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7. Abstract The FY95 Work Plan for TMACS and CASS Software Projects describes the activities planned for the current fiscal year. This plan replaces WHC-SD-WM-SDP-008. The TMACS project schedule is included in the TWRS Integrated Schedule.		
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FY95 SOFTWARE PROJECT MANAGEMENT PLAN:
TMACS, CASS COMPUTER SYSTEMS

Dave Spurling
TMACS/CASS Software Project Manager

IRM Chemical & Waste
Management Software Support

November 11, 1994

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1.0 INTRODUCTION

1.1 Purpose

This work plan explains the activities for the Tank Monitor and Control System (TMACS) and Computer Automated Surveillance System (CASS) Central Facility software projects for FY95, and identifies activities planned for the following years. TMACS and CASS are Approval Designator (Impact Level) Q projects.

1.2 Scope and Vision

This plan focuses on the TMACS and CASS "computer" systems in the 2750E building, and not the instrument installation activities in the 200 Areas. (The broader definitions of TMACS and CASS include both the computer systems and field instrumentation. See WHC-SD-WM-WP-132 for a description of the overall systems.) The TMACS and CASS projects provide the data needed for many of the centralized surveillance activities.

The vision of the TMACS Software Project is to provide a central computer facility capable of monitoring all instruments and providing distributed control within the 200 Area tank farms, graphically displaying those instruments and their statuses, trending the instrument readings over a 30 day period, and passing the readings to the Surveillance Analysis Computer System, or SACS, database for long-term analysis and storage (see SACS description, Section 1.3). This capability will allow WHC to meet its monitoring requirements in a cost effective manner, improve its ALARA conditions, and minimize the potential for unsafe tank farm conditions.

The vision of the CASS Central Facility software project is to provide limited software enhancements and support until CASS functions can be migrated to TMACS and SACS.

1.3 Overview

WHC Instrumentation & Electrical Upgrades (I&EU) designed TMACS in response to recommendations from the Defense Nuclear Facilities Safety Board for improved monitoring of waste tank temperatures in the ferrocyanide tanks. The original TMACS system was comprised of 120 thermocouples in the BY tank farm connected to 9 Acromag stations, communicating over a phone line modem to a Compaq-386 computer in the CASS Room (2750E, room B-105).

During this development, IRM Chemical & Waste Management Software Support (C&WMSS) was funded to develop a more powerful, UNIX-based system to replace the first TMACS computers and allow expansion to several thousand points using multiple vendors' I-O stations. The

TMACS Software Upgrade Project, as it was called, was approved and installed in January 1993.

TMACS development has continued since that time to address monitoring upgrades in the non-ferrocyanide tanks, which include certain CASS retirement activities. These activities are coordinated through I&EU, with input from Tank Farm Operations, WHC Major Maintenance, IRM, and other WHC Tank Waste Remediation System (TWRS) organizations.

The CASS computer system was installed in 1976 to monitor tank parameters such as level, temperature and gas/liquid leak detection, and to analyze drywell and Liquid Observation Well (LOW) gamma and neutron detector readings. The CASS Central Facility software runs on two Data General MV10000 minicomputers in a real time multi-processing, multi-user software environment. Roughly 65,000 lines of FORTRAN code are maintained in-house that control functions such as instrument polling, processing, alarming, and reporting.

The SACS software project, is managed by IRM C&WMSS (ref. WHC-SD-WM-SDP-006 Rev 2, SACS FY95 Software Project Management Plan). Its mission is to provide a database of tank temperatures, surface levels, interstitial liquid levels, liquid observation well loggings (both gross-gamma and spectral-gamma), and to provide long-term data retention of all TMACS analog readings. Other development activities considered for SACS include adding new instrument readings, including pressure, gas concentration and drywell loggings.

1.4 Strategy

1.4.1 TMACS Development

TMACS software development is based on off-the-shelf SCADA (Supervisory Control And Data Acquisition) software, which performs standard monitoring and control functions on a user-defined data set. The G2 Real-Time Expert System[®] (Gensym Corporation, Cambridge, MA) software selected for use on TMACS has a more advanced software environment than the typical SCADA system. Its rules processing capability allows the software to be tailored to meet the (Hanford) business rules, its object oriented database allows new instrument connections to be cloned and adapted from existing connections, and its data passing ability between G2 and custom written software drivers allows for connections to multiple vendors' I-O controllers. These capabilities allow the software to be developed in an efficient and timely manner, in order to satisfy the customer needs described in the following paragraphs.

The TMACS software project primarily supports the Tank Farm Instrumentation Upgrade Plan (WHC-SD-WM-WP-132), which is scheduled to install nearly 1,000 new instrument connections in FY95, and more connections in FY96 when the Upgrade Plan is scheduled for completion. The new connections include new types of sensors and I-O controllers, which must be designed and programmed into the TMACS software. This plan includes some replacement of the CASS instrumentation. Final retirement of CASS is not expected by the FY96 completion date (see CASS Retirement below).

As a production system, TMACS receives Change Requests to provide new software functions and provide 24-hour surveillance in other facilities. These requests are prioritized and included in the TMACS release schedules. (see Sections 1.5 and 1.6) Problem tracking is also administered on TMACS and CASS through System Problem Reports. FY95 plans are to reduce the number of outstanding defects from 15 to 10 and resolve 65% of the new defects reported.

As a management tool, TMACS is being developed to satisfy several Surveillance, Safety and Conduct of Operations requirements. By addressing multiple requirements in this system, TWRS organizations are able to gain a better understanding of tank behavior and improve their procedures from this knowledge. Where possible, TMACS is being integrated with SACS, which maintains up-to-date surveillance information such as manual readings and instrument limits. Other tools, such as on-line video display are being considered to better integrate available information.

Future projects, including W-314A and DACS-2 are considering TMACS as an cost-effective alternative to procured turn-key systems. TMACS development is being planned in such a way as to support or provide the monitoring and control functions for these projects. A listing of known project interfaces is provided in Appendix C.

1.4.2 CASS Retirement

The capability of TMACS and SACS to replace the CASS Central Facility hardware and software has been accepted and included in the Tank Farm Instrumentation And Data Acquisition/Management Upgrade Plan. The plan for migrating real-time instrument (temperature, alarm and liquid level) processing to TMACS is being coordinated with WHC Instrument & Electrical Upgrades. The plan for migrating drywell and LOW processing to SACS is being coordinated with Tank Farm Surveillance and SACS project management staff. Currently

no completion date has been assigned to either task. A description of the needed migration activities is described below. (Note: The decision to not connect CASS field equipment to the TMACS workstations, by writing a software driver to interface with the Central Micro, was made due to the unreliability and inaccuracy of CASS equipment, and because many of the CASS field drawings disagree with present conditions.)

- CASS/TMACS Migration

All of the real-time CASS instruments are planned for migration to TMACS. Appendix B identifies these instruments, which are broken into the following instrument types:

1.4.2.1 Temperatures. CASS temperatures are currently being migrated to TMACS by replacing or refurbishing the sensors and connecting them to Acromag I-O stations near each tank. These stations are networked within the tank farms and communicate with TMACS over dedicated phone lines. Currently, only four tanks in AP Farm are sending good readings to CASS. The rest of the readings are being taken by TMACS or recorded manually and entered into SACS.

Sixty-nine tanks are defined in the CASS temperature system; 10 of these (in SY and AN, Farms) are currently connected to TMACS, 47 (in A, AW, AX, S, SX and U) are scheduled for connection in FY95 and the last 12 (in AP, AY and AZ) are scheduled for FY96.

1.4.2.2 Level Detection. The CASS FIC (Food Instrument Corporation) level gauges are being replaced by the new Enraf model 854 displacement type level sensors. Currently 18 have been installed and 77 more are being scheduled for installation in FY95. These are being added on a tank-by-tank basis, with connection to TMACS being coordinated after installation. I&EU is adding these to future tank farm instrumentation designs, and WHC Plant Forces is coordinating connections to existing Acromag stations through the JCS process. Until TMACS receives these readings, the CASS software has been modified to accept manual entry of Enrafs and pass those values to SACS.

The Enraf devices are accurate to 0.04 inch, however, analog-to-digital, or A/D and subsequent D/A conversions between the sensor and the Acromag input modules reduce that accuracy to an estimated 0.1 inch. To correct this problem, plans are being made to install Enraf CIU stations, which communicate digitally. C&WMSS is currently writing a software driver to communicate with these stations. The first CIU is scheduled in AW Farm in FY95.

TMACS may need to provide manual data input capability for tanks not scheduled for connection and as a backup to electronic data in case of equipment failures. Operations is required to monitor many of the tank levels on a daily basis and review trends weekly. In addition to the primary waste tanks, other support tanks such as catch tanks and receiver tanks are currently monitored on CASS but not currently scheduled for migration to TMACS (see Appendix B).

