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Accession #: D196002465

Document #: SD-WM-SFR-009

Title/Desc:

TWRS VIEW SYSTEM REQUIREMENTS SPEC

Pages: 41

Station-34, #68
12-27-95

ENGINEERING DATA TRANSMITTAL

2. To: (Receiving Organization) SE Risk Management and Modeling	3. From: (Originating Organization) Technical Baseline Integration	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: TWRS 74400	6. Cog. Engr.: A. K. Lee Dimale	7. Purchase Order No.: N/A
8. Originator Remarks: N/A		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 12/15/95

15. DATA TRANSMITTED								
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-SFR-009		0	TWRSview System Requirements Specification	Q	1	1	

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)													
(G)	(H)	(J) Name (K) Signature (L) Date (M) MSIN					(J) Name (K) Signature (L) Date (M) MSIN					(G)	(H)
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TWRSview System Requirements Specification

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U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 602682 UC: 2030
Org Code: 74400 Charge Code: DIM26
B&R Code: Total Pages: 37

Key Words: TWRSview, Systems Requirements Specification

Abstract: This document provides the system requirements specification for the TWRSview software system. The TWRSview software system is being developed to integrate electronic data supporting the development of the TWRS technical baseline.

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J.L. Burkland 12/22/95
Release Approval Date

Approved for Public Release

Task	SWASDS	WHC
Hardware maintenance		X
Backup/recovery		X

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Responsibility Matrix

Task	SWASDS	WHC
Software Development		
Develop code	X	
Define data relationship/structures	X	X
Develop GUI views	X	X
Supply model diagrams		X
Create models	X	
Develop IDMMs links	X	X
Data sources		X
Data Conversion/Preparation	X	X
Develop help scripts	X	
Develop error message scripts	X	
Installation		
Provide file server/setup		X
HLAN coordination		X
Installation script/auto update	X	X
Provide software and user licenses	X	
Software Testing		
Component testing	X	
Integration testing	X	X
Total system testing		X
Training		
Setup training		X
Conduct training	X	
On-going training		X
Documentation		
Project Plan		X
Software Requirements Specifications		X
Discrepancy reporting		X
Test and Acceptance reporting		X
System Design Description	X	
User Guide		X
Maintenance		
Software development	X	
Software maintenance		X

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APPENDIX B
RESPONSIBILITY MATRIX

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LIST OF TERMS

CAD	Computer-aided Design
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESOE	End System Operating Environment
GUI	graphical user interface
HANTAG	Hanford Technical Advisory Board
HANTRB	Hanford Technical Review Board
HLAN	Hanford Local Area Network
IDMMS	Integrated Dynamic Modeling and Management System
ISD	Information Systems Definition
PMCS	Performance Measurement Control System
PNL	Pacific Northwest Laboratories
RMACS	Requirements Management and Assured Compliance System
SDD	System Design Description
SGML	Standard General Mark-up Language
SRS	Software Requirements Specification
SST	single-shell tank
SWASDS	Stone and Webster Advanced Systems Development Services, Inc.
TWRS	Tank Waste Remediation System
WHC	Westinghouse Hanford Company

Menus	Navigation / Views	Form	Description	Sources	TMRView to IDMS Links	IDMS to TMRView Links	Comments
	Technical Base-Line Evolution	Model	Select Technical Baseline Component				
Description	Specific to Anal. Tools		View description of selected analysis tool	Arena, I-Think, Excel			
Operate...	Specific to Anal. Tools		Run the selected model using the model interface developed for the application	Arena, I-Think, Excel			
Cost/Sched..	Program Elements	Model					Concepts initiated in TMRView prototype
WBS	Program Elements		Display dialogue box to access the information below				Concepts initiated in TMRView prototype
Schedule	Program Elements	Image	Display schedule for program element selected	Primavera			Concepts initiated in TMRView prototype
Cost	Program Elements	Data	Display dialogue to select cost data to display	Primavera			Concepts initiated in TMRView prototype
Logic	Program Elements	Image	Display schedule logic diagram for program element selected	Primavera			Concepts initiated in TMRView prototype
Activities	Program Elements	Data	Display dialogue to select activity data to display	Primavera			Concepts initiated in TMRView prototype
Analysis...	Program Elements	Data	Display dialogue box to perform cost/schedule analyses	KE/PT&C, PSA			Concepts initiated in TMRView prototype

