six alphanumeric characters in length.
- 3.1.1.7 Only the user and the PMCS Administrator can modify a user's password.
- 3.1.1.8 If during comparison, the password and/or user name is incorrect, the user shall be given an opportunity to reenter the password and/or user name.
- 3.1.1.9 After initial logon, the user shall be given the opportunity to change their password. This will require a confirmation step to ensure the characters are input correctly. This process is not required again after the initial logon.
- 3.1.1.10 Once a user selects a Module from the Main Menu (Section 3.1.2) and is successfully logged on to that Module, then an audit record shall be made of the access, including the user's ID, Module name, and date and time stamp. Access to audit records is limited to the PMCS Administrator.
- 3.1.1.11 Only the PMCS Administrator shall have access to tools for the Security maintenance, including adding, modifying or deleting data, of the PMCS data tables or security tables.

3.1.1.12 User groups shall be established. For example:

- Schedulers
- Program Point of Contacts
- Budget Analysts
- General Users.

3.1.1.13 Each user or group shall be assigned access to one to many Modules based upon the job function. This is an administrative task and these assignments are carried out by the PMCS System Administrator.

3.1.1.14 Main Menu categories and Module associations shall also be defined by the PMCS System Administrator.

3.1.1.15 New Main Menu categories and Module information shall be entered, deleted, or modified only by the PMCS System Administrator.

3.1.1.16 Individual fields within Modules must allow either 1) unlimited (all users) access for addition, deletion, or modification; or 2) limited (some users) access for addition, deletion, or modification; or 3) no (no users) access for addition, deletion, or modification. Assignments shall be made via the PMCS System Administrator.

3.1.1.17 The PMCS System Administrator shall be allowed to add, delete, and modify User and login information including, at a minimum, user name and user password.

3.1.1.18 The PMCS System Administrator shall be allowed to view current PMCS users.

3.1.2 PMCS Main Menu

The PMCS Main Menu application, hereafter referred to as the Main Menu, provides a user interface to allow the viewing of the Module listing, installation, updating, and launching of PMCS Modules. The Main Menu requires the following functionality:

3.1.2.1 The Main Menu shall check its version in the PMCS Security database. If the version is not current, then it shall prompt the user to reinstall the Main Menu. The setup program is executed for the user if they choose to reinstall, otherwise the Main Menu shall exit.

3.1.2.2 The Main Menu shall allow the user to logoff, change their password, exit the PMCS application, and display a PMCS "About-Box" by command.

3.1.2.3 Main Menu shall display the server name, database, current user, date and time.

3.1.2.4 Main Menu shall display a list of categories.

3.1.2.5 Each category shall display an associated listing of PMCS Modules (functionality) that a

user has rights of access to. This Module listing shall include a short description and the current version number for each Module listed.

- 3.1.2.6 If a new category is selected, the Module listing shall update automatically for that category and user.
- 3.1.2.7 A Module may be selected and launched from the Module listing. The user is not required to logon to that application once the launch occurs.
- 3.1.2.8 The user must be allowed by the Main Menu to install a new Module or reinstall an existing Module.
- 3.1.2.9 If the Module is not recognized as launch-ready by the operating system, an error message must be given.
- 3.1.2.10 Main Menu checks the version of the Module it is about to launch. If the version is not correct, then it shall prompt the user to reinstall the Module. The setup program is executed for the user if they choose to reinstall; otherwise, the Main Menu is redisplayed.

3.1.3 Work Breakdown Structure Module

The PMCS WBS Module provides the user a method to create and maintain multiple WBS and their associated Description Form and Product Sheets.

This Module provides the basic foundation for the other forms in the PMCS. The WBS Module requires the following functionality:

- 3.1.3.1 WBS Module must have access control in place (e.g., via the PMCS Main Menu).
- 3.1.3.2 Shall allow creation of a WBS, also referred to as a Scenario, that consists of a tree of related tasks in a hierarchical structure up to 20 levels deep.
- 3.1.3.3 Shall allow modification and/or viewing of an existing WBS, also referred to as a Scenario, that consists of a tree of related tasks in a hierarchical structure up to 20 levels deep.
- 3.1.3.4 Shall provide the ability to find a particular WBS number.
- 3.1.3.5 WBS numbers shall be numerical and up to 20 levels (e.g., 1.1.1.3).
- 3.1.3.6 One to many Scenarios shall exist and these are listed upon entry into the WBS Module.
- 3.1.3.7 Scenarios shall have associated with them Title, Type, Fiscal Year (FY), Revision

Number and Change Number.