1.4.2.3 Alarms. Alarm migration to TMACS is being performed through the Acromag digital I-O controller interface, which can process 16 signals per station, and the Panalarm Series 90 alarm interface, which can process several hundred alarms per station. Currently 12 Acromag alarms have been installed in the AN and SY farms, and 80 Panalarm signals have been configured in the TMACS software in the A Farm Complex and C Farm and being readied for connection in FY95. Panalarm upgrades are also being considered in the 242-S (58 alarms), 242-T (35 alarms), 241-U-271 (15) and 241-BY-271 (23) facilities. The remaining facilities, including several farms, receiver vaults, and the 242-A Evaporator, have not been planned.

1.4.2.4 Water Meters. Eight water meters are currently connected to CASS in the W-241-A, W-AX-AY-AZ, W-TGE-01, W-241-B, W-241-BY, W-271-CR, W-241-S, W-241-T, and W-241-U facilities. I&EU is currently studying ways to totalize these readings in the Acromag stations and pass total counts to TMACS. The first installation is planned in S/SX farm complex in FY95.

- CASS/SACS Migration

1.4.2.5 Liquid Observation Wells (LOWs). The LOW migration to SACS was scheduled to begin in FY94, however, priority changes and limited funding prevented this work from being performed. The SACS Configuration Control Board is responsible for rescheduling this activity.

SACS is currently storing the Interstitial Liquid Levels (ILLs) that are calculated on CASS using LOW data. The remaining functions to migrate include ILL calculation, plotting, reporting, storage and data transfer (see below).

1.4.2.6 Drywells. Plans to process drywell data on SACS are being reviewed. As a leak detection criteria, drywell data (from around the outside of the tanks) are of questionable value, however, in some tanks it is the best leak detection criteria available. WHC intends to install LOWs in all tanks where surface level monitoring is inadequate. This will eliminate the operational need for drywells and allow

transfer of this data to another organization such as WHC Geosciences. Since these ideas have not been formalized into a plan, SACS is continuing to consider drywell storage and processing as part of their migration activity.

1.4.2.7 Data Transfer. Transfer of drywell/LOW data from the drywell vans to SACS will require changes to the existing hardware and software. Currently these data are transmitted over the CASS substations to 2750E/B-107 using an in-house developed software protocol. The format of the data is a variation of Binary Coded Decimal.

To standardize the data format to ASCII and the transfer protocol to FTP or Kermit two changes are currently being worked. First, a "palmpad" computer interface is being developed by SNF Engineering Support to collect data from the current vans, convert the data to ASCII, connect to a dedicated phone line and transfer the data to CASS using Kermit. This project was started in FY94 but has not received FY95 funding. Second, new LOW vans are being procured by TWRS Characterization Equipment. C&WMSS is providing design requirements that the vendor has verbally accepted, to transmit the data to the SACS server using FTP.

- Other Retirement Activities

After the monitoring functions are retired from CASS, the CASS equipment, including the Data General computers, substation computers, and other field hardware will be ready to excess or redeploy. The Data General archive tapes will need to be transferred to another medium such as SACS or perhaps tape cartridges. This will require conversion of the file data from binary (used in the CASS database) to ASCII. Also the issue of relocating the TMACS operations facility should be considered. The TMACS computer equipment is very portable, and can operate in a reasonably maintained environment without special environmental considerations. Other uses for the current CASS computer room, such as being an HLAN control room, should be considered.

1.4.3 Hardware Strategy

The TMACS hardware procurement strategy has been to get the best UNIX workstations available (under CENRTC funding) that will meet the anticipated demands in the next two to three years. The workstations are assigned to the software engineers for testing and configuring, while the older, more reliable workstations are put to use on the production system.

The production hardware configuration uses two redundant Sun SPARC-2 workstations that are powered by a 30-minute charged battery backup unit. Each workstation performs separate software functions, however, if either workstation were to fail, the functioning workstation could be reconfigured to perform all of the hardware and software functions at a reduced speed. (Alternatively, one of the development SPARC-10 workstations could be substituted for the failed workstation.) Plans are being finalized to design and install a hardware/software configuration that would provide automatic takeover of a failed workstation by the surviving workstation. These plans will be documented in the FY95 Acquisition Plan.

Remote access to TMACS is planned for FY95 in the 242-A and 242-S Evaporator facilities. If time and funds are available, additional user terminals will be provided in the 272-AW and 272-WA Shift Offices. These will either be UNIX X-Window terminals or PCs running Microsoft® Windows™ and G2 Telewindows®.

The TMACS system architecture is expandable to allow multiple systems to be networked together. Should Tank Farm Operations require separate 200 East/West facilities in the future, new TMACS workstations can be installed and configured to provide distributed processing.

Future upgrades to the TMACS network are being planned to tie into the HLAN fiberoptic network upgrades. Dedicated fibers (in the 12-fiber bundle) are available for use by TMACS, should network traffic issues require this.

1.5 FY95 Deliverables

FY95 deliverables for CASS/TMACS were prepared with input from DOE, WHC I&EU, WHC Tank Farm Operations, WHC Surveillance/cognizant engineering and C&WMSS. These plans assume a combined CASS/SACS/ TMACS budget of \$1.5M. Section 5.0 organizes these deliverables into software releases and discusses potential impacts from funding limitations.

CASS Pre-Defined Deliverables:

CASS Deliverable Description	Driver	Milestone	Completion Date
A and C-Farm CASS alarm migration to TMACS. (FY94 carry-over)	Tank Farm Instrumentation Upgrade Plan	CASS Release 3.0	07/31/95
CASS manual liquid-level entry migration to SACS or TMACS. (FY94 carry-over)	CASS Retirement	CASS Release 3.0	07/31/95
Drywell/LOW processing: process "Quality Record" Data from vans.	QA Audit Resolution	CASS Release 3.0	07/31/95
Temperature monitoring and reporting software removed to allow for shutdown of CASS.	CASS Retirement	CASS Release 3.0	07/31/95
Liquid levels removed that have been replaced by TMACS, to allow for shutdown of CASS.	CASS Retirement	CASS Release 3.0	07/31/95
CASS alarm points removed that have been replaced by TMACS or are no longer required, to allow for shutdown of CASS.	CASS Retirement	CASS Release 3.0	07/31/95
Other Change Requests as needed by TF Operations.	Operator Requirement	CASS Release 3.0	07/31/95
Software to accept and process drywell data from new van computers.	Operator Requirement	CASS Release 3.0	07/31/95

TMACS Pre-Defined Deliverables:

TMACS Deliverable Description	Driver	Milestone	Completion Date
All possible instruments from tanks in the 241-SY, -U tank farms (19 tanks), including liquid level, temperature, pressure, % hydrogen, gas sample flow and discrete signals connected to TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan; CASS Retirement	TMACS Release 6.0	01/15/95
Software communications driver for new Enraf CIU Control Stations (provides direct connection to replace Acromag connection)	Level 1: OSD-T-151-00031: Surface-Level Resolution	TMACS Release 6.0	01/15/95
System performance improvements: - event-driven point processing.	Level 1: Operator & System Response	TMACS Release 6.0	01/15/95
System Defect backlog reduced to 65% of total as of Release 5.0.		TMACS Release 6.0	01/15/95
All Enrafs that are connected to the TMACS Acromag hardware during FY94 available through TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan	TMACS Release 7.0	05/15/95
All possible instruments from tanks in the 241-S/SX (FY94 carry-over), -A, and -AX tank farms (37 tanks), including liquid level, temperature, water flow and discrete signals connected to TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan; CASS Retirement	TMACS Release 7.0	05/15/95
Rate of change alarm processing function added.	Level 1: OSD-T-151-00031	TMACS Release 7.0	05/15/95
System performance improvements: Event driven point processing.	Level 1: Operator & System Response	TMACS Release 7.0	05/15/95
System Defect backlog reduced to 65% of total as of Release 6.0.		TMACS Release 7.0	05/15/95
All Enrafs that are connected to the TMACS Acromag hardware during FY95 available through TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan	TMACS Release 8.0	09/15/95
All possible instruments from tanks in the 241-AW (6 tanks), including temperature, % hydrogen, gas sample flow and discrete signals connected to TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan; CASS Retirement	TMACS Release 8.0	09/15/95
All Enrafs that are connected to the TMACS CIU hardware during FY95 available through TMACS.	Level 1: Tank Farm Instrumentation Upgrade Plan	TMACS Release 8.0	09/15/95
Remote TMACS user terminals at 242-A and 242-S evaporator facilities.	Level 1: Tank Farm Instrumentation Upgrade Plan	TMACS Release 8.0	09/15/95
System Defect backlog reduced to 65% of total as of Release 7.0.		TMACS Release 8.0	09/15/95

