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WRAP FACILITY MODULE 1 DATA MGMT SYSTEM SOFTWARE
REQUIREMENTS SPEC

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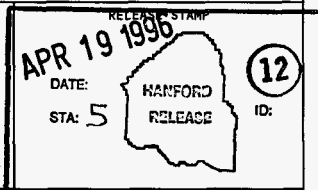
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Page 1 of 2

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Waste Receiving and Processing Facility Module 1 Data Management System Software Requirements Specification

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Abstract: This document provides the software requirements for Waste Receiving and Processing (WRAP) Module 1 Data Management System (DMS). The DMS is one of the plant computer systems for the new WRAP 1 facility (Project W-0126). The DMS will collect, store and report data required to certify the low level waste (LLW) and transuranic (TRU) waste items processed at WRAP 1 as acceptable for shipment, storage, or disposal.

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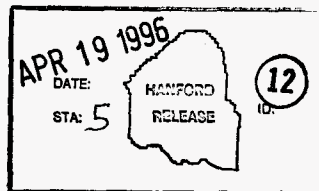
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SOFTWARE REQUIREMENTS SPECIFICATION
PROJECT W026

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WRAP MODULE 1 DATA MANAGEMENT SYSTEM
SOFTWARE REQUIREMENTS SPECIFICATION**1.0 INTRODUCTION**

The Waste Receiving and Processing (WRAP) Module 1 Data Management System (DMS) Software Requirements Specification (SRS) constitutes the software requirements for the DMS. Information in this document will be used in the software design of the automated system.

The DMS SRS will undergo reviews in order to comply with the Quality Assurance (QA) program WHC-CM-4-2, Quality Assurance Manual, QR 19.0, and the verification and validation process that is required for the development of the DMS. This document will be revised as necessary to reflect any changes or additions to the DMS requirements.

Contents of this document follows the guidance in IEEE 830-1984, IEEE Guide to Software Requirements Specifications.

1.1 PURPOSE

The purpose of this document is to define the essential requirements of the DMS software to be provided to the WRAP 1 Project, W-026, as one of the development components of the DMS software development project. Another development component is the software project management plan (SPMP) that delineates project tasks, deliverables, schedules, and costs. Software development project deliverables include such items as the software design document, code development, system implementation, reviews and audits, test plans, training plans, and system documentation (e.g., system user manual).

The DMS software requirements specifications serve as direct input to the software detailed design. The document also provides the basis for a significant portion of the DMS V&V program. To fulfill these objectives, the SRS must to the extent possible contain complete and verifiable requirements.

This SRS provides to the DMS software 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.

1.2 SCOPE

The scope of this document is limited to a definition of the software requirements for the DMS. The software requirements in this document are for the entire DMS and no distinction is made between procured software and application software to be developed during this project.

The software products to be produced are applications software for the DMS. Host software products (i.e., relational database management system) and peripheral host products (i.e., forms and report generating software to aid developers) will be provided for systems developers.

The software requirements in this document are derived from and consistent with the DMS functional and interface requirements documented in the *Functional Design Criteria (FDC) for the Waste Receiving And Processing (WRAP) Facility Module 1*, WHC-SD-W026-FDC-001, the *WRAP 1 Supplemental Design Requirements Document*, WHC-SD-W026-SDRD-001, and the *WRAP 1 Computer Interface Definition Document*, WHC-SD-W026-CSWD-001, Rev.0.

To support these requirements, the applications development has the following further general goals:

1. To acquire a relational database management system (RDBMS) product that will support the user's needs for reliable and consistent data.
2. To provide other software products to enhance the user's need for analysis and display of information (e.g., graphics and report writer capabilities).
3. To minimize user response time for data entry and reporting.
4. To reduce data redundancy and thus reduce any debate over which data sets are correct.
5. To provide data entry capability within the user's work areas so that data are entered at the source.
6. To minimize the hard copy documentation required to process and dispose of waste processed through the WRAP 1 facility.

1.3 OVERVIEW

The general structure of this document is to progress from a description of the DMS environment to the specific software requirements necessary to support the functionality of the system.

Chapter 2.0 contains descriptive information on the DMS product function, user characteristics, constraints, assumptions, and dependencies.

Chapter 3.0 defines the specific requirements that the system software must satisfy. Detailed software functionality is contained in Section 3.1, the required performance characteristics can be found in Section 3.2, and external interface requirements are contained in Section 3.3. Additional information presented in Chapter 3.0 includes design constraints, software system attributes and the future requirements of the project.

Chapter 4.0 contains project references.

Chapter 5.0 contains acronyms and a glossary.

Appendix A provides a requirements traceability matrix which relates the requirement in this document to the requirements in the *WRAP 1 Functional Design Criteria* (WHC 1993a) and the *WRAP 1 Supplemental Design Requirements Document* (WHC 1993d).

1.4 DEFINITIONS

Definitions and terminology used in this document follow IEEE 610.12-1990, Glossary of Software Engineering Terminology. Deviations or additions are defined in Section 5.2.

2.0 GENERAL DESCRIPTION

This chapter summarizes the user needs that are the basis for the development of the DMS. The primary purpose of this chapter is to provide information that will make the specific requirements in the next section easier to understand. Although the information in this chapter is intended to be complete, Chapter 3.0 constitutes the specific requirements agreed upon by the user and developer of DMS. The information in this chapter is not to be construed as implying any specific software requirements that are not explicitly stated in Chapter 3.0, Specific Requirements.

2.1 PRODUCT PERSPECTIVE

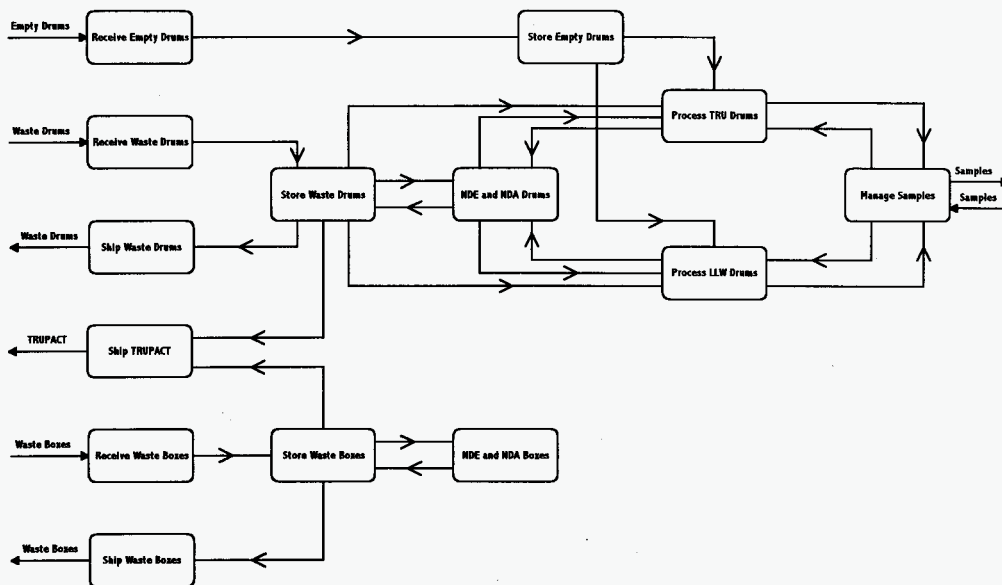
The WRAP Module 1 facility will receive, examine, assay, sample, characterize, provide for limited treatment, repackage, and ship contact handled suspect transuranic (TRU) waste currently in retrievable storage. The facility will also be used to confirm/verify newly generated contact handled TRU and Low-Level Waste (LLW). Certified TRU waste will be packaged in TRUPACT II containers for shipment to WIPP. A top-level WRAP 1 Process Flow diagram is shown in Figure 1. The planned mode of operation for the facility has been documented in *Waste Receiving and Processing Module 1 Operating Plan*, WHC-SD-W026-SD-001.

The DMS is one of the plant computer systems being provided under Project W-026, WRAP Module 1. The DMS hardware and the Plant Control System (PCS) hardware and software will be provided by Systems Interface Incorporated (SII), subcontractor to PCL Construction Services, the General Construction Contractor for WRAP 1. Systems Interface Incorporated has selected Hewlett Packard HP 9000 computers for both the PCS and the DMS.

The DMS will provide the primary data collection, tracking, presentation, and storage capability for waste stored at the WRAP 1 facility. The DMS will interface to the Solid Waste Information and Tracking System (SWITS) database over Hanford Local Area Network (HLAN) to acquire the initial data on drums and boxes arriving at the WRAP 1 facility and will update the SWITS database with the necessary certification data on shipments of waste from the WRAP 1 facility. The DMS will communicate with the WRAP 1 PCS, the drum non-destructive assay (NDA) System Integration Equipment (SIE) and the box NDA Boxed Waste Assay system (BWAS) over the WLAN to provide the other systems with required data and to receive location and certification data. Terminals located throughout the plant will be used to review and enter data. Figure 2 contains a context diagram showing the DMS data interfaces. Figure 3 is a system architecture diagram showing the DMS communication interfaces. The DMS computer (server) must communicate with all of the computers and terminals on this drawing.

Due to the similarity of the DMS data and reporting requirements with those of SWITS, the DMS will, as much as possible, utilize the data structures of the SWITS Oracle database. The DMS design will also incorporate appropriate SWITS applications, screens, and reports. Although the DMS will use much of the same structure and screens as SWITS, it must be developed so as to operate as much as possible as an independent, stand-alone system. Final determination of specific database structures, applications, screens,

WRAP 1 PROCESS FLOW



wraproc.rxd

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Figure 1. WRAP 1 Process Flow.

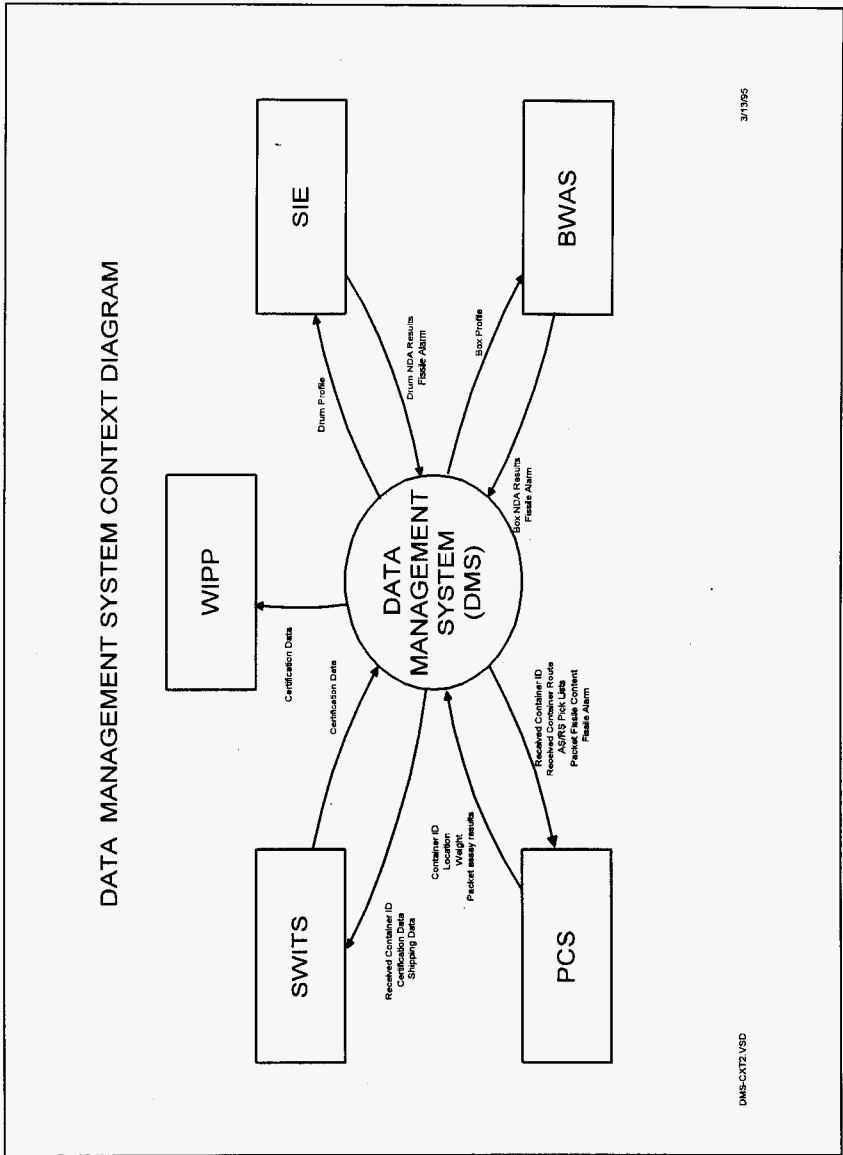


Figure 2. Data Management System Context Diagram.