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Menus	Navigation / Views	Form	Description	Sources	TMRsview to IDMS Links	IDMS to TMRsview Links	Comments
	Technical Base-line Evolution	Model	Select Technical Baseline Component				
Trade Study Anal.	Specific to Trade Study	Model					
Simul. Anal.	Specific to Trade Study	Dialogue	Display dialogue to select simulation case to perform queries below				Concepts initiated in TMRsview prototype
Foundation...	Specific to Trade Study	Dialogue	View description of simulation analysis	Arena, I-Think, Insight, OMVP			Concepts initiated in TMRsview prototype
Description	Specific to Trade Study	Text	View description of assumptions used for simulation	Arena, I-Think, Insight, OMVP			Concepts initiated in TMRsview prototype
Assumptions	Specific to Trade Study	Image	Display diagram of simulation logic	Arena, I-Think, Insight, OMVP			Concepts initiated in TMRsview prototype
Logic Diag.	Specific to Trade Study	Image	Display graphs of results from simulation analysis	Arena, I-Think, Insight, OMVP			Concepts initiated in TMRsview prototype
Graphics	Specific to Trade Study	Data	Display dialogue to select simulation data to display	Arena, I-Think, Insight, OMVP			Concepts initiated in TMRsview prototype
Results	Specific to Trade Study	Model	Display models and process analysis specific menus to navigate through process analysis results	Process Flow Diagrams			Concepts initiated in TMRsview prototype
Process Anal.	Specific to Process Anal.	Data	Display dialogue to select process analysis data to display	ASPEN			Concepts initiated in TMRsview prototype
Results	Specific to Risk Analysis	Data	Display models and risk analysis specific menus to navigate through risk analysis results				Concepts initiated in TMRsview prototype
Risk Analysis	Specific to Risk Analysis	Data	Display dialogue to select risk analysis data to display	Risk Database, RMACS, IRAP			Concepts initiated in TMRsview prototype
Results	Specific to LCC Analysis	Data	Display models and LCC analysis specific menus to navigate through LCC analysis results				
LCC Analysis	Specific to LCC Analysis	Data	Display dialogue to select LCC analysis data to display	Primavera, Excel			
Results	Specific to Anal. Tools	Data	Display dialogue to select from analysis tools to use	Arena, I-Think, Excel			
Trade Study Anal. Tools...	Specific to Anal. Tools	Data					

TWRView SYSTEM REQUIREMENTS SPECIFICATION

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) has established the Tank Waste Remediation System (TWRS) Program to safely manage and dispose of the tank waste stored at the Hanford Site. The mission of the TWRS Program is "to store, treat, and immobilize highly radioactive Hanford waste in an environmentally sound, safe, and cost-effective manner." The scope includes project and program activities for receiving, safely storing, maintaining, treating, and disposing onsite, or packaging for offsite disposal, all tank waste. Tank waste includes the current contents of 149 single-shell tanks (SST), 28 double-shell tanks (DST), approximately 60 miscellaneous tanks (identified to date), plus any new waste added to these facilities, and all encapsulated cesium and strontium stored onsite and returned from offsite users. As the TWRS program is developed and deployed, it is necessary for program decision makers to understand the cost, schedules, technical performance, environmental, and public and worker health and safety impacts of their decisions. Because of the size and complexity of the TWRS Program, an integrated computer simulation and data management system is required. A mission analysis was performed for developing an Integrated Dynamic Modeling and Management System (IDMMS) to provide the modeling and analysis capability required to understand the TWRS system behavior in terms of the identified TWRS performance measures.

The IDMMS mission analysis found the existing methods for analyzing and modeling system cost, schedule, technical performance, environmental impact, and risk to public and worker health and safety are neither integrated nor adequate to support a large, complex program. The currently available analysis and modeling tools are comprised of both manual and automated data inputs, manipulations, and outputs. An assortment of unverified databases are currently in use, making these models, assumptions, input data, and results difficult to verify and validate. Because of this, the results produced by these models are not accepted by the customer, U.S. Department of Energy and other stakeholders (Westinghouse Hanford Company [WHC], Pacific Northwest Laboratories [PNL], Washington State Department of Ecology [Ecology], U.S. Environmental Protection Agency [EPA], etc.). Thus, building consensus, making decisions, and implementing the TWRS mission becomes very difficult.

Results from the IDMMS mission analysis concluded that an integrated computer simulation and information system is required to analyze and model TWRS cost, schedule, technical performance, environmental impact, and public and worker health and safety in an efficient, consistent, repeatable, verified, and validated manner. WHC has contracted Stone and Webster Advanced Systems Development Services, Inc. (SWASDS) to develop a data integration software system (TWRView) to be used within the IDMMS.

Menus	Navigation / Views	Form	Description	Sources	TWRSview to IDMS Links	IDMS to TWRSview Links	Comments
	Technical Base-Line Evolution	Model	Select Technical Baseline Component				
Function	Alt. Arch. Schematic						
Description	Alt. Arch. Schematic	Text	Choose function definition to view from pop-up box listing functions performed by architecture component	RMACS			Concepts initiated in TWRSview prototype
Hierarchy	Alt. Arch. Schematic	IDMS Interface	Display dialogue box to select function name for IDMS interface	IDMS	Send message to IDMS to bring up functional hierarchy at selected function	Display dialogue box when message received from IDMS functional views to look at Arch. Synthesis	
Architecture	Alt. Arch. Schematic						
Description	Alt. Arch. Schematic	Text	Display architecture definition for selected architecture component	RMACS			Concepts initiated in TWRSview prototype
Hierarchy	Alt. Arch. Schematic	IDMS Interface		IDMS	Send message to IDMS to bring up architectural hierarchy at selected function	Display dialogue box when message received from IDMS architectural views to look at Arch. Synthesis	
Cost/Sched.	Alt. Arch. Schematic						Concepts initiated in TWRSview prototype
Schedule	Alt. Arch. Schematic	Image	Display schedule for architecture component selected	Primavera			Concepts initiated in TWRSview prototype
Cost	Alt. Arch. Schematic	Data	Display dialogue to select cost data to display	Primavera			Concepts initiated in TWRSview prototype
Logic	Alt. Arch. Schematic	Image	Display schedule logic diagram for architecture component selected	Primavera			Concepts initiated in TWRSview prototype
Activities	Alt. Arch. Schematic	Data	Display dialogue to select activity data to display	Primavera			Concepts initiated in TWRSview prototype
Schedule Integ.	Conceptual Arch. Schem.	Text	View schedule integration activities for the decision	EP-0786, RMACS			Concepts initiated in TWRSview prototype
Supplemental	Conceptual Arch. Schem.	Text	View supplemental information related to the decision	EP-0786, RMACS			Concepts initiated in TWRSview prototype
Decision Criteria	Conceptual Arch. Schem.	Text	View decision criteria for making decision	EP-0786, RMACS			Concepts initiated in TWRSview prototype

1.1 PURPOSE

The purpose of this document is to define the essential requirements of the TWRSview software. This Software Requirements Specification (SRS) provides to the TWRSview developers a concise definition of the system software requirements. By emphasizing functions to be performed, rather than system architecture, the SRS will not be restrictive and will allow maximum flexibility during system design.