- 3.1.3.8 Types shall include "Original Baseline", "Current Baseline", "Revision", and "What-If".
- 3.1.3.9 A user shall have the ability to restrict others from modifying their Scenario.
- 3.1.3.10 A User shall be allowed the ability to operate with a Scenario by opening, creating a new Scenario, copying from an existing Scenario and saving with a new name, deleting, or canceling the current operation.
- 3.1.3.11 A User shall be provided the ability to view WBS Scenario Properties, view assigned Scenario users, and refresh the WBS view. WBS Scenario Properties include:
 - WBS Title, Type of Usage (consisting of a checkbox for one of the following "Owner Use", "Move" or "Restricted"), WBS Type, Revision Number, Fiscal Year, Change Number, Creation Date, Owner, Update Date, and User, and having the user initiate via the proper system command or a mechanism to cancel.
- 3.1.3.12 Opening an "Original Baseline", "Current Baseline", or "Revision" type shall open only as Read Only.
- 3.1.3.13 Opening a "What-If" type shall allow the user to read and write all data unless marked as "Owner Use" or "Read Only" by the owner.
- 3.1.3.14 Scenarios shall have the ability to be specified for use by a single user (only) or for "Read Only".
- 3.1.3.15 A selected Scenario shall graphically display the actual WBS tree.
- 3.1.3.16 The WBS tree outline shall be printable via the user selecting a checkbox indicating all tree elements, a specified branch, or a unique element. Status of the print progress shall be displayed.
- 3.1.3.17 Once displayed, a WBS tree shall be allowed to expand or collapse by selecting a WBS task and having the user initiate via the proper system command.
- 3.1.3.18 Once displayed, navigating through the WBS tree shall be allowed via user initiated system command.
- 3.1.3.19 A user shall be allowed a function to Find a particular task in a WBS Scenario tree.
- 3.1.3.20 A user shall be allowed a function to add a task to a WBS Scenario tree.
- 3.1.3.21 All tasks added must have an existing peer or parent level.

- 3.1.3.22 A user shall not be allowed a delete function if they are in the Original Baseline, Current Baseline or a Revision of a WBS Scenario.
- 3.1.3.23 A user shall be allowed a function to delete a complete tree or a task from a WBS Scenario tree, but only for "What-If" Scenarios. This deletion request must be confirmed.
- 3.1.3.24 Users shall be allowed to reverse deletions at a later time.
- 3.1.3.25 The user shall be shown the effect of the request for a deletion on the WBS Scenario tree.
- 3.1.3.26 WBS Description Forms shall be allowed for top level WBS tasks per user request.
- 3.1.3.27 A WBS Description Form shall be printable via the user selecting a checkbox indicating all tree elements, a specified branch, or a unique element. Status of the print progress shall be displayed. The form shall be printed blank as well.
- 3.1.3.28 WBS Description Forms shall have the ability to be modified or deleted.
- 3.1.3.29 WBS Description Forms shall have the following:
 - Description Code, WBS Code, WBS Title, WBS Level, Tree Title, Date Prepared, Revision Number, Revision Date, and ID Number.
- 3.1.3.30 WBS Description Forms shall also have Description Filters for the following:
 - Acceptance Criteria, Goals and Objectives, Major End Item Deliverables, and Statement of Work.
- 3.1.3.31 WBS Product Sheets shall be allowed for each WBS task per user request. The only exception is Product Sheets cannot be created at the same level as the WBS dictionary and the same with the reverse.
- 3.1.3.32 WBS Product Sheets shall be printable via the user selecting a checkbox indicating all tree elements, a specified branch, or a unique element. Status of the print progress shall be displayed. The sheet shall have the ability to be printed blank as well.
- 3.1.3.33 WBS Product Sheets shall have the ability to be modified or deleted.
- 3.1.3.34 WBS Product Sheets shall have:
 - WBS Code, Product Title, WBS Level, Tree Title, Revision Number, Project Number, MYPP ACT, Scheduler Name, Responsible Manager, ADS, Schedule, Estimate and Estimate Type.
- 3.1.3.35 WBS Product Sheets shall also contain:

Data form and tables to enter "Resources" information including: Activity ID, Start Date, Suspend Date, Resume Date, Finish Date, Organization Code, Cost Element, Charge Number, Curve, EV Method, Labor Designator, Cost, Units, Start and Finish Date for the Charge Code and Organization Pairing, Job Category, FDS Send Type Designator, Funding Year, Funding Type (e.g., Expense, etc.).

Data form and tables to enter "Resource Distribution" information including: Activities, Resources, Start Date and Finish Date of the Resources, Ability for entire FY display split into separate months, Hours per month, BCWS per month, BQWS per month, BCWP per month, BQWP per month, and rate. These tables shall allow auto calculation and preservation of schedule data on user command.