WRAP 1 DATA MANAGEMENT SYSTEM COMMUNICATION INTERFACES

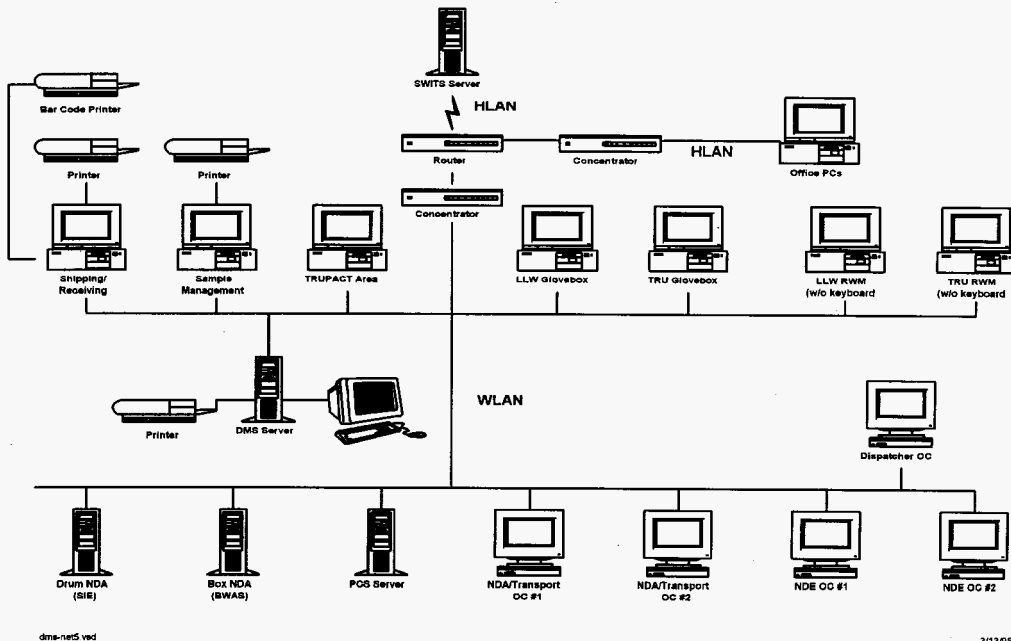


Figure 3. Data Management System Communications Interface.

and reports to be utilized will be done during detailed design. The DMS system will comply with current SWITS data standards and data element naming criteria.

2.2 PRODUCT FUNCTIONS

The WRAP 1 DMS is required to collect, store, and report data related to certification, tracking, packaging, repackaging, processing, and shipment of waste processed or stored at the WRAP 1 facility. Specific functions to be provided by the DMS include the following:

1. Maintain verification and certification records for all waste processed through the WRAP 1 facility.
2. Support receipt of waste and empty drums at WRAP 1.
3. Support shipment of waste from WRAP 1.
4. Maintain an inventory of all waste items at the WRAP 1 facility.
5. Maintain sample tracking information (chain of custody).
6. Provide waste profile data to the NDA systems and data collection functions for the NDE and NDA operations.
7. Support process area glovebox operations through waste tracking, data input, and reporting.
8. Provide facility and glovebox inventory limits checking for the WRAP 1 facility.
9. Provide an Automatic Stacker/Retriever System (AS/RS) pick list functionality for the WRAP 1 facility.
10. Provide system security.
11. Provide system maintenance capabilities.
12. Provide for communications over the WRAP local area network (WLAN) and HLAN.
13. Provide a facility performance data reporting capability (drums/shift, waste reduction factors, etc) .

2.3 USER CHARACTERISTICS

The users of the DMS software applications will be:

1. WRAP 1 operations personnel. They will be using data presentation and data entry screens to perform their operational tasks. Their primary concerns will be to perform their assigned tasks and not be concerned with the internal operation of the DMS. Operations

personnel using this system will be required to have a general working knowledge of computers and minimal typing skills.

2. WRAP 1 management and support personnel. They will be using data presentation and data entry screens to review and update data and to generate reports. These personnel will be required to have a general working knowledge of computers and minimal typing skills.

2.4 GENERAL CONSTRAINTS

This section provides a general description of items that limit the developers' options in designing the system. It is not intended to state specific requirements or design constraints but provides the basis for specific requirements.

Approval Designator. The DMS has been assigned a Approval Designator Q. In accordance with this assessment, the software development project must adhere to the requirements identified in WHC-CM-4-2, Quality Assurance Manual, QR 19.0, WHC-CM-6-1, Standard Engineering Practices, EP-2.1, and WHC-CM-3-10, Software Practices.

Auditability. For selected data elements, the system must maintain an audit trail of data changes. These data elements will be identified during detailed design.

Security. Qualified users will successfully access the DMS through the use of user names and passwords. User update privileges for specific screens shall be restricted through the assignment of user roles. These roles will be identified during system design.

Data/System Recovery. The DMS will be equipped with complete and comprehensive data recovery capability. In the event of a single component failure, such as a failed disk drive, users will experience no data loss except the current entry or modification data that was being entered at the time of failure. For multiple component failures it may be necessary to restore to the previous system backup.

System Communication. Communication protocols between computer systems will require verification of acceptance at the application level. Following system failures, resynchronization of systems' states will be required.

2.5 ASSUMPTIONS AND DEPENDENCIES

The major assumptions for this project are that a suitable development hardware platform and software products will be available at the time software coding is due to begin and that the production hardware will be available for DMS software testing by the development team prior to the start of facility integration testing. Additionally, analysts will require training on any new products that will be used for the project, including the operating system software and Oracle.

3.0 SPECIFIC REQUIREMENTS

The specific requirements that must be satisfied by the DMS software are stated in this chapter. The objective is to provide the details the software developer will need to create a design. In order to do this, the requirements must be complete and unambiguous. Any requirements that are not completely defined or appear as new requirements during the design phase will be added to the DMS SRS via engineering change to this document.

Each requirement must also be stated in such a way that its achievement can be objectively verified.

3.1 FUNCTIONAL REQUIREMENTS

This section describes the functional requirements for the WRAP 1 DMS software. The section is divided into the major DMS facility activities.

It should be pointed out that as a general rule, the user will log on with a User Name/Password combination to the system to use it. Various levels of access authority will be provided by the system. The specific roles for password authority will be determined during detailed design. The use of a Signature Password (different from the logon Password) is used on certain screens to authenticate or validate the data or commit the operation. This "Signature Password" to the system is only valid for that function and its data. If the same function is called up again, a Signature Password will have to be entered again at the appropriate time.

Inputs:

- A. A User performs "Power Up" of the DMS terminal.
- B. An Authorized User inputs a name and password authorizing that the DMS system/terminal be put in use. Based on the user's role, update or read only privileges will be provided for authorized screens.

Processing:

- A. Validate the User Password to log on to the DMS system.
- B. Generate the "WRAP 1 DMS Main Menu" screen on the terminal that was just powered up. (Menu accessibility to be consistent with the user's role)

Outputs: Display the "WRAP 1 DMS Main Menu" screen.

3.1.1 Receiving

Receiving is the processing of waste drums, waste boxes, and empty drums into the WRAP 1 facility at the receiving dock. This process ensures that the container labels are all intact, the location/relocation history on SWITS is updated, the waste container is on a process pick list, the waste container

has been assigned a routing code, and the dose equivalent curie inventory for the facility is updated with each waste container's dose equivalent curies.

3.1.1.1 Print Bar Code Package ID Labels. Print the bar code labels to replace damaged or missing bar code labels on received drums and boxes.

3.1.1.1.1 Inputs.

- A. Select the "Bar Code Generator" screen from the "WRAP 1 DMS Main Menu."
- B. Enter the Drum or Box Package Identification Number (PIN) on the Bar Code Generator screen.

3.1.1.1.2 Processing.

- A. Generate the "Bar Code Generator" screen at the Shipping/Receiving terminal.
- B. Convert the PIN alphanumerics to a bar code representation for the bar code printer which complies with the applicable WHC standard.

3.1.1.1.3 Outputs.

- A. Display the "Bar Code Generator" screen.
- B. Print the bar code on the bar code printer.

3.1.1.2 Receiving Drum or Box Containers. Process drum or box containers into the WRAP 1 facility at the receiving dock.

3.1.1.2.1 Logging Received Drum or Box Containers. Log the received drum or box containers on the loading dock into the WRAP 1 facility.

3.1.1.2.1.1 Input.

- A. Select the "Container Receiving" screen from the "WRAP 1 DMS Main Menu" screen.
- B. The drum or BOX PINs are received as a block input from the PCS or as manual input on the "Container Receiving" screen:

3.1.1.2.1.2 Processing. Generate the "Container Receiving" display screen for the Shipping/Receiving terminal. Allow deletion or addition of PINs or modification of the list.

3.1.1.2.1.3 Outputs. Display the "Container Receiving" screen with the drum or box container PINs at the Shipping/Receiving terminal for comparison to the hard copy shipping papers.

NOTE: The user needs to resolve any PIN discrepancies.

3.1.1.2.2 Confirm Data on SWITS. Confirm that SWITS has required data on the received drums or boxes.

3.1.1.2.2.1 Inputs.

- A. A request by the user to confirm that required data on the received drums or boxes is on SWITS. This request is performed from the "Container Receiving" screen.
- B. Manual correction of PIN errors as necessary to correct SWITS rejection messages.

3.1.1.2.2.2 Processing.

- A. Query the SWITS database to confirm that required data for each of the received drums or boxes is in the SWITS database.
- B. Generate error messages on the "Receiving" screen, including containers not on Processing List or TRUPACT Assembly List. (User needs to go to Section 3.1.6.2 to resolve Processing List discrepancies and Section 3.1.6.8 to resolve TRUPACT Assembly List discrepancies.)
- C. Calculate the dose equivalent curie inventory for the facility using the SWITS values for the received containers, using the calculations in Section 3.1.7.

3.1.1.2.2.3 Outputs.

- A. Display on the "Receiving" screen whether the required data for each of the (inner and outer) drums or boxes is on SWITS.
- B. Generate an alarm on the "Receiving" screen if the facility dose equivalent curie limit is exceeded. (Pop-up screen from Section 3.1.7.2.3)

3.1.1.2.3 Section Deleted

3.1.1.2.4 Retrieve Drum or Box Container Data from SWITS. Retrieve drum or box container certification data from SWITS on all received containers.