TMACS Deliverable Description	Driver	Milestone	Completion Date
Revisions to the following TMACS documents: Functional Requirements, Software Configuration Management Plan, Software Test Plan. (FY94 carry-over)	Level 1: QA Requirement	TMACS/CASS Software Project Management	09/30/95
TMACS Software Design Document - Initial Release. (FY94 carry-over)	Level 1: QA Requirement	TMACS/CASS Software Project Management	09/30/95
Releases of the following revised documents: - FY96 Software Project Management Plan; - FY96 Acquisition Plan;	Level 1: Project Management & QA Requirement	TMACS/CASS Software Project Management	09/30/95

TMACS Stretch Deliverables:

TMACS Stretch Deliverable Description	Driver	Milestone	Completion Date
Alarm set points uploaded daily from SACS.	Level 1: OSD-T-151-00031: Surface-Level Resolution	TMACS Release 6.0	01/15/95
Automatic temperature alarm distinction between waste and vapor space sensors.	Level 1: OSD-T-151-00031: Surface-Level Resolution	TMACS Release 6.0	01/15/95
System Defect backlog reduced to 45% of total as of Release 5.0.		TMACS Release 6.0	01/15/95
W-320 Project (C-106 Sluicing) monitoring implemented.	Level 1: W-320 Project	TMACS Release 7.0	05/15/95
Liquid Level/Temperature manual entry software function added.	Level 1: OSD-T-151-00031	TMACS Release 7.0	05/15/95
Installation of Sun SPARC-10 Workstations. (Assumes availability of CENRTC or lease funds)	Level 1: Operator & System Response	TMACS Release 7.0	05/15/95
System Defect backlog reduced to 45% of total as of Release 6.0.			
TMACS terminals at 272-AW and 272-WA Shift Offices.	Level 1: OSD-T-151-00031; CASS Retirement	TMACS Release 8.0	09/15/95
Exhauster fan monitoring software capable of recording system down-time and A/B unit run-time balance.	Level 1: WDOE Reporting Requirement; CASS Retirement	TMACS Release 8.0	09/15/95
System Performance Improvements: Trend Graphs	Level 1: Operator & System Response	TMACS Release 8.0	09/15/95
System Defect backlog reduced to 45% of total as of Release 7.0.		TMACS Release 8.0	09/15/95

1.6 Planned FY96 Deliverables

TMACS/CASS End-item Deliverable Description	Driver	Milestone	Completion Date
All possible instruments from tanks in the 241-AP tank farm (8 tanks), including liquid level, temperature, pressure, etc, connected to TMACS.	Tank Farm Instrumentation Upgrade Plan; CASS Retirement		FY96
All possible instruments from tanks in the 241-AY/AZ tank farms (4 tanks), including liquid level, temperature, pressure, etc, connected to TMACS.	Tank Farm Instrumentation Upgrade Plan; CASS Retirement		FY96
All possible instruments from tanks in the 241-TX tank farm (17 tanks), including liquid level, temperature, pressure, etc, connected to TMACS.	Tank Farm Instrumentation Upgrade Plan		FY96
Panalarm software connection for 242-S Alarms. (FY94 carry-over)	Tank Farm Instrumentation Upgrade Plan; CASS Retirement		FY96
Panalarm software connection for 242-T Alarms.	Tank Farm Instrumentation Upgrade Plan; CASS Retirement		FY96
Panalarm software connection for 242-U Alarms.	Tank Farm Instrumentation Upgrade Plan; CASS Retirement		FY96
Remote TMACS user terminals at 272-AW and 272-WA TF Operation shift offices.	Draft Tank Farm Instrumentation Upgrade Plan		FY96
Capability to monitor and log exhaustor fans up/down time.	Washington Department of Ecology Requirement		FY96
Maintenance user functions (inspect operations, troubleshoot, query/download parameters to remote stations, etc)	User Request, ALARA		FY96
Min/Max query function in Acromag Driver	Engineering Req.		FY96
Trend Graph Zoom Function	User Request		FY96
AY/AZ Exhaustor Upgrade interface	User Request		FY96
All possible instruments from tanks in the 241-B tank farm (16 tanks), including liquid level, temperature, pressure, etc, connected to TMACS.	Tank Farm Instrumentation Upgrade Plan		FY97
Interface with East and West Evaporators	CASS Retirement		Future
TMACS On-line Procedures	User Request		Future
TMACS On-line Video Display	User Request		Future
TMACS engineering simulation, heuristic analysis, and integrated data models	Engineering Request		Future

1.7 Definitions and Acronyms

Acceptance Test Procedure (ATP) is a test that provides step-by-step instructions for functionally testing the performance of a system. Each software release for TMACS and CASS is tested prior to installation using an ATP.

Acceptance Test Report (ATR) is a report that contains the ATP with the exception resolutions and the summary of test results with a discussion of significant areas of less than satisfactory performance. Any areas that require retesting are identified. For TMACS and CASS, ATRs are issued for each software release under Document Control.

Boeing Computer Services Richland (BCSR) is a subcontractor to the Westinghouse Hanford Company. BCSR performs the Information Resource Management tasks.

Chemical & Waste Management Software Support (C&WMSS) is a department under IRM/ISS that is responsible for the software development and maintenance activities that support the 200 Area tank farm activities. These software projects include TMACS, CASS, SACS, and the 200 West Labs.

Information and Scientific Systems (ISS) is an organization of BCSR that provides support and personnel for development and maintenance of information and scientific computer systems.

Information Resource Management (IRM) is a division of Westinghouse Hanford Company that is run by Boeing Computer Services, Richland.

Software Configuration Management Plan (SCMP) identifies and defines the configuration items in a system, controls the release and change of these items throughout the system life cycle, records and reports the status of configuration items and change requests, and verifies the completeness and correctness of these items. The TMACS Software Project documentation will use SCMP to refer to this document, and "Computer Software Configuration Management" (CSCM) Plan as part of the document number listed by Document Control. Also called "Software Configuration Control."

Software Project Management Plan (SPMP) is the controlling document that identifies all the technical and managerial project functions, activities and tasks associated with a software project. The TMACS Software Project documentation will use SPMP to refer to this document, and "Software Development Plan" (SDP) as part of the document number listed by Document Control. Also called a "Project Plan."

Software Test Plan (STP) is a plan for the conduct of software testing, including software verification and validation activities.

The TMACS Project documentation will use STP to refer to this document, and the generic "Computer Software Documentation" (CSWD) as part of the document number listed by Document Control.

Surveillance Analysis Computer System (SACS) is the primary electronic data management system for tank farm surveillance data. WHC Database Improvements organization provides the cognizant engineering functions, and IRM C&WMSS provides the program management and software project management functions.

Tank Monitor and Control System (TMACS) monitors temperatures in the 200 Area Waste Tanks, displays current values of these temperatures, produces historical reports for the Tank Farm Operations (TFO) operator in the CASS Central Facility, and downloads these data for long-term storage on the SACS computer system. Future plans for TMACS monitoring include tank levels, pressure, gas concentrations, and processing of various discrete signals.

Westinghouse Hanford Company (WHC) is the current site operations contractor for waste management at the Hanford site.

WHC Instrument And Electrical Upgrades (I&EU) is responsible for management of the Tank Farm Instrument Upgrade project, and for coordinating the overall schedule with each of the participating organizations. IRM C&WMSS assists I&EU by coordinating updates to the TFO training packages and procedures, and works with East Tank Farm Technical Support on document reviews and scheduling of operator support during software testing.

WHC Tank Waste Remediation System (TWRS) is the WHC organization responsible for the 200 Area Tank Farm engineering and operations activities.

2.0 PROJECT ORGANIZATION

2.1 Process Model

Software development and maintenance activities follow the life cycle development model identified in WHC-CM-3-10, Software Practices. In addition, TMACS is adopting the Capability Maturity Model developed by Software Engineering Institute. This model describes the characteristics of software development processes and defines five levels of process maturity. TMACS is targeting to reach Maturity Level 2 by 9/30/95.

2.2 Organizational Structure

Ongoing development of the TMACS Software Project is coordinated between WHC I&EU (Tank Farm Instrument Upgrade project management), IRM Chemical & Waste Management Software Support, or C&WMSS

(software project management), WHC Electrical Major Maintenance, WHC TFO&M Technical Management & Administration (program management), WHC Tank Farm Operations, or TFO (system users), WHC Surveillance And Data Acquisition, or S&DA (system users), Tank Farm Training, and Tank Farm Procedures. These organizations are responsible for determining TMACS requirements and scheduling priorities.

Ongoing maintenance of the CASS Software Project is coordinated between the C&WMSS, TFO&M Technical Management & Administration, TFO, S&DA, Training and Procedures groups mentioned above.