Contents of this guideline follows the guidance contained in WHC-CM-3-10, Software Management Practices.

1.2 SCOPE

The scope of the TWRSview project is to provide a software system that will interface with IDMMS to aid in integrating data related to the TWRS technical baseline. The delivered software system shall schematically model the conceptual TWRS architecture. The software system shall integrate TWRS program data by accessing the data from its storage location(s) and associating the data to the modeled components of the TWRS architecture. The integrated information shall be accessible through a graphical user interface (GUI) utilizing mouse point and click functionality.

1.3 OVERVIEW

TWRS Technical Integration has felt for some time that the need for an application such as TWRSview is necessary. To confirm or negate this feeling, in January through March of 1995, contractors working for TWRS Technical Integration interviewed select systems analysts, TWRS Engineering Organization modelers and senior management. The purpose of these interviews were to derive requirements for managing information and implications for Technical Integration tools. Many interviewees felt that they have an enormous amount of data but no useable information. Meaning that the data is not summarized, organized or made easily available in a usable fashion. TWRSview is being developed to integrate and present the data to the Program in a meaningful context to support the technical baseline integration efforts.

TWRSview is an expansion of the concept developed and known as TANKview. TANKview was a small scale demonstration model used for Tank Farm upgrades. TANKview did not evolve to a production application.

TWRS Technical Integration has engaged the SWASDS to create a prototype application of TWRSview. The initial prototype was delivered September 25, 1995 and installed on a Technical Integration general purpose server for evaluation.

Prototyping is being used as a tool for requirements gathering. TWRS Technical Integration has contracted with SWASDS for Fiscal Year 1996 to build on the prototype with various functions that will be described in the functional requirements section.

Menus	Navigation / Views	Form	Description	Sources	TWRSView to IDMS Links	IDMS to TWRSView Links	Comments
	Technical Base-Line Evolution	Model	Select Technical Baseline Component				
Decisions...	Conceptual Arch. Schem.	Dialogue	Display dialogue to view from document sources or RMACS source	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Decision	Conceptual Arch. Schem.	Text	View decision	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Decision Date	Conceptual Arch. Schem.	Text	View decision date	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Description	Conceptual Arch. Schem.	Text	View description of the decision	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Risks	Conceptual Arch. Schem.	Text	View risks associated with the decision	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Pub. Involvement	Conceptual Arch. Schem.	Text	View public involvement plan for the decision	EP-0687, RMACS			Concepts initiated in TWRSView prototype
Alternatives...	Alt. Arch. Schematic	Model	Display dialogue to select from the different alternatives analyzed and display appropriate model.	H2 Drawings, Models			
Description...	Alt. Arch. Schematic	Dialogue	Display dialogue to select description type below and source	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Assumptions	Alt. Arch. Schematic	Text	Display compilation of assumptions for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Developments	Alt. Arch. Schematic	Text	Display compilation of developments for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Materials	Alt. Arch. Schematic	Text	Display compilation of materials for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Operational	Alt. Arch. Schematic	Text	Display compilation of operational scenarios for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Process	Alt. Arch. Schematic	Text	Display compilation of process descriptions for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype
Technologies	Alt. Arch. Schematic	Text	Display compilation of technologies for architecture component selected	WM-TI-613, RMACS			Concepts initiated in TWRSView prototype

2.0 GENERAL DESCRIPTION

This section describes the general factors that affect the requirements specification for TWRSview.

2.1 PRODUCT PERSPECTIVE

TWRSview is built on the philosophy of providing information to management and the individuals who use technical integration data daily. The intent is to get data from the various data sources and present it to management in a meaningful context to enable management to understand the integration of the data associated with the technical baseline. In this manner, TWRSview will present information to management so they may begin to make decisions and start driving the work needed to produce the type of information they require to perform their work. With this philosophy in mind, SWASDS developed the menu structure for TWRSview to present a story line to management. TWRSview is meant to be a query system not a processing application.

The software system, though developed specifically for the TWRS Program, will be generic enough to be applied toward data integration for the whole Hanford Site cleanup program.

TWRSview is to be accessible from IDMMS. IDMMS provides system engineers with a set of computer-based tools that can be used to produce consistent analytical results in support of TWRS decisions. The primary building blocks of IDMMS are simulation tools. These tools permit modeling of the tank waste through retrieval, characterization, treatment and final disposal. Simulation models range from generic to very detailed. The key to IDMMS is integration of existing and yet-to-be-developed tools and data. IDMMS is currently being developed internal to WHC by TWRS Technical Integration.

2.2 PRODUCT FUNCTIONS

TWRSview will be a multi-phased project, as described below.