NOTE: Any location update problems will have to be resolved by the user at the Shipping/Receiving terminal with SWITS before the receiving process can continue.

3.1.1.2.4.1 Inputs.

- A. A request by the user on the "Container Receiving" screen at the Shipping/Receiving terminal to request the certification data from SWITS on all received drums or boxes.
- B. Signature Password.

3.1.1.2.4.2 Processing.

- A. Validate Signature Password.

- B. Retrieve data from the SWITS database using the applicable inner and outer PINs as the keys to the drum or box container data.
- C. Update the location on SWITS for the drums and boxes to WRAP 1.

3.1.1.2.4.3 Outputs. Display the "request for certification data" message on the "Container Receiving" screen.

3.1.1.2.5 Generate DMS Drum or Box Container Records. Using the requested data from the SWITS database, generate the DMS drum or box container data records. Update the facility dose equivalent curie inventory to include the received drums or boxes and send facility curie level message to the PCS. Send container location message to the PCS to add the drums or boxes to the PCS database.

3.1.1.2.5.1 Inputs. Requested data from the SWITS database.

3.1.1.2.5.2 Processing.

- A. Generate messages on the "Container Receiving" screen for the Shipping/Receiving terminal indicating the completion of the following tasks.
- B. Generate the drum or box container data records in the DMS database with the requested SWITS data.
- C. Update WRAP status code to "W".

3.1.1.2.5.3 Outputs.

- A. Display the "Container Receiving" screen.
- B. Send the accepted drum or box container PINs and location (receiving dock) to the PCS to update its database.
- C. Update the "Container Receiving" screen notifying the user that the drums or boxes have been accepted for processing.
- D. Generate an alarm on the "Receiving" screen if the facility dose equivalent curie limit is exceeded. (Pop-up screen from Section 3.1.7.2.3)
- E. Send facility curie level message to the PCS. (Section 3.1.7.2.3)

3.1.2 NDE/NOA Operations

Provide operational data and data collection functions for the NDE/NOA operations.

3.1.2.1 Drum or Box Container NDE Operation. The drum or box container NDE equipment is used to provide the user with x-ray images of the container contents. These images along with the container data will allow the user to make a determination as to whether the container should be marked compliant or non-compliant and expand, if necessary, the container data.

The tracking of waste transfers to and from the drum or box NDE equipment are covered under section 3.1.8.

3.1.2.1.1 Drum or Box Container NDE Data. This section displays the selected drum or box container data to the NDE user to support the drum or box NDE analysis.

3.1.2.1.1.1 Inputs.

- A. User request for the "NDE" screen from the "NDE/NOA" screen.
- B. User request data for the drum or box located at one of the NDE drum or box vaults (container PIN number provided automatically from DMS database), or
- C. User request for the data associated with a specific drum or box container PIN not present in the NDE vault (manual entry of container PIN).

3.1.2.1.1.2 Processing.

- A. Generate a "NDE" screen.
- B. Determine the PIN of the container if a location was chosen.
- C. Using the selected drum or box container PIN as the primary key, retrieve and display the data needed by the NDE user from the DMS database.

3.1.2.1.1.3 Outputs. Display the applicable data for the selected drum or box container on the "NDE" screen for the NDE user.

3.1.2.1.2 Drum or Box Container NDE Results. This section inputs the contents data, image information, verified/not verified status, compliant/non-compliant status for the selected drum or box container to support the drum or box NDE analysis. This function uses the "NDE" screen generated in section 3.1.2.1.1.

3.1.2.1.2.1 Inputs.

NDE user comments, image information, verified/not verified status, and compliant/non-compliant status are added as inputs to the drum or box container "NDE" screen.

3.1.2.1.2.2 Processing.

- A. Format the NDE user input for the DMS database using the drum or box container PIN as the primary key.
- B. Add the NDE user input to the DMS database against that drum or box container PIN.

3.1.2.1.2.3 Outputs.

- A. Display the "NDE" screen with all old and newly generated NDE information available for the container PIN being examined.
- B. Display the confirmation of the NDE user update to the DMS database.

3.1.2.2 Drum or Box Container NDA Operation. The drum or box NDA operation consists of assaying the drum or box to determine its isotope content and associated Alpha Ci, PE Ci, and Pu-239 fissile gram equivalent (FGE) measurements. Then, the total beta/gama Ci, alpha Ci, PE Ci and Pu-239 FGE is computed and returned. The drum NDA is done by the SIE (System Interface Equipment) controller and the box NDA is done by the BWAS.

The SIE controller has four subsystems, the two PAN (Passive Active Neutron) and two GEA (Gamma Energy Assay) systems, which measure and calculate the drum Fissile Gram Equivalents for the isotopes identified. The DMS sends the drum characterization and isotopic quantity data, if available, to the SIE and the SIE returns the calculated results to the DMS. The SIE compares the calculated results with the provided quantitative data and flags discrepancies.

The BWAS contains the equivalent of both the PAN and GEA in the same measurement vault. The DMS sends the box characterization data and the isotopic quantity data, if available, to the BWAS and the BWAS returns the calculated results to the DMS.

See 3.1.8.1.2 for DMS transfer of data to the SIE prior to assay.

3.1.2.2.1 Drum or Box Container NDA Data Revisit. Send the drum or box characterization data and DMS quantitative data (if available) to the SIE or BWAS to support the manual revisit of NDA data for drums or boxes.

3.1.2.2.1.1 Inputs.

- A. User request for the "NDA" screen from the "WRAP 1 DMS Main Menu" screen.
- B. The user will request the characterization and quantitative data associated with a drum or box container PIN to be transferred to the SIE/BWAS.

3.1.2.2.1.2 Processing.

- A. Generate the "NDA" screen.

- B. If the selected drum is an overpack, identify the PIN of the waste drum.
- C. Using the waste drum or box container PIN as the primary key, retrieve and transfer the data (characterization and quantitative) needed by the SIE or BWAS for its assay data revisit include the purpose of the assay, i.e. REVISIT.

3.1.2.2.1.3 Outputs.

- A. Display the "NDA" screen with the characterization and quantitative data for the chosen container.
- B. Send the retrieved waste drum or box characterization data and isotopic quantity data to the SIE or BWAS along with the purpose of the assay, REVISIT

3.1.2.2.2 Drum or Box Container NDA Results. Receive and display NDA drum or box assay results from the SIE or BWAS.

3.1.2.2.2.1 Inputs.

- A. Drum or box PIN with computed results from the SIE or BWAS including isotopic quantity data, and comparison with previous isotopic quantity data (if available). Date and time stamps for the assay will also be provided.
- B. Non-Listed Long Lived nuclide detected message may be received from SIE or BWAS.
- C. User request for the "NDA" screen from the "WRAP 1 DMS Main Menu" screen if required.
- D. User request to view assay results for specific drum or box.

3.1.2.2.2.2 Processing.

- A. Using the drum or box container PIN as the primary key, generate an assay record with the drum or box container results from the SIE or BWAS.
- B. If Non-Listed Long Lived nuclide detected message is received save this data in the database.
- C. Generate an update to the "NDA" screen which includes the requested results from the SIE or BWAS.
- D. If this is verification data, compare the plutonium equivalent curies, fissile equivalent grams, and decay heat to the existing certification data and display if the difference exceeds the measurement uncertainties.

3.1.2.2.2.3 Outputs.

- A. Forward the criticality alert alarm, if necessary, to PCS.

- B. Display the "NDA" screen.
- C. Display the assay data and verification check results for the requested drum or box to the NDA user.
- D. Display user comments.

3.1.2.3 NDA Verification and Background Containers. Two verification ("pink") drums which contain mixtures of known isotopic concentration will be processed through the PAN and GEA twice a day; once at the start of the shift and once at the end. Two background ("white") drums which contain waste matrices which are "clean" will be processed through the PAN and GEA at the start of the shift to verify that the facility background levels have not changed significantly since the last background check.

A verification ("pink") box which contains a mixture of known isotopic concentration will be processed through the BWAS just before and just after a series of box exams. A background ("white") box which contains waste matrices which are "clean" will be processed through the BWAS at the start of the shift to verify that the facility background levels have not changed significantly since the last background check.

The tracking of waste transfers to and from the drum or box NDA equipment are covered under section 3.1.8. Tracking of "pink" and "white" drum assay results will be performed via the assay components. QC data associated with these assays will be archived directly from the SIE.

3.1.3 Process Operations

Provide operational data and data collection functions for the process area gloveboxes.

3.1.3.1 LLW Process Glovebox. The LLW Process Glovebox is used to sort and sample the contents of waste drums designated as Low Level Waste (LLW). The sorting process removes those items that are non-compliant with the LLW burial requirements and transfers them to the LLW restricted waste management (RWM) Glovebox. Samples are taken of the compliant waste to verify that the waste is not hazardous. Compliant waste drums are then compacted into pucks, if possible, to reduce the volume and then as many pucks as possible are placed in a loadout drum.

All tracking of waste transfers to and from the LLW process glovebox are covered under section 3.1.8.

3.1.3.1.1 LLW Entry Glovebox. This section addresses the accessing of waste drums into the LLW processing line via the LLW Entry glovebox. This operation only covers the work required to remove the drum from the overpack and access it to the sorting glovebox for processing. The inner drum is removed from the overpack and the overpack drum is checked for contamination. The DMS receives a drum contamination status message from the PCS and the drum contamination status is stored in the database (see 3.1.8).

Waste drums accessed to the Sorting glovebox from the Entry glovebox will be transferred to either the compactor for waste not required to be opened or the

drum delid station and sorting table for those drums which require sorting/sampling. The drum destination depends on two flags, "sample/don't sample" based on random sampling of drums from the same batch and "compliant/non-compliant" based on NDE results. It is anticipated that approximately 25% of the drums entering this glovebox will be transferred straight through to the Compaction glovebox without being opened.

3.1.3.1.1.1 Inputs. User requests "LLW Glovebox - Drum Status at Entry" from the "Process Operations" menu

3.1.3.1.1.2 Processing. Generate the "LLW Glovebox Drum Status at Entry" screen with the PIN of the outer drum and the PIN of the inner drum (if overpacked) currently at the LLW Glovebox Entry port. Also, display on the screen whether sorting is required.

3.1.3.1.1.3 Outputs. Display the "LLW Glovebox Drum Status at Entry" screen.

3.1.3.1.2 Section Deleted.

3.1.3.1.3 LLW Sorting Glovebox Sorting Table Operations. This section covers the dumping of the waste onto the LLW glovebox sorting table, reviewing existing DMS data on the waste contents, modifying the contents inventory as required, and repackaging the compliant waste into the original waste container.

3.1.3.1.3.1 Inputs.

- A. The user selects the "LLW Sorting" screen from the "Process Operations - LLW Glovebox" menu.
- B. PINs of the drum at the sorting table and the drum at the non-compliant waste loadout port.
- C. Sorting glovebox user comments/ modifications for waste on the sorting table.
- D. User Signature Passwords.

3.1.3.1.3.2 Processing.

- A. Generation of the "LLW Sorting Table" screen with the PIN of the drum at the LLW Sorting Table, whether sampling is required, and whether the drum is compliant.
- B. Update database with comments and drum contents modifications.

3.1.3.1.3.3 Outputs. Display the "LLW Sorting Table" screen.

3.1.3.1.4 LLW Sorting Glovebox Non-compliant Waste Processing. Waste drums that have been designated as "Non-compliant" will have the non-compliant item identified while the waste is on the sorting table. The non-compliant waste packets will be identified, unique bar coded labels applied and then placed into the RWM transfer drum to be transported to the LLW RWM glovebox. Visual examination augmented by packet NDE will support this determination.