2.3 Organizational Boundaries and Interfaces

2.3.1 Field Instrumentation

Project interfaces between the TMACS Software Project and the instrumentation connections (Acromag, Panalarm, etc) are coordinated through CC Scaief, WHC I&EU.

2.3.2 SACS Project

SACS plays a vital role in the operation of both TMACS Development/Operations and CASS Retirement. As TMACS adds new sensor readings (level, pressure, gas flow, hydrogen concentration) SACS provides its users with access to those data through Sybase (on a daily frequency) and ASCII files (as continuous readings). SACS also passes tank level data to TMACS, and will in the future pass alarm set points and interstitial liquid levels (calculated from LOW loggings).

CASS Retirement activities affecting SACS include Drywell and LOW processing, which will be migrated to SACS over the next two to three years.

The organizational interfaces between SACS, TMACS and CASS are specified in the Tank Farm Surveillance System Configuration Management Plan (WHC-IP-0842, Section 12.2). All activities between these projects are controlled through approved Change Requests. (Note: TMACS and CASS do not interface with each other directly. CASS levels are passed to SACS and verified and validated by Surveillance personnel. Certain tank levels are then read by TMACS.)

2.3.3 Tank Farm Operations, Training, Procedures

TMACS and CASS software releases will change the Tank Farm Operators' procedural and training requirements. These changes must be communicated between the TMACS/CASS Software Project Manager and the appropriate contacts in Tank Farm Training, Procedures, and Operations Technical Support organizations. This is explained in Section 2.4.

2.4 Responsibilities

TMACS/CASS Software Project Manager [DG Spurling]

Prepare and administer the Software Project Management Plan and yearly Acquisition Plan. Verify that customers understand commitments two or three days after document receipt. Oversee software development and maintenance activities. Within 5-10 working days before each task item due date, contact each responsible party to remind of their agreed to commitments. If any problems are anticipated at this time, notify TFO&M Technical Management & Administration of proposed corrective actions. Coordinate revisions to the TMACS and CASS Operating Procedures with Manager, Tank Farm Procedures and Manager, Tank Farm Training. Report project status to Technical Management & Administration and IRM/ISS Functional Review committee on a monthly basis, and to IRM Project Review Board and IRM Work Authorization Board (WAB) on an as-needed basis. Interface with IRM HANford Technical Advisory Group (HANTAG) and HANford Technical Review Board (HANTRB) as needed. Responsible for preparation and maintenance of project documents (see Section 4.2, Software Documentation). Point of Contact for all TMACS and CASS Problem Reports, data requests, and Change Requests.

Manager, IRM/ISS Chemical & Waste Management Software Support (C&WMSS) [RB Bass]

Responsible for management oversight and direction over TMACS/CASS projects, including planning, administration, and document reviews.

TMACS/CASS Software Engineer [PK Scanlan, WS Slippern, SJ Washburn]

Responsible for developing the software planned in this document, according to the process flow guidelines set in the TMACS Software Configuration Management Plan (WHC-SD-WM-CSCM-019). Assist in preparing and revising TMACS project documents (see Section 4.2). Submit weekly status "bullets" to Project Manager each Thursday by COB.

TMACS System Administrator/UNIX Administrator [SJ Washburn, RA Heller]

Responsible for the security and stability of the TMACS production and development workstation software. This involves maintaining user login accounts, file access privileges, printer spooling activities, for performing periodic data backups and network file transfers, installing updated revisions of the G2 software and UNIX operating system, and coordinating UNIX security activities recommended by IRM

Telecommunications & Network Engineering (TNE) and the Hanford UNIX Users' Group (HUUG).

**SACS Technical Lead [JA Glasscock],
Administrative Lead [LM Ollero]**

Responsible for administering the SACS project schedule, which is planned and prioritized by the SACS Control Board. Communicate any SACS schedule or scope changes that may affect the TMACS or CASS Software Projects. Responsible for CASS drywell and LOW migration activities.

**Project Manager, Tank Farm Instrument and Data Acquisition/
Management Upgrade Plan [CC Scaief]**

Responsible for planning and administering the Tank Farm Instrumentation Upgrade schedule, and communicating any changes to that schedule in a timely manner. Review all changes to the TMACS Software Project Functional Requirements and Test Plans. Maintain the TMACS I/O Termination Point Listing (WHC-SD-WM-TI-594).

WHC Surveillance (TMACS, CASS, SACS) Cognizant Engineer [DA Barnes]

Responsible for review and approval of all documents associated with the TMACS and CASS software releases, including Change Requests, Requirements Specifications and Test Procedures, plus all changes to planning documents that include Software Project Management, Configuration Management, and Testing. Provide a representative to participate in testing, according to the schedule. Responsible for handling field related problems, such as maintaining field instruments, I-O controllers (CASS substations, Acromags, etc.), communications. Responsible for tracking TMACS and CASS work orders through the Job Control System (JCS). Responsible for scheduling CASS Drywell and LOW migration activity (to SACS).

Manager, Surveillance & Data Acquisition [JS Schofield]

TMACS, CASS Cognizant Engineer's manager, responsible for review and approval of all TMACS release documents.

**East, West Tank Farm Operations [R Ni/TW Bohan, JJ Klos/DJ
Saueressig/DR Myers]**

Responsible for the review and approval of all Change Requests, User Requirements, Test Procedures and Test Reports pertaining to TMACS and CASS software changes. Responsible for providing operators to participate in the software testing process, and for scheduling operator training necessary to keep CASS and TMACS operators current with the software releases.

Responsible for appointing Facility Representative for TMACS operator station in the 2750E building.

2750E Facility Representative

Responsible for handling facility related problems, such as maintaining CASS equipment in room B-105, and the CASS Central Micro in room B-107. Responsible for tracking work orders through the Job Control System (JCS).

Manager, East/West Tank Farm Technical Support [JJ Badden/DE Deaton]

Responsible for the review and approval of all Change Requests, Test Plans and Test Reports pertaining to CASS Drywell/LOW data parameters or software changes.

Manager, TWRS Tank Farm Training

Responsible for preparing and coordinating TMACS and CASS Operator training classes with Tank Farm Operations, per the TMACS and CASS software release schedule listed in Section 3.0, Activities. (Note that anticipated impacts on training are shown in each activity description.)

Manager, Tank Farm Procedures [RJ Shupe, WJ Lehman]

Responsible for coordinating releases to the TMACS and CASS Plant Operating Procedures (TO-040-025, TO-040-035) per the TMACS and CASS software release schedule listed in Section 5.4. (Note that anticipated impacts to the procedures are shown in each activity description.)

Chairman, Tank Farm Surveillance System (TFSS) Configuration Control Board (CCB) [RK Welty]

Administer TFSS Configuration Control Board and TFSS Coordinator's responsibilities.

3.0 MANAGERIAL PROCESS

3.1 Management Objectives and Priorities

FY95 objectives for TMACS and CASS are to deliver the approved FY95 workscope on or ahead of schedule, and maintain continuous operation of the TMACS and CASS systems. Any significant deviations from this plan, including any missed milestones or workscope significantly under or over what has been approved must be communicated in writing for approval with WHC TFO&M Technical Management & Administration.

3.2 Assumptions, Dependencies, and Constraints

Timely completion of the TMACS and CASS work scope assumes several things, including prompt installation of tank farm instrumentation, consistent project funding, staffing, work prioritization and hardware reliability, minimized labor reallocation from operational emergencies or media announcements, and no changes to the project Approval Designator or Safety Class. Some degree of margin has been planned into these projects, primarily because they involve ongoing maintenance support. Only a significant surprise to these assumptions would be expected to impact the project.

3.3 Acceptance Criteria

The acceptance criteria for each of the TMACS and CASS deliverables are included in the Milestone Description Sheets. The acceptance criteria for the software to be delivered are specified in the Test Procedures and Test Plans.

3.4 Risk Management

Risks associated with the TMACS and CASS software projects include adequate staffing, operability of the hardware and software, and cooperation with the organizations identified in this plan.

3.5 Monitoring and Controlling Mechanisms

Project monitoring and control are the responsibility of the Project Manager. If the project schedule can not be followed, a corrective action plan must be submitted to the Cost Account Manager, along with the necessary Baseline Change Requests. As part of the monitoring process, periodic reports are sent to WHC and BCSR management staff on a monthly basis.

Monthly reports sent to IRM include the Award Fee and Functional Review reports. These are written reports, however, the Functional Review report is presented formally to ISS management on a periodic basis. Monthly reports to WHC are currently handled by updating the Cost and Schedule Reports. No consistent meeting schedule has been established.

Periodic reports: Other reports are given to IRM management on an as-needed basis. These include Project Review, Commitment Review, and Change Control.