Data form and tables to display "Estimate Summary" information including: Activities, BCWS and BQWS information (Estimate, Schedule, Proposed, Revised, Variance E-S, Variance E-P, and Variance S-P).

Data form and tables to enter "Description Filter" information (e.g., Activity Scope, Basis of Estimate, Deliverables, Milestones, Estimating Assumptions, Impacts Risks, Resource Notes, Assumptions/Key Predecessors/Lags, etc.).

Data form and tables to enter "Milestones" information including: Milestone Control Number, Milestone Title, Activity ID, Milestone Type, Start/Finish of Milestone, Due Date, Schedule Designator.

Data form and tables to enter "Activities" information including: Activity ID, Activity Title, Start, Suspend, Resume, and Finish Date of Activity ID, Constrained Designator, Percent Complete for Activity, Responsible Organization, Send to FDS Designator.

3.1.3.36 WBS Product Sheets shall be parsed to produce SQL (i.e., expected design) schedule table.

3.1.4 Integration Module

The Integration Module provides for the integration and establishment of ties between a P3 schedule and a related WBS structure and/or milestones in the MCL. The module also will transfer data between FDS and PMCS SQL schedules. Another function of the module is the ability to create a skeleton P3 schedule from a WBS scenario and move milestone data to and from the MCL and a selected WBS scenario. The Integration Module also incorporates utilities for specific P3 schedules. The functionality required includes the following:

3.1.4.1 Integration Module must have access control in place (e.g., via the PMCS Main Menu).

3.1.4.2 The ability to send data from the SQL schedules to FDS.

- 3.1.4.3 The ability to update the SQL schedules with data from FDS.
- 3.1.4.4 The Integration Module shall provide for user-initiated creation and/or update of data in the WBS to the SQL schedule tables. This includes selecting the Source WBS, what to update (Activities, Milestones, Resources), Update Range (Tree, Branch and Start Branch, Element, and Limit of Levels), a user-initiated command to update based on the provided information, and a mechanism to cancel.
- 3.1.4.5 The Integration Module shall provide for user-initiated creation and/or update of data in the SQL schedule tables to the WBS. This includes selecting the Source Schedule, Target WBS, what to update (Activities, Milestones, Resources), Update Range (Tree, Branch and Start Branch, Element, and Limit of Levels), a user-initiated command to update based on the provided information, and a mechanism to cancel.
- 3.1.4.6 The Integration Module shall provide for user-initiated creation and/or update of data in the Milestone Control Log (MCL) to the WBS. This includes selecting the Source MCL, Target WBS, Update Range (Tree, Branch and Start Branch, Element, and Limit of Levels), a user-initiated command to update based on the provided information, and a mechanism to cancel.
- 3.1.4.7 The Integration Module shall provide for user-initiated creation and/or update of data in the WBS to the Milestone Control Log. This includes selecting the Source WBS, Target MCL, Update Range (Tree, Branch and Start Branch, Element, and Limit of Levels), a user-initiated command to update based on the provided information, and a mechanism to cancel.
- 3.1.4.8 The Integration Module shall provide for user-initiated update of data in the SQL schedule tables to FDS. This includes selecting the Project Name (consisting of Project Name, ID number, Version, Status, and P3 Source), WBS Scenario (consisting of Type, Fiscal Year and Title), and a choice of the type of work to send (Scheduled or Performed). If the work sent is "Performed", then the user selects whether the work is of Quantity Type or Cost Type. Also provided is a user-initiated command to update, based on the provided information, and a mechanism to cancel. Note: SQL schedule data must be validated before being transferred to outside systems.
- 3.1.4.9 The Integration Module shall provide for user-initiated validation of SQL schedule data. This includes the user providing the Project Name (consisting of Project Name, ID number, Version, Status, and P3 Source), WBS Scenario (consisting of Type, Fiscal Year and Title), and Validation Scope (FDS or All Data), a user-initiated command to start based on the provided information, and a mechanism to cancel.
- 3.1.4.10 The Integration Module shall provide for user-initiated update of rates. This includes the user providing the Project Name (consisting of Project Name, ID number, Version, Status, and P3 Source), whether to use unburdened rates, and whether to "Update" or

"Replace" rates for the Project, a user-initiated command to start based on the provided information, and a mechanism to cancel.