Relating the packet PIN to the RWM transfer drum and parent drum PINs is addressed in Section 3.1.8.

3.1.3.1.4.1 Inputs.

- A. The user requests the "LLW Non-compliant" screen from the "LLW Sorting Table" screen.
- B. Packet IDs from the PCS that have not been processed.
- C. User description of the waste contained in the waste packet.

3.1.3.1.4.2 Processing.

- A. Generation of the "LLW Non-compliant Packet" screen.
- B. Generate a display of packet PINs associated with the current RWM transfer drum.
- C. Update the "LLW Non-compliant Packet" screen with the user description of the waste.

3.1.3.1.4.3 Outputs. Display the "LLW Non-compliant Packet" screen.

3.1.3.1.5 LLW Sorting Glovebox Sample Processing. Waste drums that have been flagged for sample analysis will have their contents dumped on the LLW sorting table and the applicable samples taken. Drums that have had non-compliant packets removed may also require sampling. Sample Management activities are described in Section 3.1.4. Relating the sample container ID to the glovebox purge port ID and ultimately to the purge port transfer pig ID is addressed in Section 3.1.8.

3.1.3.1.6 LLW Compactor/Storage. The LLW compactor/storage locations include drum compaction operations and puck storage. LLW drums may bypass the compactor and be loaded out in 85 gallon drums. New puck bar code labels are attached to the puck or drum. Puck bar codes will be used as processing aids only. The original PIN will be retained for tracking of data in the DMS. Puck weight is recorded when the puck is first lifted by the puck grapple. The processing of location messages from the PCS is described in section 3.1.8.

3.1.3.1.7 Loadout/Storage of LLW Feed Drums/Pucks The LLW Exit operations consists of drum and puck loadout. LLW drums may bypass the compactor and be loaded out in LLW overpack drums. The puck or drum is picked up by the grapple from the compactor discharge position or a storage location and the weight read by the PCS is transferred to the DMS. When the drum or puck is placed in the product drum, a message relating the overpacked drum or puck and the loadout drum is sent from the PCS to the DMS. Relating the overpacked drum or pucks to the loadout drum is addressed in Section 3.1.8.5.

3.1.3.1.8 LLW Glovebox Product Drum Content Inventory Update. After the pucks/drum are loaded into the LLW product drum, the content inventory sheet for the product drum, generator profile data, etc, should be modified to reflect the actual contents of the product drum.

3.1.3.1.8.1 Inputs.

- A. User requests the "Exit Glovebox" screen from the "Process Operations - LLW Glovebox" menu.
- B. User request to consolidate the data from the drums placed in the product drum.-
- C. User review and modification, if necessary, of the product drum contents inventory and description.
- D. User entry of Drum seal number
- E. User Signature Password

3.1.3.1.8.2 Processing.

- A. Generate "LLW Exit Glovebox" screen.
- B. Combine contents inventories of all puck/drum containers placed in the product drum into one list.
- C. Input appropriate generator data into new product drum data fields.
- D. Validate User Signature Password.

3.1.3.1.8.3 Outputs.

- A. Display "LLW Exit Glovebox" screen with the above inputs and processing information.

3.1.3.2 LLW Restricted Waste Management. The LLW RWM Process Glovebox is used to sort, sample, and treat the contents of packets that were designated as non-compliant in the LLW Process Glovebox. The sorting process involves separating the non-compliant items from the compliant items that were packaged together in labeled packets from the LLW Process Glovebox. The non-compliant items are then screened for waste compatibility, sampled and stored to await sample results, or treated and disposed of. The compliant items are disposed of as LLW waste. Samples may be taken of the compliant waste to verify that the waste is not hazardous.

All tracking of waste transfers to the LLW RWM glovebox are covered under section 3.1.8, "Waste Inventory".

3.1.3.2.1 LLW RWM Separate Compliant from Non-compliant. This section describes the removal of packets from a transfer drum containing non-compliant waste as well as the inspection and sorting of the waste in the packets on the sorting table. First the user removes the non-compliant transfer stand from the transfer drum and sets it on the unloading tray. (The identification of the transfer drum at the LLW RWM entry port is covered in 3.8.1) Then the user removes a packet and scans it. Next the user removes the packet wrapping and separates the compliant items from the non-compliant items. Non-compliant items receive a bar code which are scanned to provide

the relationship to the packet. Compliant items are placed in the compliant items load out drum and the packet PIN noted.

The association of packets with non-compliant items or packets with load out drums is maintained in section 3.1.8.

3.1.3.2.1.1 Inputs.

- A. User requests the "LLW RWM Waste Sorting" screen from the "Process Operations - LLW RWM Process Glovebox" menu.
- B. Packet PINs from PCS following the reading of the packet bar code labels as the packets are removed from the transfer stand.
- C. Non-Compliant item PINs from the PCS following the reading of the item PINs as the bar code labels are applied.
- D. User entry of a description of the non-compliant items.
- E. User entry of contents inventory for compliant loadout drum.
- F. User Signature Password.

3.1.3.2.1.2 Processing.

- A. Generate the "LLW RWM Waste Sorting" screen for drum PIN at the LLW RWM entry port.
- B. Update the DMS database with the non-compliant item description.
- C. Update the DMS database with contents inventory for the compliant loadout drum.
- D. Validate the Signature Password.

3.1.3.2.1.3 Outputs. Display the "LLW RWM Waste Sorting" screen with the non-compliant item descriptions and the loadout drum contents inventory.

3.1.3.2.2 Aerosol Can Puncture and Drain. Aerosol cans are punctured and drained into a collection container on a one-to-one basis. The collection container will have a unique bar code label which is scanned and then the aerosol can is scanned as it is drained. The aerosol can may then be deposited in the compliant loadout drum as noted in Section 3.1.3.2.1. The liquid collected will be sampled and treated.

The association of the collection container with the aerosol can is maintained in section 3.1.8.

3.1.3.2.3 LLW RWM Glovebox Non-compliant Item Screening. Preliminary screening prior to sampling and storage of non-compliant waste in the RWM Storage carousel will be performed to support the storage of the waste and transfer of the waste samples to an analytical lab.

3.1.3.2.3.1 Inputs.

- A. User requests the "Field Screening" screen from the "LLW RWM Waste Repackaging" screen.
- B. Packet PIN and sample bottle ID from PCS.
- C. User entered preliminary screening results.
- D. User Signature Password.

3.1.3.2.3.2 Processing.

- A. Generate "Field Screening" screen.
- B. Update DMS database with data inputs when signature password is validated.

3.1.3.2.3.3 Outputs. Display "Field Screening" screen with the packet PINs, sample bottle IDs, and associated screening results.

3.1.3.2.4 LLW RWM Glovebox Sample Collection. Non-compliant items may be sampled. Sample Management activities are described in Section 3.1.4. Relating the sample container ID to the packet/non-compliant item and the glovebox purge port ID and ultimately to the purge port transfer pig ID is addressed in Sections 3.1.8.

3.1.3.2.5 Load Out Non-compliant to the RWM Storage Carousel. After all non-compliant items have been separated from the waste, containerized (if necessary), bar coded and scanned, screened, sampled, and "Added" back on the item transfer stand, the RWM transfer drum is ready to be loaded and sent to the RWM Storage Carousel to await sample analysis results.

Tracking the RWM transfer drum to and from buffer storage is covered in Section 3.1.8.

3.1.3.2.6 Perform Waste Treatment. At this point one or more Treatment Worksheets have been entered by a chemist (See SRS section 3.1.4.5). Each worksheet contains a list of items to be treated and the plant procedure to be used to treat the items. The RWM glovebox user will notify the user at the DMS LLW data entry terminal what worksheet number they will be using. The terminal user will pull up the list of available treatment worksheets and select the one indicated by the RWM glovebox user. The worksheet selected will indicate which transfer drums to retrieve and which DMS monitor to display the treatment details on (ASCII file).

The RWM transfer drums in the RWM Storage Carousel which contain items on the treatment list are scheduled by the AGV Transportation user back to the RWM glovebox for waste treatment one drum at a time until all listed items are assembled. The transfer stand is removed from the RWM transfer drum and placed at the treatment location to "Remove" the listed items and then placed back in the RWM transfer drum to be returned to the RWM Storage Carousel.

The DMS will display the PIN numbers of the transfer drum, and the PIN numbers of all packets to be retrieved from the container. As items are

"Removed" from the transfer stand (and sample containers removed from the purge port), they are scanned via a fixed bar code reader. The DMS screen is updated as each item is removed, and the PINs are removed from the transfer drum inventory. When all of the items to be treated are assembled, treatment details are then retrieved from an ASCII file and displayed on the DMS RWM monitor.

The transfer drum is considered empty when the inventory goes to zero. The tracking of packet/non-compliant items, samples, treatment containers and transfer drums is done in Section 3.1.8.

3.1.3.2.6.1 Inputs.

- A. User requests the "LLW RWM Treatment" screen from the "Process Operations - LLW RWM Process Glovebox" menu.
- B. User input of worksheet number from list of available worksheets.
- C. Messages from PCS with packet PINs and sample bottle IDs of items presented for treatment.
- D. User input of information concerning the treated waste such as waste description and treatment comments.
- E. User input of treatment results.
- F. User Signature Password.

3.1.3.2.6.2 Processing.

- A. Generate the "LLW RWM Treatment" screen.
- B. Display transfer drum PIN and PINs for all items to be removed from transfer drum on RWM glovebox DMS monitor. Indicate when each PIN has been removed from drum.
- C. Display worksheet instructions on the RWM glovebox DMS monitor.
- D. Validate the Signature Password.
- E. Commit the data collected on the "LLW RWM Treatment" screen to the DMS database after the signature password has been entered.
- F. Archive worksheet.

3.1.3.2.6.3 Outputs.

- A. Display the "LLW RWM Treatment" screen with the user input of treatment progress and results.
- B. Display the "LLW RWM Processing Instruction" screen on the RWM glovebox DMS monitor.

3.1.3.2.7 Loadout of Treated Waste. When the treatment of the non-compliant waste items is completed and the waste is ready to be removed from the glovebox, the user will access a PCS menu and note that waste load out operations are to commence. The PINs for all treated waste to be loaded out shall be scanned via a fixed bar code reader to associate the treated items to the drum located at the treated item load out port.

After the treated item load out drum containing treated waste is full, it is disconnected from the glovebox and the drum is sent to the NDE/NDA Area for examination. The drum may have a drum seal attached.

3.1.3.2.7.1 Inputs.

- A. User requests the "LLW RWM Treated Waste Load Out" screen from the "LLW RWM Process Glovebox" screen.
- B. Treatment container PINs from the PCS as they are placed in the treated item load out drum.
- C. User entry of a content inventory description of the treated waste as it is placed in the treated item load out drum.
- D. Enter the drum seal number.
- E. User Signature Password.

3.1.3.2.7.2 Processing.

- A. Generate the "LLW RWM Treated Waste Load Out" screen.
- B. Update the "LLW RWM Treated Waste Load Out" screen as information is input.
- C. Validate the Signature Password.
- D. Commit the data collected to the DMS database after the signature password has been entered.

3.1.3.2.7.3 Outputs. Display the "LLW RWM Treated Waste Load Out" screen with the container PINs and content inventory description.

3.1.3.3 TRU Process Glovebox. The TRU Process Glovebox is used to sort and sample the contents of waste drums designated as Transuranic (TRU) waste. The sorting process removes those items that are non-compliant with the TRU burial requirements and transfers them to the TRU RWM Glovebox. Samples are taken of the compliant waste to verify that the content inventory was correct and accurate or to create a new content inventory.