3.6 Staffing Plan

Current staffing on the TMACS and CASS projects are adequate for the defined FY95 work scope, provided the assumptions and dependencies defined above are not violated. No provision is currently in place for backup software engineers. A replacement SE may be needed on

the CASS project to replace Stan Slippert if rumored cuts in contract personnel are enforced.

TMACS SEs have received special training through Gensym and on the job. Replacement of these positions would require individuals qualified in software engineering, design, and programming, and having some experience in the G2 Real Time Expert System software product. A qualified replacement for one of these positions would require approximately three months of training to function as an individual contributor. A record of each SE's training is provided in the Project Notebook.

The project management position must be defined in terms of the technical and administrative responsibilities. The TMACS Software Project Manager must be familiar with G2, C and UNIX. The CASS Software Project Manager must know Data General's AOS/VS Operating System environment, FORTRAN-77, C and Assembly programming languages. For administrative project control, the Project Manager must understand the Cost Account budgeting and control process, the administrative configuration management process, and reporting requirements of WHC and BCSR.

4.0 TECHNICAL PROCESS

4.1 Methods, Tools and Techniques

Ongoing development and support of the CASS and TMACS production systems is controlled under the Tank Farm Surveillance System (TFSS) Configuration Management Plan (WHC-IP-0842, Section 12.2) and the TMACS Software Configuration Management Plan (WHC-SD-WM-CSCM-019, Rev 0) and the CASS Software Configuration Management Plan (WHC-SD-WM-CSCM-002, Rev 0). All changes to these systems are approved and documented through Change Request control.

4.2 Software Documentation

The TMACS Software Project will provide the documents needed to satisfy the WHC Standard Engineering Practices (WHC-CM-6-1), the WHC Quality Assurance (WHC-CM-4-2), the WHC Software Practices (WHC-CM-3-10), and customer documentation requirements as specified in the objectives.

The following table identifies TMACS documents existing and planned:

Document Number	Rev	Document Title	Release Date
WHC-SD-WM-SDP-004	0	TMACS Software Upgrade Plan Project Management Plan	3/31/92
WHC-SD-WM-SDP-008	0	FY94 Work Plan: TMACS, CASS Computer Systems	2/25/94
WHC-SD-WM-SDP-011	0	FY95 Software Project Management Plan: TMACS, CASS Computer Systems	11/30/94*
WHC-SD-WM-CSCM-019	0	TMACS Software Configuration Management Plan	3/10/93
WHC-SD-WM-CSCM-002	0	CASS Software Configuration Management Plan	8/31/89
WHC-SD-WM-SFR-006	0	TMACS Software Project: Functional Requirements	12/11/92
WHC-SD-WM-SFR-003	0	SOFTWARE REQUIREMENTS SPECIFICATION: CASS CENTRAL FACILITY	9/30/91
WHC-SD-WM-TP-148	0	TMACS Software Test Plan	9/30/92
WHC-SD-WM-CSWD-004	2	CASS Software Revision 2.0 Test Report	5/24/94
WHC-SD-WM-CSWD-065	3	CASS Software Revision 2.2 Test Report	7/15/94
WHC-SD-WM-SDD-039	0	TMACS Software Design Document (Conceptual)	9/30/95 *

* Estimated Signoff Date

The TMACS Software Design Document will give the conceptual design, describing the high-level functions performed by TMACS. In WHC-SD-WM-SDP-004, TMACS Software Upgrade Plan Project Management Plan the Software Design Document was waived. The reason it was waived is that the G2 "expert system" software provides the following built-in software engineering tools:

- Data structure models in the object definitions;
- Software design descriptions in the Structured English programming language;
- Processing logic descriptions from the rules and procedures.

By using these software tools, the detailed software design is given in the software. To formalize this design, a conceptual design document will be formally released in FY95.

4.3 Configuration Control

The Configuration Management Plans for TMACS and CASS are described in WHC-SD-WM-CSCM-019 and WHC-SD-WM-CSCM-002. These plans tie the administrative change control process to the Waste Tank Project Administration Manual (WHC-IP-0842), describe the process for initiating and performing software changes, and specify the tools used in software configuration control on each of the software/hardware environments.

4.4 Acquisition

An acquisition plan for FY95 hardware and software purchases is being written. A summary of the items to be purchased is provided in Section 5.3 Budget and Resource Allocation.

4.5 Data Management

Long-term data retention and access to the TMACS data is provided by the Surveillance Analysis Computer System (SACS). As part of this service, SACS handles all sitewide data management issues.

5.0 Work Packages, Budget, and Resource Management

FY95 TMACS and CASS Software development and maintenance activities are funded primarily through cost account 1N1D4E, task packages N1277 and N1281. C&WMSS tracks its labor and non-labor charges through the following RFSS (Requests For Service), Workorders and Task Packages:

TMACS (Task Package N1277)

R50108	TMACS Software Release 6.0
R50122	TMACS Software Release 7.0
R50123	TMACS Software Release 8.0
R50110	TMACS Software Project Management
R50111	TMACS Software Project Support (Non-Labor)

CASS (Task Package N1277)

R50166 (W/O E52705)	CASS Software Release 3.0
R50168 (W/O E52705)	CASS Software Release 3.1
R50107	CASS Software Project Management
R50109	CASS Software Project Support (Non-Labor)
N57BE (Task Pkg)	New LOW Van Technical Support
N57C5 (Task Pkg)	Drywell Van Technical Support

5.1 FY95 Work Packages

Each of the FY95 Deliverables that are software related are scheduled for delivery via software release: three for TMACS, and two for CASS. Deliverables that are not software related will be released throughout the year. These activities are summarized below from the Milestone Description Sheets, which are provided in Appendix A. Note that the Milestone Description Sheets include an explanation of possible impacts to Operator Procedures or training.

5.1.1 TMACS Release 6.0

Deliverables:

- All possible instruments from tanks in the 241-SY, -U tank farms (19 tanks), including liquid level, temperature, pressure, %hydrogen, gas sample flow and discrete signals connected to TMACS
- Software communications driver for new Enraf CIU Control Stations
- System performance improvements: event-driven point processing.

Stretch Deliverables:

- Alarm set points uploaded daily from SACS
- Automatic temperature alarm distinction between waste and vapor space sensors

5.1.2 TMACS Release 7.0

Deliverables:

- All Enrafs that are connected to the TMACS Acromag hardware during FY94 available through TMACS
- All possible instruments from tanks in the 241-S/SX (FY94 carry-over), -A, and -AX tank farms (37 tanks), including liquid level, temperature, water flow and discrete signals connected to TMACS
- Rate of change alarm processing function added

Stretch Deliverables:

- W-320 Project (C-106 Sluicing) monitoring implemented
- Liquid Level/Temperature manual entry software function added
- Installation of Sun SPARC-10 Workstations. (Assumes availability of CENRTC or lease funds)

5.1.3 TMACS Release 8.0

Deliverables:

- All Enrafs that are connected to the TMACS Acromag hardware during FY95 available through TMACS
- All possible instruments from tanks in the 241-AW (FY94 carry-over), -AP, -AY, -AZ and -TX (35 tanks), including temperature, %hydrogen, gas sample flow and discrete signals connected to TMACS
- All Enrafs that are connected to the TMACS CIU hardware during FY95 available through TMACS
- Remote TMACS user terminals at 242-A and 242-S evaporator facilities

Stretch Deliverables:

- TMACS terminals at 272-AW and 272-WA Shift Offices
- Exhauster fan monitoring software capable of recording system down-time and A/B unit run-time balance
- System Performance Improvements: Trend Graphs

5.1.4 CASS Release 3.0

Deliverables:

- Drywell/LOW processing: process "Quality Record" Data from vans
- Software to accept and process LOW data from new van computers
- Other Change Requests as needed by Tank Farm Operations

5.1.5 CASS Release 3.1

Deliverables:

- Remove the Temperature Options from CASS Menu
- Other maintenance Change Requests and Problem Reports to be determined by priority and available time

5.1.6 TMACS/CASS Software Project Management, WHC Project Support

Deliverables. Issue the following documents for release:

- WHC-SD-WM-SFR-006 REV 1, "TMACS SOFTWARE FUNCTIONAL REQUIREMENTS"
- WHC-SD-WM-CSCM-019 REV 1, "TANK MONITOR AND CONTROL SYSTEM (TMACS) SOFTWARE CONFIGURATION MANAGEMENT PLAN"
- WHC-SD-WM-TP-148 REV 1, "TMACS SOFTWARE TEST PLAN"
- WHC-SD-WM-SDD-039 REV 0, "TMACS Conceptual Software Design Document"
- WHC-SD-WM-SDP-0xx, REV 0, "FY96 Software Project Management Plan: TMACS, CASS Computer Systems"
- "FY96 TMACS Acquisition Plan"

5.2 Dependencies

The first three work packages are sequential TMACS software releases. The scope of each release is independent. Similarly, packages four and five are CASS software releases that add independent functions.