- 3.1.4.11 The Integration Module shall provide for the user-initiated application of ModMast. This includes the user providing the Project Name (consisting of Project Name, ID number, Version, Status, and P3 Source), ModMast Date, a user-initiated command to start based on the provided information, and a mechanism to cancel.
- 3.1.4.12 The Integration Module shall allow for the user-initiated global resource or organizational changes to an existing schedule stored in SQL schedule tables. This includes the user providing the Project Name (consisting of Project Name, ID number, Version, Status, and P3 Source), the Old Value, the New Value for replacement, the Organization Code and whether it is 5 digits in length, and the Resource and whether it is 8 digits in length, a user-initiated command to start based on the provided information, and a mechanism to cancel.
- 3.1.4.13 The Integration Module shall provide for user-initiated redirection of FDS data to a user-specified location, will provide "warn on exit" user option, and a user-initiated mechanism to start or cancel.
- 3.1.4.14 The Integration Module shall provide a user-initiated means for exit from the Integration Module.

3.1.5 Milestone Control Module

The Milestone Control Module provides for the ability to enter data that generates Milestone Description Sheets (MDS), Milestone Control Log, provides validation of input to the Activity Planning Forms, the schedules, and WBS Module. The functionality required includes the following:

- 3.1.5.1 Milestone Control Module must have access control in place.
- 3.1.5.2 The ability to enter new MCL data sets consisting of Data Source (the WBS), MCL Title, Fiscal Year, and whether for "Owner Use Only", and a user-initiated mechanism to accept (ok) or cancel.
- 3.1.5.3 The ability to open existing data sets for editing in normal, "Exclusive Use" or "Read Only" sessions.
- 3.1.5.4 The ability to view a WBS in tree form to select a WBS code.
- 3.1.5.5 The ability to enter a new milestone, or MCL entry, consisting of selecting a WBS code for the new milestone, and automatically generating a new milestone number upon user command.

- 3.1.5.6 The user shall have the ability to modify and delete milestones.
- 3.1.5.7 No duplicate milestone numbers shall be allowed.
- 3.1.5.8 The MCL Module shall provide for a directory listing of all associated WBS Scenarios that have milestones. A user shall be able to open, create a new MCL entry, move data between WBS Scenario types with appropriate security (e.g., "Current", "What If" or "Revision"), delete (if the user is the creator of the data set), properties (MCL properties of data set), concurrent users of selected data set, refresh of the MCL directory table, and a mechanism to cancel.
- 3.1.5.9 When open, a WBS Scenario shall be allowed for viewing in tree form. Tree branches shall have the ability to be expanded or collapsed to the maximum number of levels available for that Scenario. A user-initiated mechanism that accepts (ok) that will return the selected WBS number from view and a mechanism to cancel.
- 3.1.5.10 When a WBS Scenario is selected, all pertinent data are displayed and the user shall have the ability to create a MCL entry including the following:

Title (consisting of Milestone Number, Milestone Type, WBS Code, Revision Number, Due Date, Title, and a checkbox for whether it is baseline).

Comments (consisting of report remarks, e.g., a list including cause, impact, recovery plan, etc.).

Reference (consisting of FDS Number, Safety Initiative, ADS Number, DNFSB Number, TPA Number, PBI Number, B&R Code, Project Number).

Milestone Description Sheet (consisting of Preparation Date, Deliverables with a choice from a list, Due Date, Addressed to choice from a list, Description choice from a list, and an expansion area to put notes).

CIN (consisting of CIN Number, CIN Revision Number, Change Class, Approval Date, Brief Description, and chance to expand on these notes if space is limited).

Status (consisting of TPA completion date, Baseline date, Schedule completion date, Deleted date, Schedule forecast date, Previous forecast date, Manager forecast date, and Target schedule date). The user shall have automatically displayed to them, the Created Date, Last Updated Date and who updated the record.

Schedule (consisting of Schedule Name, Scheduler, Activity Identification, Project Manager name, Target name, Last Status Date, and Target Activity identification).

Flags (consisting of selections of either/or selection boxes for "Peg Milestone", "Carry Over", "Budget Formulation", "Include in SMS Count", "Mark for Deletion" and "Administrative"). The Flags are accessed and maintained by the MCL System Administrator only.

- 3.1.5.11 The MCL shall allow the user to view pertinent data from the MCL data set by use of selection of fields for the main view.
- 3.1.5.12 The MCL shall also allow the use of filters to allow specific value or ranges of values for data to be viewed, for the fields that are selected.
- 3.1.5.13 The MCL shall allow the use of a search engine to locate, based upon the currently selected data, of values being exact in value, higher in value, lower in value, or in a range.
- 3.1.5.14 The MCL shall have a standard set of reports available from a listing. This listing shall have the ability to be modified and new reports shall have the ability to be added to the system at a later time by the MCL System Administrator.
- 3.1.5.15 The MCL shall allow creation of user-defined MCL reports by allowing the use of filters to allow only a specific value or ranges of values for data to be reported (e.g., printed).