All tracking of waste transfers to and from the TRU process glovebox are covered under section 3.1.8. The tracking/management of fissile material inventory will be handled as discussed in Section 3.1.7.

Inputs: The user selects "TRU Process Glovebox" from the "Glovebox Operations" screen.

Processing: Generate the "TRU Process Glovebox" screen.

Outputs: Display the "TRU Process Glovebox" screen.

3.1.3.3.1 TRU Entry Glovebox. This section addresses the accessing of waste drums into the TRU processing line via the TRU Entry glovebox. This operation only covers the work required to remove the drum from the overpack and access it to the sorting glovebox for processing. The inner drum is removed from the overpack and the overpack drum is checked for contamination. The DMS receives a drum contamination status message from the PCS and the drum contamination status is stored in the database.

3.1.3.3.1.1 Inputs.

- A. "Drum Contamination Status" message from the PCS.
- B. User requests "TRU Glovebox - Drum Status at Entry" from the "Process Operations" menu

3.1.3.3.1.2 Processing:

- A. Update the overpack drum contamination status field (not "Processing Status" field) for the drum currently at the TRU drum entry port.
- B. Update the overpack drum container status to empty and delete the container relationship record between the overpack and the inner drum.
- C. Generate the "TRU Glovebox Drum Status at Entry" screen with the PIN of the outer drum and the PIN of the inner drum (if overpacked) currently at the TRU Glovebox Entry port. Also, display the FGE of the drum and the total FGE for the TRU Glovebox.

3.1.3.3.1.3 Outputs. Display the "TRU Glovebox Drum Status at Entry" screen.

3.1.3.3.2 TRU Sorting Glovebox Sorting Table Operations. This section covers the transfer of the drums from the Entry glovebox to the delid station, dumping of the waste onto the TRU glovebox sorting table, reviewing existing DMS data on the waste contents, modifying the contents inventory as required, and repackaging the waste into one of the two load out waste container(s).

3.1.3.3.2.1 Inputs.

- A. User requests the "TRU Sorting" screen from the "Process Operations - TRU Glovebox" menu
- B. PINs of drum at the sorting table and the drums at the two compliant loadout ports received from the PCS.

- C. TRU sorting glovebox user comments and waste descriptions for the compliant waste, including which TRU one-trip drum each compliant item from the sorting table went into.

- D. User Signature Passwords.

3.1.3.3.2.2 Processing.

- A. Generation of the "TRU Sorting Table" screen (original contents data and modified contents data for one of the load out ports).

- B. Update database with comments and drum contents modifications.

3.1.3.3.2.3 Outputs. Display the "TRU Sorting Table" screen with one-trip drum contents inventory displayed.

3.1.3.3.3 TRU Sorting Glovebox Non-compliant Waste Loadout. Waste drums that have been designated as "Non-compliant" will have the non-compliant item identified while the waste is on the sorting table. Visual examination augmented by packet NDE and on-line sampling techniques will support this determination.

Once the suspect non-compliant item has been identified, the packet will be placed in the Packet Assay Monitor (PAM). The PAM unit will perform a packet assay and report a Pu-240 equivalent value (along with uncertainty) to the PCS which then transfers the data to the DMS. The DMS will utilize the Pu-240 value to calculate the Pu-239 FGE of the waste packet and display this value on the TRU Process Glovebox DMS terminal. This value will be retained in a temporary file (available for review by the Sorting glovebox user) until it is determined whether or not the packet is compliant or non-compliant.

If the waste packet is determined to be compliant (per PCS menu selection) the assay data is discarded by the DMS when the next PAM message is received from the PCS. If the packet is determined to be non-compliant, the PCS will send a non-compliant item message to the DMS which will associate the Pu-239 FGE value to that packet PIN.

Relating the packet PIN to the RWM transfer drum and parent drum PINs is addressed in Section 3.1.8.

3.1.3.3.3.1 Inputs.

- A. User request for the "TRU Non-Compliant Packet" screen from the "TRU Sorting Table" screen.

- B. Pu-240 value (and uncertainty) from the PCS.

- C. Packet PIN for non-compliant packets from the PCS.

- D. User description of the waste contained in the waste packet.

3.1.3.3.3.2 Processing.

- A. Generation of the "TRU Non-Compliant Packet" screen with a display of packet PINs associated with the current RWM transfer drum.

- B. Calculation of Pu-239 FGE from Pu-240 value.
- C. Deletion of PAM data for compliant packets.
- D. Storage of the user description and the Pu-239 value for the non-compliant packet.

3.1.3.3.3 Outputs.

- A. Display the "TRU Non-Compliant Packet" screen with the packet PIN and content description.
- B. Display the Pu-239 FGE value.
- C. Display the attached RWM transfer drum cumulative Pu-239 FGE value.

3.1.3.3.4 TRU Sorting Glovebox Sample Processing. Waste drums that have been flagged for sample analysis will have their contents dumped on the TRU sorting table and the applicable samples taken. Drums that have had non-compliant packets removed may also require sampling. Sample Management activities are described in Section 3.1.4. Relating the sample container ID to the glovebox purge port ID and ultimately to the purge port transfer pig ID is addressed in Section 3.1.8.

3.1.3.3.5 Empty Feed Drum Compaction. Once the TRU waste drums are delidded, the TRU glovebox user uses the PCS controls to relocate the empty, relidded drum to the empty drum compaction glovebox. The empty drum is compacted and placed via an empty puck grapple into an 85-gallon Drath & Schraeder overpack. A message relating the compacted empty drum and the loadout drum is sent from the PCS to the DMS. Relating the compacts to the loadout drum is addressed in Section 3.1.8.5.

3.1.3.4 TRU Restricted Waste Management. The TRU RWM glovebox will receive waste from the TRU glovebox for processing. All operations within the TRU RWM glovebox will parallel those defined for the LLW RWM glovebox. The TRU RWM Sorting Table screen for this glovebox will contain the same data elements recorded in the TRU glovebox and the mixed waste data elements addressed in the LLW RWM glovebox. All tracking of waste transfers to the TRU RWM glovebox are covered under section 3.1.8. The tracking/management of fissile material inventory will be handled as discussed in Section 3.1.7.

3.1.4 Sample Management

Manage the analytical sample data from the point the sample is taken in the glovebox to the final disposal of the sample in a glovebox loadout drum. Activities will include, sample tracking, manually updating the DMS with waste type designators and the treatment procedures to be used in the RWM gloveboxes. Laboratory analytical results will not be loaded into the DMS electronically.

3.1.4.1 Obtain Waste Sample & Initiate Chain of Custody. This activity will cover the sample collection in the Process Area gloveboxes. As the samples are taken, applicable Chain of Custody data will be entered into the DMS

(date, time, user ID, etc). This data will be printed out on a Chain of Custody form at a later date when the sample is physically removed from the WRAP 1 facility.

3.1.4.1.1 Inputs.

- A. Request the "Sample Acquisition" screen. This screen is available from any of the following screens in the Process Operations section:
 - LLW Sorting Table
 - LLW RWM Waste Sorting
 - TRU Sorting Table
 - TRU RWM Waste Sorting
- B. Sample bottle ID and parent drum or packet PIN from the PCS.
- C. Manual entry of sample data.
- D. User Signature Password.

3.1.4.1.2 Processing.

- A. Generate the "Sample Data" screen with the applicable drum or packet.
- B. Validate the user Signature Password.
- C. Updating the DMS database with the sample and chain of custody data.

3.1.4.1.3 Outputs.

- A. Display the "Sample Data" screen.
- B. Display the sample PIN and sample data associated with the PIN being sampled.

3.1.4.2 Electronic Chain of Custody screen. This activity addresses the input of data required to maintain a record of those individuals disconnecting the purge port container from the glovebox, placing the purge port into a purge port transfer pig (as applicable), placing the outer sample container into temporary Process Area storage, transferring the outer sample container to the WRAP 1 Sample Management Area, and transferring the sample container from the WRAP 1 facility. Each time a new user handles the waste sample container, this DMS screen will be accessed and the applicable data entered into the DMS. The tracking of sample PINs to purge ports and pigs is addressed in Section 3.1.8.

3.1.4.2.1 Inputs.

- A. Request the "Electronic Chain of Custody" screen from the "Sample Management" screen.
- B. Select or manually enter desired purge port/transfer pig PIN to be updated in the DMS

- C. Manual entry of Chain of Custody data
- D. User Signature Password

3.1.4.2.2 Processing.

- A. Generate the "Electronic Chain of Custody" screen.
- B. Validate the user Signature Password.

3.1.4.2.3 Outputs. Display the "Electronic Chain of Custody" screen with the Pig and/or Purge Port PIN and chain of custody data.

3.1.4.3 Chain of Custody/Sample Analysis Request Form. This activity will generate the hard copy Chain of Custody form that will be used to transfer the waste samples from the WRAP 1 facility to an analytical lab. It also generates the hard copy Sample Analysis Request Form required by the lab to specify the analyses to be performed. The Sample Management Area user will sign the hard copy of the form once it is printed out on the Sample Management Area printer.

3.1.4.3.1 Inputs.

- A. Request "Chain of Custody" screen from the "Sample Management" menu.
- B. Manually enter applicable Chain of Custody data for the transfer Pig PIN or Purge Port if a Pig is not used.
- C. Request "Sample Analysis Request" screen from the "Sample Management" screen.
- D. Manually enter the analyses required for each sample in the transfer pig.
- E. Request hard copy of "Chain of Custody/Sample Analysis Request" form when ready to send samples to the laboratory.

3.1.4.3.2 Processing.

- A. Generate the "Chain of Custody" screen.
- B. Generate the "Sample Analysis Request" screen.
- C. Update DMS database.
- D. Generate "Chain of Custody/Sample Analysis Request" form.
- E. Generate the "Sample Analysis Request" form.

3.1.4.3.3 Outputs.

- A. Display the "Chain of Custody" screen with chain of custody data and sample PINs contained within.

- B. Display the "Sample Analysis Request" screen with analysis required for selected sample PIN.
- C. Print a hard copy of the "Chain of Custody/Sample Analysis Request" form for the samples in the transfer pig.

3.1.4.4 Waste Designation. This activity will use a hard copy of the summarized sample results to update the DMS database with applicable waste description and codes.

NOTE: Once waste is ultimately loaded out into drums, the mixed waste data of each packet or collection container will be consolidated and associated to the load out drum. This consolidation and association activity will be performed outside of the process area.

3.1.4.4.1 Inputs.

- A. Request the "Packet Waste Designation" screen from the "Sample Management" menu, the "Worksheet Data Entry" screen or the "Processed Waste Data Review and Modification" screen.
- B. Packet PIN selected by user from list of all packets stored in transfer drums if screen is accessed from "Sample Management" menu or "Worksheet Data Entry" screen, or from list of packets in previously selected product drum if screen is accessed from "Processed Waste Data Review and Modification" screen.
- C. Manual entry of applicable waste description and codes

3.1.4.4.2 Processing.

- A. Generate the "Packet Waste Designation" screen.
- B. Update the DMS database with applicable waste data

3.1.4.4.3 Outputs. Display the "Waste Designation" screen with the packet PIN, applicable waste description, and codes.

3.1.4.5 Treatment Worksheet Entry. This activity provides an input screen for a plant chemist to enter all the information regarding a treatment worksheet. A worksheet is a plant form that contains all the information necessary to treat one or more items in either the TRU or LLW RWM glovebox. A worksheet is uniquely identified by an administratively assigned worksheet number.