Work package six, TMACS/CASS Software Project Management is not dependent on packages one to five, nor are those packages dependent on this work package.

5.3 Budget and Resource Allocation

TMACS Software Project

Item	Staff	FY95\$K
N1277: TMACS Rel. 6.0, 7.0, 8.0		
Labor - IRM staff (\$57.90/hr + 21.60%)	3.2	\$409.4
Training & Travel		15.9
MICROCOMPUTER		
G2 Runtime/Maint		13.2
G2 Prod.Upgrade		14.0
Parallax Video Proc		11.0
Sun/Dec Maint		7.2
Sun O/S, Newsprint		3.4
HLAN Connection		10.4
Total MICRO + MPR (15.2%) + G&A (22%)		83.2
Total N1277 (Program \$K)		\$508.4
CENRTC		\$75.0

CASS Software Project

Item	Staff	FY95\$K
<u>N1281: CASS Rel. 3.0, 3.1</u>		
Labor - IRM staff (\$57.90/hr + 21.60%)	0.3	\$38.4
Labor - WHC staff (\$41.60/hr + 17.26%)	0.3	27.6
MICROCOMPUTER		
CASS Maint.		50.0
CASS Telecomm.		7.2
Total MICRO + MPR (15.2%) + G&A (22%)		80.4
Total N1281 (Program \$K)		\$146.4

5.4 TMACS, CASS Software Release Schedule

TMACS Software Release 6.0	1/16/95
TMACS Software Release 7.0	5/15/95
TMACS Software Release 8.0	9/15/95
CASS Software Release 3.0	7/31/95
CASS Software Release 3.1	9/15/94

6.0 VERIFICATION AND VALIDATION PLANNING**6.1 Overview**

Software V&V planning identifies the work packages, scope of work, responsibilities, and personnel necessary to assure fulfillment of a software project's objectives. This SPMP outlines the Software V&V Planning for the TMACS and CASS projects.

TMACS/CASS Software V&V activities are coordinated with the IRM Software V&V Organization and WHC Software QA. These activities include document reviews, test oversight and meetings/discussions for project management guidance.

Other CASS and TMACS V&V documents include:

- WHC-IP-0842 Tank Farm Surveillance & Operations Administration, Section 12.2, Tank Farm Surveillance System (TFSS) Configuration Control
- WHC-SD-WM-CSCM-019 TMACS Software Configuration Management Plan
- WHC-SD-WM-CSCM-002 CASS Software Configuration Management Plan

- WHC-SD-WM-TP-148, TMACS Software Test Plan
- WHC-SD-WM-CSWD-004, CASS Software Revision x.0 Acceptance Test Procedure/Report (Major Release)
- WHC-SD-WM-CSWD-065, CASS Software Revision n.x Acceptance Test Procedure/Report (Minor Release)

6.2 Development Cycle Verification and Validation

Software development is initiated by Change Requests administered through the Tank Farm Surveillance System (TFSS) Change Control Board (see WHC-SD-WM-CSCM-002/019). These Change Requests are incorporated into the Functional Requirements (TMACS: WHC-SD-WM-SFR-006; CASS: WHC-SD-WM-SFR-003), TMACS Software Design (WHC-SD-WM-SDD-039), and testing (TMACS Test Cases 1 through 12 - WHC-SD-WM-TRP-105 to TRP-114, TRP-201 to TRP-202; CASS Test Plans- WHC-SD-WM-CSWD-004 for major release, WHC-SD-WM-CSWD-065 for minor release) documents and reviewed by V&V. For testing documents, these changes are incorporated into the appropriate Test Case with a direct mapping of Change Request to test step. These changes are reflected in the Test Case prior to testing and installation. For requirements and design documents, these changes are incorporated periodically, but not to exceed one year.

6.3 Assessment

Since the goal of the TMACS/CASS project management staff is to continuously improve not only the product but the process of software development, improvements to the V&V plan are studied and evaluated on an ongoing basis. These improvements include:

- Creating a new TMACS Software Design Document;
- Revising the TMACS Functional Requirements document to provide better traceability;
- Establishing a Software Action Plan (SAP) in the TMACS SCMP for all software development. Included in this SAP are scheduled reviews for each software lifecycle activity;
- Creating a new Software Engineer's manual for TMACS;
- Revising the TMACS Test Plan to automate regression testing functions.

6.4 Independence

Independent reviews are performed from a pool of several organizations, including:

- IRM Software V&V;
- WHC Software QA
- WHC Instrument & Electrical Upgrades;
- WHC Tank Farm Surveillance & Data Acquisition;
- IRM Surveillance Analysis Computer System (SACS) Software Project;

- WHC Tank Farm Operations

Each organization has qualified representatives to provide peer review in engineering and/or software engineering disciplines .

6.5 Verification and Validation Reporting

V&V reviews are documented by acceptance signature.

6.6 Verification and Validation Administration

The following V&V administrative procedures are in place:

- Change Request Processing: see WHC-IP-0842 Tank Farm Surveillance & Operations Administration, Section 12.2, Tank Farm Surveillance System (TFSS) Configuration Control
- Software Problem Reporting: see WHC-SD-WM-CSCM-019 TMACS SCMP (Note: A CASS Problem Report similar to the TMACS Problem Report form is in use but has not been added to WHC-SD-CSCM-002, CASS SCMP)

In addition to these procedures, the Software Action Plan proposed in Section 6.3 will provide planning and review steps for a higher degree of internal V&V control.

6.7 Standards, Practices, and Conventions

See Section 6.1 above.

7.0 REFERENCES

WHC-SD-WM-WP-132 REV 4, "TANK FARM INSTRUMENTATION AND DATA ACQUISITION/ MANAGEMENT UPGRADE PLAN"

WHC-SD-TI-594 REV 0, "TMACS I/O TERMINATION POINT LISTING"

WHC-SD-WM-SDP-006 REV 2, "SACS FY95 SOFTWARE PROJECT MANAGEMENT PLAN"

WHC-SD-WM-SFR-006 REV 0, "TMACS SOFTWARE FUNCTIONAL REQUIREMENTS"

WHC-SD-WM-SFR-003 REV 0, "SOFTWARE REQUIREMENTS SPECIFICATION: CASS CENTRAL FACILITY"

WHC-SD-WM-CSCM-019 REV 0, "TANK MONITOR AND CONTROL SYSTEM (TMACS) SOFTWARE CONFIGURATION MANAGEMENT PLAN"

WHC-SD-WM-CSCM-002 REV 0, "COMPUTER AUTOMATED SURVEILLANCE SYSTEM (CASS) SOFTWARE CONFIGURATION MANAGEMENT PLAN"

WHC-IP-0842, "WASTE TANK PROJECT ADMINISTRATION MANUAL"

WHC-SD-WM-TP-148 "TMACS SOFTWARE TEST PLAN"

WHC-SD-WM-CSWD-004 REV 2, "CASS SOFTWARE REVISION 2.0 TEST REPORT"
(Major Release)

WHC-SD-WM-CSWD-065, Rev 3, "CASS SOFTWARE REVISION 2.2 TEST REPORT"
(Minor Release)

WHC-SD-WM-SDP-008 REV 0, "FY94 WORK PLAN: TMACS, CASS COMPUTER SYSTEMS"

WHC-SD-WM-SDP-004 REV 0 (1992), "TANK MONITORING AND CONTROL SYSTEM
UPGRADE SOFTWARE PROJECT MANAGEMENT PLAN"

WHC-CM-3-10, "SOFTWARE PRACTICES"

APPENDICES**APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets**

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: TMACS Software Release 6.0		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 01/16/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☐ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☐ Drawings ☐ Other (specify) TMACS S/W Release 6.0 Test Report	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
Test and install TMACS Software Release 6.0. Release shall include the following software changes: <ul style="list-style-type: none"> * All possible instruments from tanks in the 241-SY, -U tank farms (19 tanks), including liquid level, temperature, pressure, %hydrogen, gas sample flow and discrete signals connected to TMACS. * Software communications driver for new Enraf CIU Control Stations (provides direct connection to replace Acromag connection) * System performance improvements: <ul style="list-style-type: none"> - event-driven point processing. Stretch Deliverables: <ul style="list-style-type: none"> * Alarm set points uploaded daily from SACS. * Automatic temperature alarm distinction between waste and vapor space sensors. THOSE STEPS THAT RELY ON FIELD INSTALLATION SCHEDULES MAY NEED TO BE MOVED TO LATER REVISIONS, SHOULD THE FIELD INSTALLATIONS SCHEDULES FALL BEHIND.			
THIS RELEASE IS EXPECTED TO AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Software Release Acceptance Test executed successfully.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets (Continued)