3.1.6 ECN Module

The Engineering Change Notices (ECN) Module allows users to find change information, edit existing change information, enter new change information, and delete existing change information. Various reports with user selectable filters and sorts will be available for viewing existing change notices. The functionality required includes:

- 3.1.6.1 Engineering Change Notice Module must have access control in place.
- 3.1.6.2 The user shall be allowed to retrieve ECNs of interest by entering a Project Number, or selecting from a list of Project Numbers, or for an individual change number, or by drawing number.
- 3.1.6.3 Other filters for accessing an ECN of interest shall be provided, based on the information contained in an ECN data set.
- 3.1.6.4 The user shall be displayed information related to the requested ECN, including all associated documents.
- 3.1.6.5 The user shall be provided commands to move through the list of ECNs.
- 3.1.6.6 Information for an ECN shall include Change Number, Project Number, Initiator/Author,

Initiation Date, ECN Type from a list, Safety Class from a list, Description Field, and a table for multiple associated documents (numbers, sheet numbers and revision numbers). The user will also enter in a "Ratified" selection box of Yes or No.

- 3.1.6.7 Ability for new documents to be associated with an existing ECN by the user.
- 3.1.6.8 Ability for documents to be located by the user via entry of the ECN change number.
- 3.1.6.9 Ability for documents to be deleted for an existing ECN by the user, after verification that the user has been alerted to this action.
- 3.1.6.10 Ability for user to delete a Project and all related change notices, after verification that the user has been alerted to this action.
- 3.1.6.11 Reports shall be available for all projects without filtering.
- 3.1.6.12 Custom report filters, native to the implementation software and ECN fields, shall be allowed for customized user report definition.
- 3.1.6.13 Defined user reports shall be allowed for selection from a list. The ECN System Administrator adds these reports to the system.

3.1.7 P3/PMCS Module

P3/PMCS is designed to be run from the PMCS Main menu. The purpose of this Module is for moving a P3 schedule from the PMCS desktop to the PMCS SQL server, or to bring a schedule back from the PMCS SQL server to the PMCS desktop. The functionality required includes:

- 3.1.7.1 The P3/PMCS Module must have access control in place (e.g., via the PMCS Main Menu).
- 3.1.7.2 When the Module is entered, the Project schedule information is displayed in a list including, Type, Project Name, Version Number, Project Title, Saved By (designator integer), Saved Date, Last Updated Date, and Updated By (designator integer).
- 3.1.7.3 The user shall be allowed to perform the following functions including:

Saving a new project SQL/PMCS (Consisting of Primavera project file, PMCS project name with browser, and means for the user to save or cancel on command). If a user attempts to save over the same schedule, the user is notified and asked for verification on whether they would like to cancel, overwrite or save with a new name specified by the user. If the schedule is saved as a new name, the information will update in the Project information listing on-screen.

Retrieve a P3 project schedule from a project in the list or from a user specified location. Overwriting a desktop schedule is permitted with user confirmation.

Delete a P3 project schedule from a project in the list or from a user specified location with user confirmation.

Refresh the P3/PMCS on-screen information.

A user-initiated means for exit from the P3/PMCS Module.

3.2 EXTERNAL INTERFACE REQUIREMENTS

This section will discuss external interfaces to the PMCS, including the user interface, hardware and software interfaces, and communications interfaces.

3.2.1 User Interfaces

The PMCS user interface shall be based on current Microsoft Windows defacto standard practices for design of screens including data entry, file access, printing, print set-up, and other user commands.

3.2.1.1 User Screens

In general, PMCS screens for the user shall meet the following criteria:

- Icon access from the desktop to the PMCS application
- Graphical user interface
- Standard Windows functions for the active display (e.g., minimize, maximize, etc.)
- Ability to switch to other active applications (e.g., cc:mail, LANcal)
- Ability to setup system devices (e.g., printers, networks, file locations, etc.) from the operating system
- Font of at least 5 points for all displays
- Contrast of background and text colors to allow ease of readability
- Pull-down menus
- Dropdown selection lists for data entry consistency purposes
- Icon toolbars for point and click functions (related in some cases to menu items)
- Screen sizing capabilities
- Scroll bar ability (to move within a screen if all data can not be displayed)
- Split screens where applicable to allow associated menus to sub-menus
- Pop up forms
- Button selections including OK and Cancel
- Where feasible, mouse right button click functionality
- Drop down help from icons

- Upon PMCS errors produce an error message in a dialog box
Note: error messages will be generated by the RDMS and relayed to the user.
- Confirmation dialog box upon specific actions (e.g., deletion of a record).