3.1.4.5.1 Inputs.

- A. Request the "Worksheet data Entry" screen from the "Sample Management" menu.
- B. Worksheet Number, PIN of container(s) to be treated, WRAP 1 treatment procedure number, TRU or LLW indicator, and file name of ASCII file to be displayed on monitor behind appropriate RWM glovebox. Verify that for all samples to be treated, if any,

results have been received. Refer to SRS section 3.1.3.2.6 for application of treatment process.

3.1.4.5.2 Processing.

- A. Generate the "Worksheet Data Entry" screen and allow user to input/update worksheet records.
- B. Perform input validation. Worksheet number field must be unique. Container type must be sample, packet, collection container or treatment container. Procedure entered must be a valid treatment procedure. File name entered must already exist. TRU or LLW indicator must correspond to the secondary waste type. Treatment procedure is checked to make sure it is not expired.
- C. Store each Worksheet record entered.

3.1.4.5.3 Outputs. Display the "Treatment Process Entry" screen with the treatment number and description.

NOTE: Once waste is ultimately loaded out into drums, the mixed waste data of each packet or collection container will be consolidated and associated to the load out drum. This consolidation and association activity will be performed outside of the process area.

3.1.5 Shipping

Support the shipment of empty drums, waste drums and waste boxes from the WRAP 1 facility by providing the proper shipping documentation, verification that the correct drums are in the shipment, and updates to SWITS with certification data, shipping data, and location data.

3.1.5.1 Generate Drum or Box Documentation. Generation of drum or box documentation to support shipping and disposal of waste from WRAP 1 via the loading dock. This documentation includes the Uniform Hazardous Waste Manifest (UHWWM), empty drum transfer papers, and the Onsite Radioactive Shipment Record (RSR).

3.1.5.1.1 Inputs.

- A. User requests the "Loading Dock Shipping Data" screen from the "Shipping" menu.
- B. Generated list and associated data for drum or box shipment based on drum type (secondary waste type code)
- C. Manually entered data to complete shipping forms
- D. Request to print shipping reports

3.1.5.1.2 Processing.

- A. Generate the "Loading Dock Shipping Data" screen.

- B. Store entered data

3.1.5.1.3 Outputs.

- A. Display the "Loading Dock Shipping Data" screen with the shipping list and shipping form data.
- B. Print the proper shipping reports.

3.1.5.2 Shipping Drum or Box Containers. The shipping section consists of the assembly of drum or box containers into a shipment on the loading dock, the completion of drum or box container documentation and the loading onto trucks of drums or boxes to be shipped to storage or disposal sites. Final inspection of containers is performed.

3.1.5.2.1 Requesting Retrieval of Drums for Shipment. The user requests the drums for the shipment be retrieved from the AS/RS.

3.1.5.2.1.1 Input.

- A. User requests the "Loading Dock Container Shipping" screen from the "Shipping" menu.
- B. User entry or selection of a LLW or TRU shipment that has a prepared pick list (Section 3.1.6.4).
- C. User request for pick list download to the PCS.
- D. PINs of drums at the shipping dock received from the PCS.

3.1.5.2.1.2 Processing.

- A. Generate the "Loading Dock Container Shipping" display screen for the Shipping/Receiving terminal.
- B. Display list of shipments with prepared pick lists.
- C. Display PINs and locations of drums in selected shipment.
- D. Prepare picklist message to send to the PCS. (Section 3.1.8).
- E. Update drum or box location to shipping dock. (Section 3.1.8)

3.1.5.2.1.3 Output.

- A. Display the "Loading Dock Container Shipping" screen.
- B. Shipping pick list message to the PCS.
- C. Display the scanned drum or box container PINs at the Shipping/Receiving terminal.

3.1.5.2.2 Certification Data to SWITS. After the drum or box containers have been loaded on the truck, and the waste has been shipped from

the facility, update the container location and the waste certification data on SWITS.

3.1.5.2.2.1 Input. A request by the user to transmit certification data and the location update information on the pending shipment shown on the "Loading Dock Container Shipping" screen to SWITS. This request is performed from the "Loading Dock Container Shipping" screen.

3.1.5.2.2.2 Processing.

- A. Generate a message on the "Loading Dock Container Shipping" screen for the Shipping/Receiving terminal that SWITS is being updated.
- B. Formulate an update to the SWITS database using the PINs as keys to update their certification data and location data.
- C. Generate a message on the "Loading Dock Container Shipping" screen for the Shipping/Receiving terminal indicating the accept/reject of the database updates. No SWITS database updates are to be committed until all data for the shipment has been accepted.
- D. All data associated with shipped waste containers is flagged as historical data. Location is updated to indicate waste is "In Transit". WRAP data uploaded to SWITS is flagged as "read only" thereby prohibiting modification by WRAP personnel.

3.1.5.2.2.3 Output.

- A. Display the message on the "Loading Dock Container Shipping" screen for the Shipping/Receiving terminal.
- B. Certification and location confirmation messages from SWITS or alarm/rejection message from SWITS for each container in the location update which was sent to SWITS.
- C. Set data flags in the DMS to mark the records as historical data
- D. Send a message to the PCS noting the waste location is "In Transit".

3.1.5.2.3 Section deleted.

3.1.5.3 TRUPACT II Shipment. This section describes the assembly of TRU waste containers, the completion of TRU waste container documentation, the loading of TRUPACT II casks to be shipped to WIPP and the updating of SWITS with certification and location data.

3.1.5.3.1 Assemble TRU Waste Containers. Palletize TRU drums on TRUPACT pallets or stack TRU boxes using the TRUPACT payload assembly pick list to ensure that the casks are loaded properly.

3.1.5.3.1.1 Input.

- A. User request for the "TRUPACT Payload Assembly" screen from the "Shipping" screen.

- B. TRUPACT payload assembly pick list for PINs to be assembled.
- C. TRUPACT payload assembly number.
- D. Scanned bar code PINs or user input of PINs.
- E. Signature Password.
- F. User confirmation of payload assembly.

3.1.5.3.1.2 Processing.

- A. Verification of the Signature Password.
- B. Generation of the "TRUPACT Box Payload Assembly" report (data entry form).
- C. Generation of the "TRUPACT Payload Assembly" screen.
- D. Verification of drum PINs as they are assembled compared to the payload data provided.
- E. Confirmation of TRUPACT assembly load.
- F. Generate TRUPACT Drum Loading report (data entry form).

3.1.5.3.1.3 Outputs.

- A. Display the "TRUPACT Payload Assembly" screen.
- B. Display verification that the containers are properly assembled.
- C. Print the TRUPACT Drum Loading report.
- D. Print the TRUPACT Box Payload Assembly report.

3.1.5.3.2 Load the TRU Waste Assemblies into Casks. This section describes the loading of an assembly into a particular TRUPACT II shipping cask. The TRUPACT payload assembly ID number is used as the key to relate the 14 TRU drums or 2 TRU boxes that are loaded inside a cask.

3.1.5.3.2.1 Input.

- A. Request the "TRUPACT Cask Loading/Certification" screen from the "Shipping" screen.
- B. TRUPACT Payload Assembly ID number.
- C. Manual data entry of data collected on the TRUPACT Drum Loading report or TRUPACT Box Payload Assembly report.
- D. Signature Password.

3.1.5.3.2.2 Processing.

- A. Generate the "TRUPACT Cask Loading/Certification" screen.
- B. Verification of Signature Password.
- C. Process manually entered data.
- D. Confirmation of entered data and update of the DMS database.

3.1.5.3.2.3 Output. Display the "TRUPACT Cask Loading/Certification" screen with manually entered data.

3.1.5.3.3 Complete TRU Waste Shipping Data. Complete data entry for the TRU waste shipment and upload the data to SWITS.

3.1.5.3.3.1 Input.

- A. Request the "TRU Waste Shipping" screen from the "Shipping" screen.
- B. Signature Password.
- C. Authorized cask ID number and drum PINs.

3.1.5.3.3.2 Processing.

- A. Generate the "TRU Waste Shipping" screen.
- B. Validate the Signature Password.
- C. Formulate an update message to the SWITS database using the drum PINs and cask ID number as keys and the location.
- D. All data associated with shipped waste containers is flagged as historical data. Location is updated to indicate waste is "In Transit". WRAP data uploaded to SWITS is flagged as "read only" thereby prohibiting modification by WRAP personnel.
- E. Delete the container PIN from the Facility Inventory.

3.1.5.3.3.3 Output.

- A. Display the TRU Waste Shipping screen with confirmation of the following outputs.
- B. Send the update message to the SWITS database.
- C. Send a message to the PCS noting the waste is "In_Transit".

3.1.6 Process Routing and Pick lists

This module assists the operations personnel with the creation and maintenance of the various container process routing designations and pick lists for the AS/RS. The pick lists are uploaded to the PCS. The PCS will overwrite any existing pick list with the new one for that activity.

3.1.6.1 Process List Additions. Provide the capability to add to the WRAP 1 Processing List and resequence (change the order of) containers which are scheduled to be processed at WRAP but have not been received.

3.1.6.1.1 Inputs.

- A. User requests the "Process List Additions" screen from the "Pick List" menu.
- B. User enters PINs and corresponding routing code, sampling status, compliant flag, and Profile ID for drums to be added to the processing list. Data will be entered in the order drums are scheduled to be processed.

3.1.6.1.2 Processing.

- A. Generate the "Process List Additions" screen.
- B. Update the Process List upon user command by adding the entered list to the end of the current Process List.
- C. Save the list of process list additions for future editing if committed by the user.

3.1.6.1.3 Outputs.

Display the "Process List Additions" screen.

3.1.6.2 Process Pick List. Maintain the Process List by allowing the user to reorder the list, insert drums in the AS/RS that are not on the list, and add or modify the route codes, sample flags, compliant flags, and profile IDs. Send the Process Pick List, consisting of user-selected drums which are in the AS/RS, to the PCS. Drums are removed from the Process List when they are received at the infeed conveyor (Section 3.1.8.1).

3.1.6.2.1 Inputs.

- A. Request the "Process List" screen from the "Pick List Menu."
- B. User command to reorder the list.
- C. User command to insert drums in the AS/RS waiting for processing but not on the list.
- D. User command to add or modify the routing code, sampling status, compliance status, and profile ID for one or more of drums on the process pick list.
- E. User flag drums to be uploaded to PCS.
- F. User command to upload the Process Pick List to the PCS.

3.1.6.2.2 Processing.

- A. Generate the "Process List" screen showing PCS flag, sequence of drum PINs, location, bin number, route code, sample flag, compliant flag, and profile ID.
- B. Generate a pop-up screen of route designation codes and descriptions when requested.
- C. Generate a pop-up screen of profile IDs and descriptions when requested.
- D. Display PINs of any drums not on the Process Pick List but located in the AS/RS with the container WRAP status code of waiting for processing.
- E. Insert received drums in the AS/RS not on the list according to user command.
- F. Reorder the list according to user command.
- G. Add or modify the PCS flag, drum route code, sampling status, compliant status, and profile ID according to user command.

3.1.6.2.3 Outputs.

- A. Display the "Process List" screen showing the PCS flag, sequence of drum PINs, bin number, route code, sample flag, compliant flag, and profile ID.
- B. Upload the Process Pick List only, including those drums currently in the AS/RS and flagged for the PCS.

3.1.6.3 AS/RS Retrieval & Storage via Transfer Car. Provide an AS/RS pick list creation and maintenance capability for the storage of waste drums into the AS/RS using the transfer car.

3.1.6.3.1 Inputs.

- A. Request "AS/RS Storage Pick List" screen from the "Pick List Menu."
- B. The drum PINs at the discharge conveyor as received from the PCS.
- C. User selection of a drum PIN from a list of either LLW or TRU drums stored in the AS/RS on partially loaded pallets. If there is no partially loaded pallet in the AS/RS with waste of the same type as the drum to be stored, then an empty pallet will have to be used.