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: TMACS Software Release 7.0		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 05/15/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☐ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☒ Drawings ☐ Other (specify) TMACS S/W Release 7.0 Test Report	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
Test and install TMACS Software Release 7.0. Release shall include the following software changes: <ul style="list-style-type: none"> * All Enrafs that are connected to the TMACS Acromag hardware during FY94 available through TMACS. * All possible instruments from tanks in the 241-S/SX (FY94 carry-over), -A, and -AX tank farms (37 tanks), including liquid level, temperature, water flow and discrete signals connected to TMACS. * Rate of change alarm processing function added. 			
<u>Stretch Deliverables:</u> <ul style="list-style-type: none"> * W-320 Project (C-106 Sluicing) monitoring implemented. * Liquid Level/Temperature manual entry software function added. * Installation of Sun SPARC-10 Workstations. (Assumes availability of CENRTC or lease funds) 			
THOSE STEPS THAT RELY ON FIELD INSTALLATION SCHEDULES MAY NEED TO BE MOVED TO LATER REVISIONS, SHOULD THE FIELD INSTALLATIONS SCHEDULES FALL BEHIND.			
THIS RELEASE IS EXPECTED TO AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Software Release Acceptance Test executed successfully.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets (Continued)

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: TMACS Software Release 8.0		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 09/15/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☐ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☐ Drawings ☐ Other (specify) TMACS S/W Release 8.0 Test Report	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
Test and install TMACS Software Release 8.0. Release shall include the following software changes: * All Enrafs that are connected to the TMACS Acromag hardware during FY95 available through TMACS. * All possible instruments from tanks in the 241-AW (6 tanks), including temperature, %hydrogen, gas sample flow and discrete signals connected to TMACS. * All Enrafs that are connected to the TMACS CIU hardware during FY95 available through TMACS. * Remote TMACS user terminals at 242-A and 242-S evaporator facilities. <u>Stretch Deliverables:</u> * TMACS terminals at 272-AW and 272-WA Shift Offices. * Exhauster fan monitoring software capable of recording system down-time and A/B unit run-time balance. * System Performance Improvements: - Trend Graphs THOSE STEPS THAT RELY ON FIELD INSTALLATION SCHEDULES MAY NEED TO BE MOVED TO LATER REVISIONS, SHOULD THE FIELD INSTALLATIONS SCHEDULES FALL BEHIND. THIS RELEASE IS EXPECTED TO AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Software Release Acceptance Test executed successfully.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets (Continued)

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: CASS Software Release 3.0		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 07/31/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☐ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☐ Drawings ☐ Other (specify) CASS S/W Release 3.0 Test Report	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
Test and install CASS Software Release 3.0. Release shall include the following software changes: * Drywell/LOW processing: process "Quality Record" Data from vans. * Software to accept and process drywell data from new van computers. * Other Change Requests as needed by Tank Farm Operations THIS RELEASE IS EXPECTED TO AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Software Release Acceptance Test executed successfully.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets (Continued)

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: CASS Software Release 3.1		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 09/15/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☒ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☐ Drawings ☐ Other (specify) CASS S/W Release 3.1 Test Report	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
Test and install CASS Software Release 3.1. Release shall include the following software changes: * Remove the Temperature Options from CASS Menu; * Other maintenance Change Requests and Problem Reports to be determined by priority and available time. THIS RELEASE IS NOT EXPECTED TO AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Software Release Acceptance Test executed successfully.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX A: TMACS/CASS FY95 Milestone Description Sheets (Continued)

Westinghouse Hanford Company MILESTONE DESCRIPTION SHEET			
Title: TMACS/CASS Software Project Management		Date Prepared: 10/11/94	
Assigned To: ISS/Chemical & Waste Management Software Support		CIN: N/A	
WBS Designator: 6.4.2.1		Due Date: 09/30/95	
Control Number: N/A		Revision:	
Milestone Type: ☐ DOE-HQ ☐ DOE-RL ☒ CNTR ☐ OTHER _____	Division: ☐ State ☐ Federal ☐ DOE ☐ RCRA ☐ TPA# _____	DELIVERABLE: ☐ Report ☐ Letter ☐ Drawings ☐ Other (specify) (See Documents below)	ADDRESS TO: ☐ DOE-HQ ☐ DOE-RL ☒ Other (specify) WHC
Milestone Description			
The following Project Documents will be issued for release: WHC-SD-WM-SFR-006 REV 1, "TMACS SOFTWARE FUNCTIONAL REQUIREMENTS" WHC-SD-WM-CSCM-019 REV 1, "TANK MONITOR AND CONTROL SYSTEM (TMACS) SOFTWARE CONFIGURATION MANAGEMENT PLAN" WHC-SD-WM-TP-148 REV 1, "TMACS SOFTWARE TEST PLAN" WHC-SD-WM-SDD-039 REV 0, "TMACS Conceptual Software Design Document" WHC-SD-WM-SDP-0xx, REV 0, "FY96 Software Project Management Plan: TMACS, CASS Computer Systems" "FY96 TMACS Acquisition Plan"			
THIS DELIVERABLE WILL NOT AFFECT TMACS/CASS TRAINING AND PROCEDURES.			
Description of what constitutes completion of this milestone:			
Documents issued for release.			
Cost Account Manager	Date	Program/Project Manager	Date
Program Element Manager	Date	DOE Monitor	Date

APPENDIX B: CASS Real-Time Instruments

1.0 CASS Level Measuring (195 tanks)

101-A	Man Tape		101-S	Intrus FIC	Planned in FY95
102-A	Intrus FIC	Planned in FY95	102-S	Auto FIC	Planned in FY95
103-A	Intrus FIC	Planned in FY95	103-S	Enraf	Planned in FY95
104-A	Man Tape		104-S	Man Tape	
105-A	Man Tape		105-S	Intrus FIC	Planned in FY95
106-A	Intrus FIC	Planned in FY95	106-S	Enraf	Planned in FY95
101-AN	Auto FIC	Planned in FY95	107-S	Enraf	Planned in FY95
102-AN	Auto FIC	Planned in FY95	108-S	Intrus FIC	Planned in FY95
103-AN	Auto FIC	Planned in FY95	109-S	Intrus FIC	Planned in FY95
104-AN	Auto FIC	Planned in FY95	110-S	Intrus FIC	Planned in FY95
105-AN	Auto FIC	Planned in FY95	111-S	Enraf	Planned in FY95
106-AN	Auto FIC	Planned in FY95	112-S	Intrus FIC	Planned in FY95
107-AN	Auto FIC		101-SX	Intrus FIC	Planned in FY95
101-AP	Auto FIC	Planned in FY96	102-SX	Intrus FIC	Planned in FY95
102-AP	Auto FIC	Planned in FY96	103-SX	Intrus FIC	Planned in FY95
103-AP	Auto FIC	Planned in FY96	104-SX	Intrus FIC	Planned in FY95
104-AP	Auto FIC	Planned in FY96	105-SX	Intrus FIC	Planned in FY95
105-AP	Auto FIC		106-SX	Enraf	Planned in FY95
106-AP	Auto FIC		107-SX	Man Tape	
107-AP	Auto FIC		108-SX	Man Tape	
108-AP	Auto FIC		109-SX	Man Tape	
101-AW	Auto FIC	Planned in FY95	110-SX	Man Tape	
102-AW	Auto FIC	Planned in FY95	111-SX	Man Tape	
103-AW	Auto FIC	Planned in FY95	112-SX	Man Tape	
104-AW	Auto FIC	Planned in FY95	113-SX	Man Tape	
105-AW	Auto FIC	Planned in FY95	114-SX	Man Tape	
106-AW	Auto FIC	Planned in FY95	115-SX	Man Tape	
101-AX	Intrus FIC	Planned in FY95	101-SY	Auto FIC	
102-AX	Man Tape		102-SY	Enraf	
103-AX	Intrus FIC	Planned in FY95	103-SY	Enraf	
104-AX	Man Tape	Planned in FY95	101-T	Auto FIC	Planned in FY95
101-AY	Auto FIC	Planned in FY96	102-T	Enraf	<u>Installed on TMACS: FY94</u>
102-AY	Auto FIC	Planned in FY96	103-T	Auto FIC	Planned in FY95
101-AZ	Auto FIC	Planned in FY96	104-T	Man Tape	
102-AZ	Auto FIC	Planned in FY96	105-T	Intrus FIC	Planned in FY95
101-B	Intrus FIC	Planned in FY96	106-T	Intrus FIC	Planned in FY95
102-B	Auto FIC	Planned in FY96	107-T	Enraf	Planned in FY95
103-B	Intrus FIC	Planned in FY96	108-T	Man Tape	Planned in FY95
104-B	Man Tape		109-T	Enraf	Planned in FY95
105-B	Man Tape		110-T	Intrus FIC	Planned in FY95
106-B	Auto FIC	Planned in FY96	111-T	Auto FIC	
107-B	Man Tape		112-T	Auto FIC	Planned in FY95
108-B	Intrus FIC	Planned in FY96	201-T	Man Tape	
109-B	Man Tape		202-T	Man Tape	
110-B	Man Tape		203-T	Man Tape	
111-B	Intrus FIC	Planned in FY96	204-T	Man Tape	
112-B	Auto FIC	Planned in FY96	101-TX	Auto FIC	Planned in FY96
201-B	Man Tape		102-TX	Man Tape	
202-B	Man Tape		103-TX	Intrus FIC	Planned in FY96
203-B	Man Tape		104-TX	Auto FIC	Planned in FY96
204-B	Man Tape		105-TX	Man Tape	
101-BX	Man Tape		106-TX	Man Tape	
102-BX	Man Tape		107-TX	Auto FIC	Planned in FY96
103-BX	Auto FIC	Planned in FY95	108-TX	Intrus FIC	Planned in FY96
104-BX	Auto FIC	Planned in FY95	109-TX	Intrus FIC	Planned in FY96
105-BX	Intrus FIC	Planned in FY95	110-TX	Man Tape	
106-BX	Enraf	<u>Installed on TMACS: FY94</u>	111-TX	Man Tape	
107-BX	Auto FIC	Planned in FY95	112-TX	Man Tape	
108-BX	Man Tape		113-TX	Man Tape	
109-BX	Auto FIC	Planned in FY95	114-TX	Man Tape	
110-BX	Man Tape		115-TX	Man Tape	
111-BX	Man Tape		116-TX	Man Tape	
112-BX	Auto FIC	Planned in FY95	117-TX	Man Tape	
101-BY	Man Tape		118-TX	Intrus FIC	Planned in FY95
102-BY	Man Tape		101-TY	Intrus FIC	Planned in FY95
103-BY	Man Tape		102-TY	Auto FIC	Planned in FY95