The first phase, a prototype based on the physical and technical data, existing site conditions, clean-up strategies and baseline programs has been partially accomplished. Future deliverables will incorporate the Technical Integration Management Process and will be delivered in several phases. The future phases are intended to build on the TWRSview prototype by providing integration of information through all aspects of the system engineering process in developing the technical baseline. Technical baseline development includes:

- Formation of the mission analysis.
- System functions and requirements synthesis.
- System architecture synthesis.
- System trade study analysis.
- System testing and verification.
- Program schedule and cost definition.

Menus	Navigation / Views	Form	Description	Sources	TURSView to IDMS Links	IDMS to TURSView Links	Comments
	Technical Base-line Evolution	Model	Select Technical Baseline Component				
IDEF	Technical Base-line Evolution	IDMS interface	Display dialogue box to select function name for IDMS interface	IDMS	Send message to IDMS to bring up IDEF diagram at selected function	Display dialogue box when message received from IDEF view of IDMS to look at PER Synthesis	
N-Squared	Technical Base-line Evolution	IDMS interface	Display dialogue box to select function name for IDMS interface	IDMS	Send message to IDMS to bring up N-Squared diagram at selected function	Display dialogue box when message received from N-Squared view of IDMS to look at PER Synthesis	
Requirements	Technical Base-line Evolution	IDMS interface	Display dialogue box to select requirement name for IDMS interface	RMACS	Send message to bring up RMACS browser display for selected requirement	Display dialogue box when message received from requirement view of IDMS to look at PER Synthesis	
Issues	Technical Base-line Evolution	IDMS interface	Display dialogue box to select issue for IDMS interface	RMACS	Send message to bring up RMACS browser display for selected issue	Display dialogue box when message received from issues view of IDMS to look at PER Synthesis	
Required Analyses	Technical Base-line Evolution	IDMS interface	Display dialogue box to select required analysis for IDMS interface	RMACS	Send message to bring up RMACS browser display for selected required analysis	Display dialogue box when message received from required analysis view of IDMS to look at PER Synthesis	
Arch Synthesis	Conceptual Arch. Schem.	Model	When Arch Synthesis is selected, bring up a dialogue box to select program data base to query data from				
Procedure	Conceptual Arch. Schem.						
Alt. Generation	Conceptual Arch. Schem.	Text	View Alternative Generation and Selection procedure	Alternative Generation and Selection procedure			
Decision Mgmt	Conceptual Arch. Schem.	Text	View Decision Management procedure	Decision Management procedure			

Integration of the technical baseline developments include:

- Understanding of the TWRS behavior in terms of technology performance, cost, and schedule parameters.
- Assessing tradeoffs in the parameters.
- Communication of TWRS program information.
- TWRS baseline system verification.

2.3 USER CHARACTERISTICS

All users will require basic computer skills and knowledge of operating in a windows environment.

All users will receive basic TWRSview training before being provided access to any portion of the system. Primary users will be program managers that can benefit from the type of information contained in TWRSview. Engineers will need to be knowledgeable of TWRSview, as they are the source of much of the information to be supplied.

2.4 GENERAL CONSTRAINTS

TWRS Technical Integration has determined that TWRSview will be an approval designator Q.

2.5 ASSUMPTIONS AND DEPENDENCIES

SWASDS must be available to supply technical support for the duration of development and initial implementation. TWRS Technical Integration will assume responsibility for the software and maintenance after implementation. In the event that SWASDS is unable to provide technical support, other resources will be identified and pursued to complete the task.

STONEview¹ software licenses must be obtained. STONEview is a product developed and owned by the SWASDS. SWASDS will supply an initial set of individual user licenses.

A file server must be available and compatible. The prototype of TWRSview will be installed on a general purpose Hanford Local Area Network (HLAN) server. Final implementation will need to be on an application file server, although one has not been identified.

The data supporting TWRSview will be growing as more functions and requirements are defined for individual TWRS program elements. Therefore, it is important for configuration management of data source information to occur.

¹STONEview is a trademark of Stone and Webster Advanced Systems Development Services, Inc.

Menus	Navigation / Views	Form	Description	Sources	TMRSSView to IDMS Links	IDMS to TMRSSView Links	Comments
	Technical Base-line Evolution	Model	Select Technical Baseline Component				
Cost Estimates	Scope Diagram	Text	View cost estimates of selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TMRSSView prototype
Interfaces	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines to identify system interfaces				
Report	Mission Analysis Schematic	Text	Choose text of system interface topics to view	mission analysis reports			
Miss. Level Reqmts	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines to identify mission level requirements				
Report	Mission Analysis Schematic	Text	Choose text of mission level requirement topics to view	mission analysis reports			
System Life Cycle	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines to capture system life cycle				
Report	Mission Analysis Schematic	Text	Choose text of system life cycle topics to view	mission analysis reports			
F&R Synthesis	Technical Base-line Evolution	Model	When F&R Synthesis is selected, bring up a dialogue box to select program database to query data from				
Procedure	Technical Base-line Evolution	Text	View Functions and Requirements Analysis and Allocation procedure	Functions and Requirements Analysis and Allocation procedure			
Functions	Technical Base-line Evolution						
Hierarchy	Technical Base-line Evolution	IDMS interface	Display dialogue box to select function name for IDMS interface	IDMS	Send message to IDMS to bring up functional hierarchy view at selected function	Display dialogue box when message received from functional hierarchy view of IDMS to look at F&R Synthesis	

Boeing's Information Systems Definition (ISD) work effort intends to help support this long range dependency.

System owners of the data sources must also buy-in and agree to support the interfacing and/or supplying of the information. If the buy-in and support from systems owners is not accomplished then the integrity of the data will be questionable.