3.1.6.3.2 Processing.

- A. Generate the "AS/RS Storage Pick List" screen showing the applicable data (waste type, primary waste type code, secondary waste type code, and storage category code) for the drums on the discharge conveyor.

- B. Initially display the list of drums stored in the AS/RS on partially filled pallets with the same waste type (LLW or TRU) as the next drum to be removed from the discharge conveyor. Allow the user to manually select either LLW or TRU drums to be displayed.
- C. Transfer the selected drum PIN to the AS/RS Transfer Car Pick List.

3.1.6.3.3 Outputs.

- A. Display the "AS/RS Storage Pick List" screen with the partially loaded pallets.
- B. Send the selected drum PIN to the PCS in an AS/RS Transfer Car Pick List message.

3.1.6.4 AS/RS Shipping Pick List. Provide the capability to upload LLW and TRU Shipping Pick Lists that will be used to support shipping from the WRAP 1 shipping dock located on the south side of the facility. These shipments may be for many reasons including Head Gas analysis of TRU drums, LLW to onsite burial, or storage of mixed waste in the Central Waste Complex. The shipping pick list for a specific shipment will be uploaded to the PCS after the shipment vehicle has arrived at WRAP 1 and is ready to receive the waste containers.

3.1.6.4.1 Inputs.

- A. Request the "AS/RS Shipping Pick List" screen from the "Pick List" screen.
- B. User request for list of LLW or TRU drums in the AS/RS available for shipment.
- C. User selection of drums for entry on the pick list
- D. User input of shipment ID# for the selected PINs.

3.1.6.4.2 Processing.

- A. Generate the "AS/RS Shipping Pick List" screen.
- B. Generate a shipment pick list record with the selected drum PINs and entered shipment.

3.1.6.4.3 Outputs. Display the "AS/RS Shipping Pick List" screen with applicable drum PINs.

3.1.6.5 TRUPACT Assembly List. Provide an AS/RS pick list creation and maintenance capability to support the assembly of TRUPACT payloads.

3.1.6.5.1 Inputs.

- A. Request the "TRUPACT Assembly List" screen from the "Pick List" screen.

- B. User entry of TRUPACT assembly data including shipment number, assembly ID, and list of PINs by loading sequence.
- C. User request to send TRUPACT assembly pick list to the PCS.

3.1.6.5.2 Processing.

- A. Generate the "TRUPACT Assembly List" screen displaying entered data and current location of each PIN.
- B. Save committed data.

3.1.6.5.3 Outputs.

- A. Display the "TRUPACT Assembly List" screen.
- B. Display the assembly number and applicable drum PINs in the proper AS/RS retrieval sequence, along with PIN locations.
- C. Send the TRUPACT Assembly Pick List to the PCS.

3.1.7 Facility and Glovebox Radiological Limits Checking

Provide dose equivalent curie and fissile loading audits and checks for the WRAP 1 facility. The dose equivalent curie inventory for the facility will be calculated and checked against the facility limit. Fissile tracking in WRAP 1 includes tracking Pu-239 FGE inventory inside the TRU and TRU RWM gloveboxes. Total measurement uncertainty for Pu-239 FGE values may be required for fissile material inventory calculations. If this is required, WRAP Projects/Programs will provide the calculations for determining these values.

3.1.7.1 Facility and Glovebox Radiological Limits Report. Report the curie dose equivalent inventory for the WRAP 1 facility and the fissile material inventory (Pu-239 FGE) for the TRU RWM and TRU process gloveboxes.

3.1.7.1.1 Inputs.

- A. Request the "Facility and Glovebox Radiological Inventory" screen from the "WRAP 1 DMS Main" screen.
- B. Allow authorized user to update inventory value for each of the areas. New value must be less than the corresponding limit.

3.1.7.1.2 Processing.

- A. Generate the "Facility and Glovebox Radiological Inventory" screen.
- B. Update the radiological inventory if committed by authorized user.

3.1.7.1.3 Outputs.

- A. Display the "Facility and Glovebox Radiological Inventory" screen.

- B. Display the facility dose equivalent curie inventory and the fissile loading for the TRU and TRU RWM gloveboxes along with the curie and fissile load limits. Hard copy reports (i.e., screen print) will be available.

3.1.7.2 Facility Curie Limit Check. Calculate facility dose equivalent curie inventory and check against the facility limit. This check is performed automatically upon receipt or shipment of waste at WRAP 1.

3.1.7.2.1 Inputs. The dose equivalent curie total of waste received or shipped at WRAP 1.

3.1.7.2.2 Processing.

- A. Calculate the new facility dose equivalent curie inventory by adding or subtracting the curies received or shipped.
- B. Check the total against the facility limit. Save this value to an historical file.

3.1.7.2.3 Outputs.

- A. Send the facility curie level message to the PCS with the new inventory value and an alarm if the facility limit is exceeded.
- B. If facility limit is exceeded, display DMS pop-up "Facility Curie Limit Alarm."

3.1.7.3 TRU Glovebox Fissile Material Inventory Check. Calculate fissile material inventory within the TRU glovebox and check the glovebox fissile loading against the glovebox fissile loading limit when transporting a waste drum to or from the TRU glovebox. Provide the PCS with the current fissile loading and an alarm if the limit is exceeded.

Since waste is moved between drums in this glovebox, the fissile material inventory cannot be tracked simply by totaling the fissile material associated with the drums that come and go. The fissile material inventory is tracked by keeping a running total of what comes in (measured by NDA) and what goes out (also measured by NDA). When a drum reaches the entry lift table, its contents are added to the running total of the glovebox. When a drum leaves the exit port and goes through the NDA, and arrives at the discharge conveyor, then its contents are subtracted from the running total of the glovebox. When a transfer drum leaves the transfer drum port on the TRU Process glovebox, its next location is either the process area carousel or the TRU RWM transfer drum port, where its location will be noted and the fissile contents of the transfer drum will be subtracted from the running total of the TRU process glovebox. If the new location is the TRU RWM transfer drum port, the contents are added to the running total of the TRU RWM glovebox.

3.1.7.3.1 Inputs.

- A. Waste drum PIN with a location on the TRU entry glovebox lift table.

- B. Transfer drum PIN with previous location of TRU glovebox transfer drum port and a new location other than the TRU Glovebox RWM Transfer Port.
- C. Drum PIN and fissile material inventory from the SIE
- D. User request to reset the TRU process glovebox fissile material inventory to an assayed/surveyed value. This will normally be performed each time the glovebox is empty.

3.1.7.3.2 Processing.

- A. Add the waste drum fissile material to the TRU glovebox fissile material running total (PIN and Pu-239 FGE listed).
- B. When the transfer drum PIN is logged with a new location other than the TRU Glovebox RWM Transfer port, the DMS will subtract the transfer drum fissile material inventory from the TRU glovebox running total and remove the drum PIN from the TRU Glovebox Drum List.
- C. When a drum on the TRU Glovebox Drum List is logged with a new location of Discharge Conveyor, the DMS will subtract the Pu-239 FGE value received from the SIE for the drum from the TRU glovebox running total and remove the drum PIN from the TRU Glovebox Drum List
- D. Reset TRU glovebox fissile material inventory to assayed/surveyed value
- E. Maintain a TRU glovebox fissile material inventory history
- F. Generate the "TRU Glovebox Fissile Material Inventory" screen.

3.1.7.3.3 Outputs.

- A. Send a fissile material level message to the PCS with the new TRU glovebox fissile material inventory and an alarm if the glovebox inventory exceeds the limit.
- B. DMS pop-up TRU Glovebox Fissile Material Inventory display indicating the new TRU glovebox fissile material inventory and glovebox alarm if exceeded.

3.1.7.4 TRU RWM Glovebox Fissile Material Inventory Check. Calculate fissile material inventory within the TRU RWM glovebox and check the glovebox fissile loading against the glovebox fissile loading limit when transporting a waste drum to or from the TRU RWM glovebox. Provide the PCS with the current fissile loading and an alarm if the limit is exceeded.

Drum PINs and Pu-239 FGE inventory will be added to the TRU RWM Glovebox Drum List as they are accessed to the glovebox. Exit drum PINs and inventory will be subtracted from the glovebox when the drum arrives at the discharge conveyor, and after the SIE calculates an Pu-239 FGE value. If the PIN for the transfer drum is on the glovebox PIN list, the Pu-239 FGE value will not

be added to the glovebox inventory. Any time a 55-gallon D&S transfer drum is accessed to a different glovebox port, or the drum is accessed to an outgoing airlock, the DMS will verify that the PIN is not on the TRU RWM glovebox listing. The DMS will subtract the PIN from the TRU RWM glovebox listing if it is present.

3.1.7.4.1 Inputs.

- A. Transfer drum PIN with a location update on the TRU RWM Transfer Drum port lift table and isn't on the TRU RWM glovebox drum list.
- B. Drum PIN and fissile material inventory from the SIE.
- C. User request to reset the TRU RWM glovebox fissile material inventory to an assayed/surveyed value. This will normally be performed each time the glovebox is empty.

3.1.7.4.2 Processing.

- A. Add the transfer drum fissile material inventory to the TRU RWM glovebox running total (PIN and Pu-239 FGE listed) when the Transfer drum PIN updates its location to the TRU RWM Transfer Drum port lift table and the transfer drum is not on the TRU RWM Glovebox Drum List. Add the drum PIN to the TRU RWM Glovebox Drum List.
- B. When a drum on the TRU RWM Glovebox Drum List is logged with a new location of Discharge Conveyor, the DMS will subtract the Pu-239 FGE value received from the SIE for the drum from the TRU RWM Glovebox running total and remove the drum PIN from the TRU Glovebox Drum List.
- C. Reset TRU RWM glovebox fissile material inventory to assayed/surveyed value
- D. Maintain a TRU RWM glovebox fissile material inventory history.
- E. Generate the "TRU RWM Glovebox Fissile Material Inventory" screen.

3.1.7.4.3 Outputs.

- A. Send the fissile inventory level message to the PCS with the new TRU RWM glovebox fissile material inventory and an alarm if the glovebox inventory exceeds the limit.
- B. DMS pop-up "TRU RWM Glovebox Fissile Material Inventory" screen indicating the new TRU RWM glovebox fissile material inventory and the glovebox limit if exceeded.

3.1.8 Waste Inventory by Location and/or Container Relationships

The PCS will be sending a number of data messages to the DMS over the WLAN which will have to be sorted into message types and then operated on according to the type and the data. A major function of the PCS messages is

to maintain a dynamic inventory of all waste items and empty drums by interior location at the WRAP 1 facility. The next major function is to maintain container relationship records between associated waste items at the WRAP 1 facility. Each location record update or relationship record generated will also include the current date and time elements.

Certain data elements are sent from the PCS to the DMS for calculation and/or comparison and a message returned to the PCS with the results. In some cases the return message will be an alarm message to be displayed and logged by the PCS.

The specific message formats for the various types of messages are contained in references SII 1994 and BNFL 1994.

The messages will be sorted according to the following message types:

- A. If the message type is "Container Location" or "Container Location with Weight," go to Section 3.1.8.1.
- B. If the message type is "Restricted Waste Packet and Parent Drum" or "Restricted Waste Packet and Transfer Drum," go to Section 3.1.8.2.
- C. If the message type is "Purge Port Location" or "Purge Port and Transfer Pig," go to Section 3.1.8.3.
- D. If the message type is "Sample and Parent Drum/Packet" or "Sample and Purge Port," go to Section 3.1.8.4.
- E. If message type is "Puck and Overpack Drum" go to Section 3.1.8.5.
- F. If message type is "Non-compliant Item and Packet" go to Section 3.1.8.6.
- G. If message type is "Aerosol Can and Collection Container" go to Section 3.1.8.7.
- H. If message type is "Remove from Transfer Stand" go to Section 3.1.8.8.
- I. If message type is "Add to Transfer Stand" go to Section 3.1.8.9.
- J. If message type is "Treatment Container and Item Container" go to Section 3.1.8.10.