3.2.1.2 Reports

The hardcopy page layout and contents general requirements, per functional area, are:

- All reports shall have page numbers and a descriptive title.
- *PMCS Security Module* - None
- *PMCS Main Menu* - None
- *Work Break down Structure Module*
 - ◆ WBS Tree Structure Report: prints out the tree and branches for up to 20 WBS levels.
 - ◆ WBS Dictionary: prints out key elements of the WBS including (suggested): Program/Title Participant, Date Prepared, WBS Element Code/Level, WBS Element Title, Current Revision Number, Effective Revision Date, Approved Changes, and Element Description.
 - ◆ WBS Product Sheet: prints out key elements of the WBS including (suggested): WBS code, Product Title, Tree Title, Level, Revision Number, Project Number, MYPP ACT, Scheduler Name, Responsible Manager, ADS, Schedule, Estimate and Type, Resources, Resource Distribution, Estimate Summary, Description Filters, Milestones, Activities.
- *Integration Module* – None
- *Milestone Control Module*
 - ◆ Milestone Description Sheet Report: prints out key elements for types of Scenarios including: Original Baseline, Current Baseline, and What-If. If the type is Original Baseline or Current Baseline, a signature block will not appear on the MDS report. If the type is What-If, a signature block will appear on the MDS report. Also prints out key elements of the Milestone Control Module including (suggested): Milestone Number, Revision, FDS WBS, Due Date, Completed Date, Scheduler, Title, Comments, Reference, MDS, CIN, Status and Schedule. This sheet can also be printed out as a blank form.
 - ◆ Custom Reports: based on different filters on the key elements, shall have the ability to be generated, saved and retrieved by a user. These reports shall be displayed in a custom report list.
 - ◆ Standard Reports: based on different filters on the key elements, are listed with descriptive title. These standard reports are produced for global user selection. These are maintained by the PMCS System Administrator. For instance, "90 Day Look Ahead and Overdue" or "Completed Milestone" may be two such reports available globally to users.
- *Engineering Change Notice Module*
 - ◆ Reports shall be able to download to a text file.
 - ◆ All Projects Report: prints out key elements for all available projects.

- ◆ Detail Log Report: prints out all available information associated with the current project number. Alternately, the user may select a different project number.
- ◆ Drawings by ECN Report: the user may accept the current project number or select a new project number. The report will list all documents associated with the selected project number.
- ◆ Change Notices by Drawing Number Report: the user may accept the current document number or select a new document number. The report will list all change notices that reference this document.
- ◆ Unapproved Change Notices Report: the user may produce a report containing a listing of all unapproved change notices.
- *P3/PMCS Module*
 - ◆ Orphaned Custom Data Items Report: prints out when certain referential integrity violations occur. This report shall include (suggested): Application Name, Report Date, Project Identification, Project Version, Source Project Path, and Name, Record Type, Activity Identification, and Record Identification.

3.2.1.3 Timing of Input and Output

- The system shall have time-out mechanisms in place to alert the user that a request for SQL processing has failed. This mechanism shall also allow a controlled exit or retry.
- For all local user input (e.g., drop-down menus, drop-down lists, button activation, Module selection, etc.) all responses (average) (e.g., visible system response to the command except for cases of system lock-up) shall be within 10 seconds.
- From the starting of a functional Module to being active within a said Module, the response shall be within a reasonable timeframe of 30 seconds to 1 minute.
- Saving data or uploading data locally shall occur within a timeframe of 1 to 15 minutes.
- For the upload and download of system data to other systems or across the network, the completion time shall be dependent upon the size of the data set being processed. However, this should occur within 1 to 30 minutes; save for unexpected communication outages, local system failure, or target system downtime.
- Reports shall *start* printing within 1 to 5 minutes of initiation. Report print times depend upon the location of the printer, printer usage, and size of printing job, and therefore this range is given.

3.2.2 Hardware Interfaces

The PMCS shall use PC workstations and file servers in a client-server architecture. Setup and interfacing of the file servers and workstations shall be via LMSI standard HLAN practices and recommendations.

Three servers shall act as domain controllers for the PMCS domain on HLAN. One of these domain controllers shall be designated as the primary domain controller that maintains the Master Access Control List (ACL). The other two domain controllers shall be designated as Backup Primary Domain Controller (BPDC) that maintains backup copies of the ACL.

The first BPDC shall also store the PMCS production client software, source-code, File Transfer Protocol (FTP) services and all the TWRS and Spent Nuclear Fuels P3 schedules. The other BPDC is used as a fail-over standby and maintains a copy of the production library and FTP services. All other file servers are for serving SQL clients and shall be identical.