3.0 SPECIFIC REQUIREMENTS

The TWRSview product is a view only application. It is intended to be a tool to provide program managers with enough information to begin making decisions based on mission needs.

3.1 FUNCTIONAL REQUIREMENTS

This portion of the SRS describes the functional requirements for TWRSview. Sections are logically separated based on the functions to be performed to show integration in each part of the technical baseline development. Appendix A provides guidelines for what to include in the menu structures for TWRSview to satisfy the functional requirements identified below.

Inputs accessed by TWRSview will be addressed via tables, describing the data source, methods anticipated of populating the database for implementation and future plans to access the data. Outputs are addressed as a separate section due to TWRSview being a view only application.

3.1.1 Mission Analysis Formulation

SWASDS will create models based on information supplied from TWRS Technical Integration. These models will be used to navigate through information related to a system's mission analysis. Functions performed from the mission analysis models include:

- display the mission analysis procedure
- view guidelines for preparing specific portions of the mission analysis
- view the specific definition for each portion of the mission analysis
- display images of the system boundary diagrams for systems being analyzed
- query and display appropriate text and/or data from mission analysis for key mission analysis components (i.e., mission definition, initial unacceptable conditions, acceptable end states, system

Menus	Navigation / Views	Form	Description	Sources	TWRSview to IDWMS Links	IDWMS to TWRSview Links	Comments
	Technical Base-line Evolution	Model	Select Technical Baseline Component				
Locate...	Site/Facility Schematics	Dialogue	Dialogue to select from list of contaminants to locate				Concepts initiated in TWRSview prototype
Hazards...	Site/Facility Schematics	Data	Dialogue to select hazard types to query on	tank waste monthly summary report, capsules database, IRAP database, TRAC			Concepts initiated in TWRSview prototype
Ground...	Site/Facility Schematics		Display dialogue for retrieving ground contaminants data				Concepts initiated in TWRSview prototype
Water...	Site/Facility Schematics		Display dialogue for retrieving water contaminants data				Concepts initiated in TWRSview prototype
End States	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines to identify acceptable system end states				
Report	Mission Analysis Schematic	Text	Choose text of acceptable end state topics to view	mission analysis reports			
Strategies	Scope Diagram	Model	Select strategy from pop-up list box	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Scope	Scope Diagram	Text	View scope of selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Risks	Scope Diagram	Text	View risks of selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Benefits	Scope Diagram			risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Summary	Scope Diagram	Text	View summary of selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Land Use	Site/Facility Maps	Model	View land use model for selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype
Milestones	Scope Diagram	Text	View milestones for selected strategy	risk based approach to Hanford site cleanup document			Concepts initiated in TWRSview prototype

boundaries and external interfaces, mission level requirements, and system life cycle)

- provide capability to add results from new mission analyses to the developed query structure
- provide capability to readily update mission analysis models and maintain database links.

3.1.2 System Functions and Requirements Synthesis

Systems functions and requirements synthesis is performed using the TWRS Technical Integration Requirements Management and Assured Compliance System (RMACS). The software system shall interface with one of the RMACS tools (a client/server relational database information system) to graphically depict requirements allocation to the functions defined in the RMACS. To accomplish this task TWRSview should:

- provide communication links between TWRSview and IDMMS
- provide a database structure that can be updated to provide additional relationships between IDMMS views and TWRSview models which is used to produce the communication links
- provide menu functions to perform the following:
 - display the Functions and Requirements Analysis and Allocation procedure
 - display results from functional analysis (i.e., function decomposition and function definition). This will primarily be accomplished through communication links with IDMMS
 - display results from requirements analysis showing requirements development, requirements allocation, and requirements validation. Requirements development and allocation comes from RMACS and IDMMS communication links. Requirements validation is provided by results from parametric studies, analysis, or simulation.

3.1.3 System Architecture Synthesis

SWASDS will create models of the system architectures defined by TWRS Technical Integration that will carry out the synthesized functions. The system architectures will be provided in the form of Computer-aided Design (CAD) generated flowsheets, drawings, and graphics in multiple formats. The models created within the software system shall provide traceability of functions and requirements allocation to architecture components. Traceability of functions and requirements allocation shall be accomplished through mouse point and click functions on the modeled architecture components.

Menus	Navigation / Views	Form	Description	Sources	TWRSView to IDWMS Links	IDWMS to TWRSView Links	Comments
	Technical Baseline Evolution	Model	Select Technical Baseline Component				
Mission Analysis	Mission Analysis Schematic	Model	When Mission Analysis is selected, bring up a dialogue box to select program database to query data from				
Procedure	Mission Analysis Schematic	Text	View mission analysis procedure	mission analysis procedure			
Mission Definition	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines for Mission Definition preparation				
Boundary Diagram	Mission Analysis Schematic	Image	View image of system boundary diagram	mission analysis reports			
Report	Mission Analysis Schematic	Dialogue	Choose text of mission definition topics to view	mission analysis reports			
Initial Conditions	Mission Analysis Schematic						
Guidelines	Mission Analysis Schematic	Text	View guidelines to capture system initial conditions				
Report	Mission Analysis Schematic	Text	Choose text of initial condition topics to view	mission analysis reports			
Site...	Site/Facility Schematics	Model	Display model related to Program and mission level selected.				Concepts initiated in TWRSView prototype
Configuration	Site/Facility Schematics						Concepts initiated in TWRSView prototype
Locate...	Site/Facility Schematics	Dialogue	Dialogue to select from list of facilities to locate and highlight on the model	Transfer Line Database			Concepts initiated in TWRSView prototype
Describe	Site/Facility Schematics	Text	View description of facility selected				Concepts initiated in TWRSView prototype
Scaled Map	Site/Facility Schematics	Model	Display model of scaled map for the area selected				Concepts initiated in TWRSView prototype
Picture	Site/Facility Schematics	Image	Display photo image of facility selected				Concepts initiated in TWRSView prototype
Contaminants	Site/Facility Schematics						Concepts initiated in TWRSView prototype