APPENDIX B: CASS Real-Time Instruments (Continued)

104-BY	Man Tape		103-TY	Intrus FIC	Planned in FY95
105-BY	Man Tape		104-TY	Auto FIC	Planned in FY95
106-BY	Man Tape		105-TY	Man Tape	
107-BY	Man Tape		106-TY	Man Tape	
108-BY	Man Tape		101-U	Man Tape	
109-BY	Auto FIC	Planned in FY95	102-U	Intrus FIC	Planned in FY95
110-BY	Man Tape		103-U	Enraf	Planned in FY95
111-BY	Man Tape		104-U	Man Tape	
112-BY	Man Tape		105-U	Enraf	Planned in FY95
101-C	Man Tape		106-U	Enraf	Planned in FY95
102-C	Intrus FIC	Planned in FY95	107-U	Enraf	Planned in FY95
103-C	Enraf	Planned in FY95	108-U	Intrus FIC	Planned in FY95
104-C	Auto FIC	Planned in FY95	109-U	Enraf	Planned in FY95
105-C	Auto FIC	Planned in FY95	110-U	Intrus FIC	Planned in FY95
106-C	FIC, Enraf	Installed on TMACS: FY95	111-U	Intrus FIC	Planned in FY95
107-C	Auto FIC	Planned in FY95	112-U	Man Tape	
108-C	Man Tape		201-U	Man Tape	
109-C	Man Tape		202-U	Man Tape	
110-C	Man Tape		203-U	Man Tape	
111-C	Man Tape		204-U	Man Tape	
112-C	Man Tape		S-302	Intrus FIC	
201-C	Man Tape		S-302-A	Intrus FIC	
202-C	Man Tape		S-304	Man FIC	
203-C	Man Tape		TX-302-C	Auto FIC	
204-C	Man Tape		TX-302-B	Man Tape	
A-302-A	Man FIC		U-301-B	Auto FIC	
A-302-B	Man Tape		UX-302-A	Man FIC	
311-ER	Man FIC				
VENT STA.	Man Tape				
151-AZ	Auto FIC				
154-AZ	Man Tape				
216-B-3	Man Tape				
216-B-3A	Man Tape				
216-B-3B	Man Tape				
216-B-3C	Man Tape				

2.0 Alarm Interface Stations (800 alarms)

2750E	(4)		Vent Station	(9)	
241-A-271	(100)	FY95 to TMACS	242-S	(58)	FY95 to TMACS
242-A	(130)		224-SX-271	(25)	
241-AN-271	(77)		241-SY-271	(20)	
241-AP-271	(96)		244-SY-271	(16)	
204-AR	(14)		242-T	(35)	FY96 to TMACS
244-AR	(36)		241-U-271	(15)	FY96 to TMACS
241-AW-271	(56)		East Gamewell Loop	(16)	
241-BY-254	(23)		West Gamewell Loop	(10)	
241-CR-271	(24)	FY95 to TMACS			

3.0 CASS Water Meters (9)

W-241-A	(no schedule)	W-271-CR	(no schedule)
W-AX-AY-AZ	" "	W-241-S	FY95 to TMACS
W-TGE-01	" "	W-241-T	(no schedule)
W-241-B	" "	W-241-U	" "
W-241-BY	" "		

APPENDIX B: CASS Real-Time Instruments (Continued)

4.0 CASS Temperature Sensors (69 Tanks)200 East

101-A	FY95 to TMACS
102-A	" " "
103-A	" " "
106-A	" " "
101-AN	<u>transferred to TMACS in FY94</u>
102-AN	" " " " " "
103-AN	" " " " " "
104-AN	" " " " " "
105-AN	" " " " " "
106-AN	" " " " " "
107-AN	" " " " " "
101-AP ¹	FY96 to TMACS
102-AP ¹	" " "
103-AP ¹	" " "
104-AP ¹	" " "
105-AP	" " "
106-AP	" " "
107-AP	" " "
108-AP	" " "
101-AW	FY95 to TMACS
102-AW	" " "
103-AW	" " "
104-AW	" " "
105-AW	" " "
106-AW	" " "
101-AX	FY95 to TMACS
102-AX	" " "
103-AX	" " "
104-AX	" " "
101-AY	FY96 to TMACS
102-AY	" " "
101-AZ	FY96 to TMACS
102-AZ	" " "

200 West

101-S	FY95 to TMACS
102-S	" " "
103-S	" " "
105-S	" " "
106-S	" " "
107-S	" " "
108-S	" " "
109-S	" " "
110-S	" " "
111-S	" " "
112-S	" " "
101-SX	FY95 to TMACS
102-SX	" " "
103-SX	" " "
104-SX	" " "
105-SX	" " "
106-SX	" " "
107-SX	" " "
108-SX	" " "
109-SX	" " "
110-SX	" " "
111-SX	" " "
112-SX	" " "
114-SX	" " "
101-SY	<u>transferred to TMACS in FY95</u>
102-SY	" " " " " "
103-SY	" " " " " "
102-U	FY95 to TMACS
103-U	" " "
105-U	" " "
106-U	" " "
107-U	" " "
108-U	" " "
109-U	" " "
110-U	" " "
111-U	" " "

¹ Temperatures Currently Functional on CASS

APPENDIX C: Other Tank Farm Projects

Note: Some project references may be out-of-date.

PROJECT	TITLE
W-314A	Tank Farm Integrated Instrumentation System Upgrade
W-314B	Double Shell Tank Ventilation Upgrades
W-314C	Waste Transfer Systems Upgrade
W-314D	Tank Farm Electrical Upgrade
W-314E	Centralized Maintenance Facilities
W-314F	Single Shell Tank Ventilation Upgrades
W-314G	Radiation Zone Lighting Upgrades
B-595	Hanford Waste Vitrification Plant
W-236B	Initial Pretreatment Module
W-303	Multi-purpose Processing and Storage Complex
W-260	Multi-Tank Waste Storage
2009	Proposed Steam Plant
W-022	Regulated Equipment Maintenance Facility
W-062	Tank AP-104 Upgrade
W-116	Support Facility
W-118	Portable Instrument Houses
W-182	272-AW Facility Upgrade
W-200	200W Tank Farm Instrument Upgrade
W-213	Vault Support Equipment
W-223	Tank Farm Support Control & Data Acquisition
W-224	Local Area Network (LAN)
W-228	Spectral Gamma Analysis System (SGAS)
W-257	Raw/ Sanitary Water Line
W-299	GPF Utilities Upgrades (EXP)
W-307	Portable Instrument House #4 (CE)
W-308	Exhauster #2 and #3 (CE)
W-309	Vault #104 and #105 Support Equipment (CE)
W-315	Pilot Scale Retrieval
W-316	NACW In-Tank Washing System (AZ-101 & 102)
W-???	Contamination Zone Reduction & Alarm Upgrade
W-???	DACS-2