Currently, the only PMCS data highway interface shall be to the FDS, Primavera (P3), and ECN Module systems.

The current minimum requirement for standard workstation system hardware is a 486/66 PC with 16 M of RAM, and a hard-drive of at least 300 Mbytes. The current minimum requirement for a standard file server system hardware is to be specified in conjunction with LMSI Network Support personnel during design and implementation.

3.2.3 Software Interfaces

- For PMCS, file servers shall use the Microsoft Windows NT (3.51 or 4.0 or higher), as the Operating System (O/S).
- For PMCS, workstations shall use the Microsoft Windows (3.11/DOS6.22, 95, 98 or higher), as the Operating System (O/S).
- The Relational Database Management System used shall be Microsoft SQL (versions 6.0 or 6.5 or higher). PMCS user interfaces shall be built in Access or Visual Basic.
- Communications software will be as specified by LMSI network support personnel.
- Existing applications utilized shall include the information provided by the most recent production revision of P3, FDS, and the ECN Module. Interfaces to these systems shall be via a custom transfer program.

3.2.4 Communications Interfaces

- The interface of PMCS hardware, including servers and workstations, to the network shall be via standardized network configurations provided by LMSI HLAN Network Support Services. LMSI will be retained to optimize the system per performance requirements and expected data loads.
- Standard HLAN protocols shall be utilized (e.g., FTP, TCP/IP, etc.). These protocols shall be transparent to the PMCS, but available to support the movement of data sets between PMCS components and other systems. For instance, the communications interface for down/up loading Financial data and P3 schedule BCWP is via FTP.
- Protocols selected must support the RDMS and Windows NT.

3.3 PERFORMANCE REQUIREMENTS

3.3.1 Static Numerical Requirements

The current static numerical requirements include support to:

- 100 active users
- 300 occasional users
- Range from 1 to 400K records
- Support of an unlimited number of potential workstations (currently 400).
- Support of up to 50 concurrent users.

3.3.2 Dynamic Numerical Requirements

The current dynamic numerical requirements include support to:

- 100 estimated system transactions per user per 10 minutes session
- 40 Mbytes of PMCS, P3, FDS, ECN data to process during normal time periods
- 80 Mbytes of PMCS, P3, FDS, ECN data to process during peak time periods
- Refer to Section 3.2.1.3 for time delay responses to inputs and requests

3.4 DESIGN CONSTRAINTS

There are currently no constraints on design due to the fact that the system is already in production. Please refer to Section 2.4 for general constraints that may affect future design.

3.4.1 Standards Compliance

- The PMCS application itself must be in compliance with the Software Practices Hanford procedures. This SRS document is written in accordance with the *Software Practices – System Requirements Specifications*, HNF-PRO-496.
- Only the TWRS procedure set, 0842 series, *recommends* that PMCS be utilized for "good business practices". In 1995, PMCS was designated as the electronic data repository for cost, schedule, and technical administrative baseline information for the TWRS program.
- Communications standards and protocols are outside the scope of this document; however, it is assumed that LMSI shall implement per industry practices.

3.4.2 Resource Limitations

- System responses are limited by the ability of HLAN to handle peak data traffic.
- System responses are also limited by the speed of the individual workstations or fileserver processor family (e.g., 486, Pentium, etc.)
- The RDMS is inherently limited to processing a given number of records based upon design of the application. Care should be taken to ensure the design is reviewed and that the design meets the performance requirements specified.
- System responses are limited by the ability of an external system (e.g., P3) to process a user or system request, and return a response or requested data.

3.5 ATTRIBUTES

- For security requirements, refer to Section 3.1.1.
- Maintenance shall be performed under configuration control, in compliance with the Software Practices Hanford procedures.
- Data integrity from other systems is the responsibility of those System Administrators. Data shall be checked for proper format prior to being uploaded into the PMCS SQL tables.
- Referential integrity checks shall be performed on SQL data.
- Where possible, PMCS code should be modular in design to allow ease of programming, maintenance, isolated, and system testing.

- PMCS code shall be portable to new workstations via an automated setup program.

3.6 OTHER REQUIREMENTS

This section will discuss the PMCS requirements not related to functionality.

3.6.1 Data

The data within the PMCS are specified within the functional Module descriptions in Sections 3.1.1 through 3.1.7. In some cases, specific requirements exist for these data and are included in these sections where applicable. For instance, how the data are presented to the user or the type of data and number of characters (e.g., alphanumeric, integer, etc.). Otherwise, the design of data and data formats was specified during design and implementation.

3.6.2 Operations

The System Administrator, in close conjunction with the software developers and HLAN network support personnel, shall perform initial start-up of the system.