Specific functions to be performed include:

- display alternative generation and selection procedure
- display decision management procedure
- display decisions required for the program resulting from the functional analysis
- display alternatives generated to satisfy the functions, requirements, and performance measures. Alternatives may be displayed in a number of ways including textual, image, or CAD drawings of conceptual system configuration
- display decision criteria for selecting alternative
- provide capability to add additional decisions and alternative architecture selections into the defined database structures for the software system
- provide capability to update architecture models and maintain database links.

3.1.4 System Trade Studies Analysis

The software system shall provide traceability of trade study analyses to the system architecture. Views of alternative system architectures evaluated in the trade studies shall be provided. The software system shall access trade study analyses data from the database sources and integrate the data through mouse point and click functionality in the system architecture models. System trade studies include risk analysis, decision analysis, cost and schedule analysis, and process simulation.

Trade studies encompass results from multiple analysis. Therefore, the software system structure shall be designed and constructed in such a manner to capture trade study data for a given decision statement in a consistent database structure such that results from new analysis for the trade study may be added without redesign or redevelopment of the software. The software system shall have the capabilities to select from the multiple trade study analyses to assess the results from a particular analysis or compare results between two or more analyses.

Specific functions provided by the software system to show traceability of trade study analyses include:

- query capability to select among the various analyses for a particular decision
- query and display results from analysis
- run trade analysis models that have been set up for access to users

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- provide capability to add additional trade study analyses into the defined database structures for the software system
- provide capability to update trade study models and maintain database links.

3.1.5 System Testing and Verification

The software system shall integrate testing and verification data for the system architecture to the system models. Traceability to system technical performance measures and verification data shall be provided. Specific functions provided by the software system to show traceability include:

- display technical performance measures for system being tested
- query and display testing and verification results
- provide capability to add additional testing and verification results into the defined database structures for the software system.

3.1.6 Program Schedule and Cost Definition Section

The software system shall provide traceability between the system technical baseline development and the program management baseline. The software system shall access the program baseline schedule and cost database data. Traceability to the system technical baseline will be accomplished with mouse point and click functionality in the system architecture models. The software system shall also provide functionality to show effects to the program or technical baseline caused by changing program or technical bases.

3.1.7 Inputs

Below are the known sources of inputs for the prototype of TWRSview. This is not a complete list and will be expanded to include other sources prior to implementation. The first column, data sources, is the known source of information. The second column, implementation, is the anticipated method of populating the database for initial implementation. The third column, future, is the anticipated method of accessing the data in the future.

Data Source	Implementation	Future
"Waste Tank Summary Report"	spreadsheet format, manipulated and uploaded	electronic access

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Data Source	Implementation	Future
CAPSULES Database	updated quarterly DBase ¹ copy to TWRSview area	same
Normalized TRAC	spreadsheet format and im- ported	direct link with Tank Characterization Database
"Development of a Risk- Based Approach to Hanford Site Cleanup" DRAFT	WordPerfect ² format copy to TWRSview area	same
ARENA models	ascii text and import	same
ASPEN models	ascii text and import	same
WHC-SD-WM-TI-613 "TWRS Process Flowsheet"	WordPerfect format copy to TWRSview area	SGML converted format
WHC-EP-0856 "Tank Waste Remediation System Operational Scenario"	WordPerfect format periodic copy to TWRSview area	same
RMACS "Requirements Manage- ment and Assured Com- pliance System"	directly access via Microsoft Access	same
P3 "TWRS program cost and schedule information"	spreadsheet format and graphics, copy to TWRSview area	Link into PMCS
OWVP "Operational Waste Vol- ume Projection"	WordPerfect and graphics, scanned image file loaded to TWRSview area	May be replaced and will evaluate direct link
Flowsheets "CAD drawings"	copy to TWRSview area	direct link if drawings can be standardized
IRAP "Integrated Risk Assessment Program"	Paradox ³ format copied to TWRSview area	direct link if firewall issue can be overcome

¹DBase is a trademark of Ashton-Tate.

²WordPerfect is a trademark of WordPerfect Corporation.

³Paradox is a trademark of Borland International.

Access to the data on the file server will be password protected to guard against unauthorized access.

4.0 REFERENCES

- Johnson, M. E., 1994, *Tank Waste Remediation Systems Decision and Risk Assessment*, WHC-EP-0786, Westinghouse Hanford Company, Richland, Washington.
- Johnson, M. E., 1995, *Tank Waste Remediation System Operational Scenario*, WHC-EP-0856, Westinghouse Hanford Company, Richland Washington.
- Orme, R. M., 1995, *TWRS Process Flowsheet*, WHC-SD-WM-TI-613, REV 1, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-3-10, *Software Practices*, Westinghouse Hanford Company, Richland, Washington.