Normal operations have the domain controllers provide the PMCS application to HLAN users. Users shall be allowed to start-up and logon to the PMCS from their workstations via HLAN, but only with the proper security level and access. Special operations may involve setting up the PMCS for development testing over the network, and is outside the scope of this document.

Shutdown of the system, for maintenance or new PMCS releases, shall be handled via alerting users of a system outage date and time and arranging the outage with LMSI Network Support.

The PMCS System Administrator shall perform the PMCS data backup, via the BPDC that is used as a fail-over standby that maintains a copy of the production library and FTP services. LMSI shall assist the PMCS System Administrator in system recovery of any data files that are lost or corrupted.

The PMCS System Administrator in conjunction with LMSI shall provide maintenance of all workstation and fileserver systems, software and hardware components.

3.6.3 Site Adaptation

No requirements have been identified for this Section.

3.6.4 Options

Alternative proposals to the requirements in this SRS are not applicable since the PMCS baseline has been released, and this document serves as an as-built SRS. However, for future development considerations, refer to Section 2.4.

3.6.5 Scheduling

Users require that the system is available during normal work operations (Monday thru Friday; 6:00 am – 5:00 pm). Normal supported work hours for the HLAN Customer Technical Support (CTS) is around the clock for computer and HLAN issues.

Maintenance of the file servers shall be handled during off-normal work hours. When a file server is not in service during normal work operations, then the backup file server shall take over as the primary.

All scheduled outages shall be communicated to the PMCS users in advance. Unscheduled outages and expected resolution timeframe should be communicated to the PMCS users.

3.6.6 Reliability and Recovery

A recovery and reliability plan shall be written to discuss back up, recovery, and restart Scenarios and placed in the PMCS project file.

3.6.7 Audit

When a user logs on or off the PMCS application, the user ID shall be logged to a table as a record. This record shall include user identification, the Module that was opened, and a date and time stamp. When the user session ends, this is also recorded with a date and time stamp.

3.6.8 Priorities

No requirements have been identified for this Section.

3.6.9 Transferability

No special implementation requirements for multiple installations have been identified.

3.6.10 Conversion

No special system conversion requirements have been identified. Any data conversion requirements are as specified in Sections 3.1.1-3.1.7.

3.6.11 Testing and Acceptance Criteria

The original, baseline software version of the PMCS was released with informal, undocumented testing, but was accepted by the customer as complete.

The strategy now, since the PMCS is in a maintenance state, is that proposed changes to the actual PMCS baseline software shall be documented via the Software Change Requests/Problem Report Form process controlled and described in the *Software Configuration Management Plan for the TWRs Controlled Baseline Database System*, (LMHC 1998a).

All approved changes shall be tested per the *System Maintenance Test Plan for the TWRs Controlled Baseline Database System* (LMHC 1998b) which includes how to document specific test criteria via Test Information (TI) forms. This SRS document serves as a basis for the TI form to reference a specific design basis, especially in the subsections included within Sections 3.1.1-3.1.7 of this document.

3.6.12 Documentation

A user's guide, accessible via the user's workstation, shall be produced that discusses the use of each functional Module within PMCS. A formal user's manual is documented in the *TWRs Controlled Baseline Database User Manual*, (LMHC 1998c).

3.6.13 Training

All PMCS users who were given access to the initial application were provided with training in 1996 and 1997 per the *TWRs Controlled Baseline Database User Manual*, (LMHC 1998c). All future users may require a training session in the PMCS application.

All other individual's training, including software development and HLAN communications personnel, is outside the scope of this document.

3.6.14 Security and Privacy

The data in PMCS have been designated as proprietary. The requirements for user authorization, security, and safeguards are in Section 3.1.1. Only privileged users shall have access to specific data and the PMCS System Administrator shall assign these privileges. In some cases, for example, a "What-If" Scenario, shall have the ability to be defined by a user its own security and limit access.

4 REFERENCES

- HNF-PRO-496, *Software Practices - System Requirements Specifications*, Fluor Daniel Hanford, Richland, Washington.
- LMHC, 1997, *Performance Measurement Control System Project Management Plan*, HNF-SD-TWR-PMP-001, Rev. 0-A, Lockheed Martin Hanford Company, Richland, Washington.
- LMHC, 1998a, *Software Configuration Management Plan for the TWRS Controlled Baseline Database System*, HNF-2429, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.
- LMHC, 1998b, *System Maintenance Test Plan for the TWRS Controlled Baseline Database System*, HNF-3186, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.
- LMHC, 1998c, *TWRS Controlled Baseline Database User Manual*, HNF-2428, Rev. 2, Lockheed Martin Hanford Company, Richland, Washington.