Data Source	Implementation	Future
WHC-EP-0786 "System Decision and Risk Assessment"	ascii text and import	direct link by storing in RMACS
KE/PT&C Excel	copy to TWRSview area	direct link

3.1.8 Outputs

Outputs to be provided are as follows:

- provide capability to print text file being displayed
- provide capability to print complete image file being displayed
- image viewing functionality shall include zoom, zoom area, refresh, and pan
- text viewer shall provide functionality to copy full text or selected text to the windows clipboard or into a text file that can be read by a word processor such as WordPerfect or Microsoft Word¹.
- image viewer shall provide functionality for user to copy image file to user defined destination
- export results of queries to another file or print
- data source references will be identified either in data queries or results of data queries.

3.2 EXTERNAL INTERFACE REQUIREMENTS

3.2.1 User Interfaces

A graphical user interface will be used to allow users to view the information specified in the functional requirements section. The GUI will provide a means to access and view the information on a personal computer by using a mouse point and click function. The GUI shall provide hierarchial views of the physical components that make up the TWRS baseline system. From each of these views, the user shall be able to access the TWRS program data identified in the functional requirements section associated with the system component.

The underlying data structure used by the GUI to show the information integration must be dynamic to allow changes for carrying out various "what-if" scenarios. TWRS Technical Integration source data may reside in multiple

¹Microsoft Word is a trademark of Microsoft Corporation.

1. Introduction

The introduction provides a general description of the software system. The purpose of the introduction is to provide users with an overview of the functions performed by the system and how the system operates.

2. Preliminary Design

This section lists the forms, libraries, and tables used in developing the software system.

3. Detail Design

This section of the SDD describes each form, method, and library used in the database administration section of the software system. The following items are suggested to describe each component:

- Input/Output data elements
- Local data elements
- Error handling
- Logic flow
- Local database structures
- External database query design structure
- Dialogue design structure
- Data, text and graphic display structures
- TWRSview installation scripts
- Integration of new data into the models (minor maintenance data changes, etc.)

4. References

3.6.9 Training

SWASDS shall provide two (2) days of training on SWASDS's delivered software system directly after each phase. This training shall be provided to TWRS Technical Integration's personnel at TWRS Technical Integration's work site.

Future training to users will be provided by TWRS Technical Integration. TWRS Technical Integration will supply Points of Contact within their organization for question/answers pertaining to the use of TWRSview.

3.6.10 Security and Privacy

Distribution of access to the TWRSview application and the number of users allowed will be controlled by TWRS Technical Integration. The data viewed via the application is not of a private nature. Therefore, there is not the need to have userid/password control beyond the HLAN signon.

sources and on different computers. SWASDS's software system shall be able to connect to the individual data sources so that when changes are made by the data owner, the effects to the TWRS program can be displayed through the GUI.

3.2.2 Hardware Interfaces

The software system shall be deployed over HLAN. SWASDS will provide support to access database information and display information using the Hanford computer network.

SWASDS shall work with TWRS Technical Integration to develop installation scripts so that user's can install the software system on their PCs and set up file directory paths.

Subject to the security, copyright, and/or software license agreements, the TWRS Technical Integration will also provide HLAN environment and database connection information to include the following:

1. HLAN software and protocol
2. Database servers:
 - a. Hardware
 - b. Operating System
 - c. Database software and version
 - d. Database Dynamic Link Libraries
 - e. Database address for each pertinent data
3. File Servers
 - a. File address for each pertinent data file

The software system for modeling the TWRS baseline system shall be capable of running under Microsoft Windows¹ on IBM compatible personal computers.

3.2.3 Software Interfaces

The software system shall access information not residing within the 3-D modeling environment (e.g., RMACS data, tank waste inventory data, etc.).

SWASDS's software system shall be compatible for executing within the IDMMS computing environment developed by TWRS Technical Integration. Database structures developed by SWASDS to complete this task shall be commensurate with the IDMMS data structure, provided by TWRS Technical Integration, to allow software hooks into SWASDS's database(s) for querying and filtering data. Communication links between SWASDS's software system and TWRS Technical

¹Microsoft Windows is a trademark of Microsoft Corporation.

3.6.5 Audit

The user interaction with TWRSview will involve queries against read-only files. The components of TWRSview will be protected from unauthorized change. No tracing or logging will be necessary.

3.6.6 Transferability

This system has the potential to be used for a variety of purposes. Coordination with PNL should occur to reduce the likelihood of duplication of services.

3.6.7 Conversion

Prototype implementation of TWRSview may include some conversion routines to load data for purposes of demonstration to management.

Production implementation will include the use of conversion routines for portions of the data.

Future enhancements will include dynamically linking to the applications that currently have a static interface with TWRSview. TWRS Technical Integration intend to work with the system owners of these applications to reach a common goal of dynamically linking the applications.

3.6.8 Documentation

Documents that will be provided by TWRS Technical Integration as part of the IDMMMS project covering TWRSview are:

- Project Plan
- Test and Acceptance Plan
- User Guide

TWRSview specific documents to be provided by TWRS Technical Integration are:

- Software Requirements Specification
- Discrepancy reporting

SWASDS will provide the following documents:

- System Design Description

The System Design Description (SDD) shall provide information necessary for TWRS Technical Integration to perform verification of SWASDS's software. The System Design Description will contain the following types of information:

Integration's IDMMMS shall be developed jointly between TWRS Technical Integration and SWASDS.

3.2.4 Communication Interfaces

The software system must be adaptable to running on HLAN and the PNL network.

3.3 PERFORMANCE REQUIREMENTS

The TWRSview system will be a multi-user system. Initial TWRSview use will be limited to 20 concurrent users.

The application is intended to support many more users over time and the design will need to be scalable to accomplish this long term goal.

3.3.1 Readability

Graphics shall be clearly visible and readable on a 15 inch monitor with options to enlarge or decrease the size of the particular view. For all views, a sizing option will be made available on each screen.

3.3.2 Response Times

Graphic views shall take less than 15 seconds to display for 95 percent of the time. Data queries will complete within 1 minute for 95 percent of the queries requested. These required response times are based on a user accessing TWRSview via a standard 486/33 workstation with 8 megabytes of memory.

If a lower end machine is utilized response times may decrease. Also, the amount of other applications opened may decrease response time. For further information of recommended workstation configuration, see Section 3.4.2.

When the TWRSview application is processing a query or retrieving files, it must be clearly visible to the user that it is processing and is not ready to accept keyboard input.

3.4 DESIGN CONSTRAINTS

3.4.1 Standards Compliance

Workstations accessing TWRSview will be configured with the site standard End System Operating Environment (ESOE) configuration. ESOE is not a requirement for operation of TWRSview, but is a site standard for Hanford.

This section outlines other general requirements that do not fit any of the categories previously addressed. Because of their unique nature, these requirements will be addressed in separate categories.

3.6.1 Data

TWRSview is a host based repository of data from multiple sources. The initial implementation will be to copy many sources of information in a manual mode. The goal is to directly access as many input sources as possible. The databases should be formatted such that STONEview can readily access the information. As the data sources grow, it will become necessary to have a directory of where information resides.

There are a variety of data types, including documents, models, images and factual data. TWRSview is intended to be adaptable to various data types and to be structured so expansion is easily accomplished.

At a minimum on implementation, the TWRSview file server must have 500 megabytes of disk space available. User workstations must have 10 - 15 megabytes of disk space available.

3.6.2 Operations

The TWRSview server(s) will be maintained in a manner similar to all HLAN servers. A complete backup will be done weekly, supplemented by nightly backups of the changed data. If special maintenance activities are necessary, the users will be notified before the downtime occurs.

3.6.3 Site Adaptation

TWRSview is targeted for the Tank Waste Remediation Program currently, which will begin with a small user base.

In the future, TWRSview will be expanded to include other Hanford Site programs. All information will be included in the same application with menu options to select a specific program.

3.6.4 Reliability and Recovery

If the system fails, the users will not lose any data, as TWRSview is read only information. The only consequence will be unavailability for the duration of the down-time.

If there is an extreme system crash, which may include damage to the data storage device, it may be necessary to restore from backup. Network Operations will supply backups to the data.

The data supporting the TWRSview application will reside on a file server with standard file server configuration. The application will generally reside on the users local hard drive.

A presentation will be made to the HANTAG board in regards to TWRSview as an application to run in a production environment. HANTAG's interests are in introducing new technologies used, how the application will integrate with the current environment, as well as a forum to ask questions and/or to raise issues and concerns.

A presentation will be made to the HANTRB board to request support on nightly backups, file server maintenance, and HLAN support. HANTRB is a board that should be approached within a few months of implementation.

3.4.2 Resource Limitations

Currently STONEview does not have a network license option. The licenses are for specific individual users. In the future, a network license managing capability, such as software metering, should be pursued for the network environment.

As a minimum, users need to have an IBM compatible 486/33 workstation configured with 8 megabytes of memory. Frequent users of TWRSview are recommended to have 16 megabytes of memory.

3.5 ATTRIBUTES

3.5.1 Availability

The TWRSview system shall be available for users access from 6:00 am to 8:00 pm, seven days a week. It is understood that downtime for maintenance, backups, and support will be necessary. This downtime should be kept to a minimum (preferably less than 10%). Users will be notified prior to scheduled downtime.

3.5.2 Maintenance

During software development SWASDS will be the custodians of the software and code. After implementation, TWRS Technical Integration will take ownership of the software and code.

During construction and after implementation, TWRS Technical Integration will be the custodians of the databases.

Network Telecommunications will have ownership of file server hardware maintenance.

3.5.3 Compatibility

The TWRSview application is developed using STONEview software. The software must be compatible with the IDMMS and network environment. For further information, refer to Software Interfaces, Section 3.2.1.

3.5.4 Data Integrity

With the installation of TWRSview on a users workstation, some files are downloaded to the local hard disk. Periodically these files may become outdated. SWASDS will provide version checking such that when a user accesses TWRSview, they will be assured that if the files on the local hard disk are not the same as the server files, then the application will download the new files.

For long term data integrity to be intact, TWRS Technical Integration must work together with the interface application owners to dynamically link with the data sources. The data sources must also be pedigreed to ensure the most recent valid information is accessible.

3.5.5 Ease of Use

The TWRSview system will provide functions to allow easy access and utilization of the system. The following capabilities will be provided to allow the system to be more intuitive (user friendly):

- Menu Driven Menus will be provided for user interface with the system
- Print Options An option to print various information described in the output section
- Queries There will be speedy results for queries
- Help Messages Informational messages will be provided to define or describe the purpose of each screen and provide status information pertaining to current operations
- Error Messages Error messages will be provided that will be unique and meaningful to each specific error. They will aid the user in recovering from error situations that might occur while reporting data
- Mouse Functions The majority of the functions performed will be via mouse point and click on either the tool bar or a highlighted area

3.6 OTHER REQUIREMENTS