3.1.8.1 Drum or Box Inventory. Process the drum or box PIN and location messages from the PCS. The message may also contain the container weight.

3.1.8.1.1 Inputs. Location and drum or box PIN message from the PCS. This message may also include the drum or box weight.

3.1.8.1.2 Processing. If the location is the receiving dock, perform the processing described in 3.1.1.2. Otherwise, using the drum or box PIN as the key, update the container location record with location, date and time and move the former location to a location history record for that PIN.

The specific location updates that trigger actions are referenced in the following Table 1.

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
A. Box Storage Location	Former location was "BOX NDA"	Set the Container WRAP Status Code to "Processing Complete" status.
B. AS/RS	Always	Add pallet of drums to AS/RS bin inventory.
C. Pallet Stand or Transfer Car	Always	Remove pallet of drums from AS/RS bin inventory.
D. Infeed Conveyor	1. Always	Set the Container WRAP Status Code to "In Processing" status.
	2. Weight information was included with the location update, Always	a) Record as verification data. If verification data already exists, then the weight will not be recorded.
		b) Check the drum weight against the certification weight for an out of tolerance condition and generate the out of tolerance alarm message at the discharge conveyor DMS terminal.
		c) Check drum weight against the max weight of 1000 pounds and generate the out of tolerance alarm message for the DMS terminal.
	3. Always	The drum characterization data and isotopic quantity data (if available) will be sent to the SIE. If the outer drum is an overpack, the PIN and data for the waste drum will be sent to the SIE.
	4. The drum is on the Process List	Delete the drum PIN from the Process List

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
E. AGV at PAN or AGV at GEA	Always	The DMS will generate a download data message to the SIE instructing it to transmit the drum database to the specific PAN or GEA location identified.
F. Box NDE Vault Location	1. Weight information was included with the location update, always	a) Record weight as verification data. If verification data already exists, then the weight will not be recorded.
		b) Check the verification weight against the certification weight for an out of tolerance condition and generate the out of tolerance alarm message at the discharge conveyor DMS terminal.
		c) Check box weight against the max weight of 4000 pounds and generate the out of tolerance alarm message for the DMS terminal.
	2. Always	Set container WRAP status code to "In Processing."
G. Empty Drum Infeed Conveyor	Always	Send empty drum process route message to the PCS with the process route of the empty drum.
H. LLW Entry Glovebox Lift Table	1. Waste drum overpacked.	a) Send location message to PCS with overpack drum PIN.
		b) Delete overpack container relationship.
	2. Waste drum not overpacked.	Send location message to PCS with waste drum PIN.

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
I. LLW Puck	Weight was included with the location update, always.	Update the DMS with the LLW puck bar code for the LLW drum PIN which is the "oldest" drum with LLW compactor as the current location. Record the puck weight in the database.
J. Box NDA Vault	Always	Send the box database to the BWAS.
K. Not used		
L. Not used		
M. Not used		
N. TRU Entry Glovebox Lift Table	1. Waste drum overpacked.	a) Send location message to PCS with overpack drum PIN. b) Delete overpack container relationship.
	2. Waste drum not overpacked.	Send location message to PCS with waste drum PIN.
	3. Always	Perform the processing of Section 3.1.7.3, TRU Glovebox Fissile Material Inventory Check.
O. TRU Empty Drum Compaction Loadout Drum Lift Table	Always	Add drum PIN to "TRU Glovebox Drum List".
P. TRU RWM Transfer Port Lift Table	Transfer drum PIN is not on "TRU Glovebox Drum List".	Add transfer drum PIN to "TRU Glovebox Drum List".
Q. TRU Exit Glovebox Loadout Position #1 Lift Table	Always	Add drum PIN to "TRU Glovebox Drum List".

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
R. TRU Exit Glovebox Loadout Position #2 Lift Table	Always	Add drum PIN to "TRU Glovebox Drum List".
S. TRU RWM Port Lift Table	Transfer drum PIN is not on "TRU RWM Glovebox Drum List".	a) If drum PIN is on "TRU Glovebox Drum List", perform the processing of Section 3.1.7.3, TRU Glovebox Fissile Material Inventory Check.
		b) Add drum to the TRU RWM glovebox drum list and perform the processing of Section 3.1.7.4, TRU RWM Glovebox Fissile Material Inventory Check.
T. TRU RWM Compliant Waste Loadout Port Lift Table	Always	Add drum PIN to "TRU RWM Glovebox Drum List".
U. TRU RWM Exit Port Lift Table	Always	Add drum PIN to "TRU RWM Glovebox Drum List".
V. Process Area Carousel	Transfer drum PIN is on "TRU Glovebox Drum List".	Delete the drum from the TRU glovebox drum list and perform the processing of Section 3.1.7.3, TRU Glovebox Fissile Material Inventory Check.
W. Airlock B1	Weight information was included with the location update and the drum is a product drum.	a) Record weight as certification data.
		b) Check drum weight against the max weight of 1000 pounds and generate the out of tolerance alarm message for the DMS terminal at the RWM pedestal terminal.
		c) Send the characterization data and quantitative data (if available) to the SIE noting the assay is for certification.

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
X. Not used.		
Y. Not used.		
Z. Airlock A3 (May be used for out going if the B airlock is broken.)	Weight information was included with the location update and the drum is a product drum.	a) Record weight as certification data. b) Check drum weight against the max weight of 1000 pounds and generate the out of tolerance alarm message for the DMS terminal at the RWM pedestal terminal. c) Send the characterization data and quantitative data (if available) to the SIE noting the assay is for certification.
AA. Discharge Conveyor	1. Always	Set the Container WRAP Status Code to "Processing Complete" status.
	2. Drum PIN is on "TRU Glovebox Drum List"	a) Delete drum from the TRU glovebox drum list. b) Perform the processing of Section 3.1.7.3, TRU Glovebox Fissile Material Inventory Check.
	3. Drum PIN is on "TRU RWM Glovebox Drum List"	a) Delete drum from the TRU RWM glovebox drum list. b) Perform the processing of Section 3.1.7.4, TRU RWM Glovebox Fissile Material Inventory Check.
AB. Discharge Conveyor Scale	Not an empty container.	a) Record as verification data. If verification data already exists, then the weight will not be recorded.

Table 1. Actions Triggered By Specific Location Updates.

LOCATION UPDATE TO:	OPTIONS	ACTIONS
		b) Check the drum weight against the certification weight for an out of tolerance condition and generate the out of tolerance alarm message at the discharge conveyor DMS terminal.
		c) Check drum weight against the max weight of 1000 pounds and generate the out of tolerance alarm message for the DMS terminal at the discharge conveyor.
AC. Background Drum Storage Conveyor	Always	Send the characterization data for the drum to the SIE.
AD. NDE/NDA Carousel	Drum is a verification drum	Send the characterization data for the drum to the SIE.
END		

3.1.8.1.3 Outputs.

- A. If there is a box out of tolerance weight condition, send a pop-up screen with the box PIN, location, weight, limits, scale, and alarm type to the Shipping/Receiving DMS terminal.
- B. If there is a drum out of tolerance weight condition at the infeed or discharge conveyor, send a pop-up screen with the drum PIN, location, weight, limits, scale, and alarm type to the Discharge Conveyor DMS terminal.
- C. If there is a drum out of tolerance weight condition at the airlock, send the drum PIN, location, weight, limits, scale, and alarm type to the LLW Glovebox DMS terminal.
- D. If the destination is NDA, send the drum database message to the SIE noting that the drum database transferred contains default or drum specific characterization data and either contains or does not contain isotopic quantity data. The purpose of the assay (processing or certification) will also be transmitted.
- E. If the location is AGV at NDA vault, send a database transfer message (based on vault location) to the SIE.
- F. If the location is the Box NDE, send the boxed waste characterization data message to the BWAS.
- G. If the location is the empty drum infeed conveyor, send the empty drum's process route to the PCS.

3.1.8.2 Packet Removal from LLW and TRU Gloveboxes. Process the packet PIN and location messages from the PCS. Associate the packet PIN with the oldest waste drum PIN and transfer drum PIN scanned at this glovebox.

3.1.8.2.1 Input.

- A. Restricted waste packet and parent drum message from PCS.
- B. Restricted waste packet and transfer drum message from PCS.

3.1.8.2.2 Processing.

- A. Generate a container relationship record showing the packet PIN and the waste drum PIN that it came from.
- B. Generate a container relationship record showing the packet PIN and the transfer drum PIN it went into.
- C. If this is a TRU glovebox, then add the Pu-239 FGE calculated in Section 3.1.3.3.3 to the packet PIN record and the transfer drum PIN record.

3.1.8.2.3 Output. None

3.1.8.3 Purge Port Inventory. Process the Purge Port PIN and location messages from the PCS. Associate the Purge Port PIN with the current location at connect to the glovebox or with the Pig PIN at disconnect from the glovebox.

3.1.8.3.1 Input.

- A. Purge port location message from PCS, or
- B. Purge port and transfer pig message from the PCS.

3.1.8.3.2 Processing.

- A. Generate a location record for the purge port.
- B. If the message has just the purge port and PIN then update the location record and generate a history record.
- C. If the message includes both the purge port PIN and the pig PIN, then generate a container relationship record between the purge port and the pig. Also update the location record and generate a history record.

3.1.8.3.3 Output. None.

3.1.8.4 Sample Inventory. Process the sample PIN and location messages from the PCS. There are three message types; a sample PIN associated with a packet or drum PIN (3.1.8.4.1) a sample PIN associated with a Purge Port (3.1.8.4.2) and a sample PIN removed from a Purge Port (3.1.8.4.3).

3.1.8.4.1 Sample/Container Inventory. Process the sample PIN and location messages from the PCS. Associates the sample PIN and the packet or drum PIN in the message.

3.1.8.4.1.1 Input. Sample and parent drum/packet message from PCS.

3.1.8.4.1.2 Processing. Generate a container relationship record between the sample PIN and the packet or drum PIN in the message.

3.1.8.4.1.3 Output. None.

3.1.8.4.2 Sample Added to Purge Port. Process the sample PIN and purge port location messages from the PCS. Associates the sample PIN and purge port PIN in the message.

3.1.8.4.2.1 Input. Sample and purge port message from PCS.

3.1.8.4.2.2 Processing. Generate a container relationship record between the sample PIN and the Purge Port PIN in the message.

3.1.8.4.2.3 Output. None.

3.1.8.4.3 Sample Removed from Purge Port. Process the treatment sample and purge port messages from the PCS. Associates the sample PIN with the

location and disassociates the sample PIN with the purge port PIN in the message

3.1.8.4.3.1 **Input.** Treatment sample and purge port message from PCS.

3.1.8.4.3.2 **Processing.** Delete the container relationship record between the sample PIN and the Purge Port PIN and record the sample location.

3.1.8.4.3.3 **Output.** None.

3.1.8.5 Puck and Overpack Drum. Process the puck and overpack drum messages from the PCS. Associates the LLW puck, LLW drum, or compacted TRU empty drum and an overpack or loadout drum that it is put into.

3.1.8.5.1 **Input.** Puck and overpack drum message from the PCS.

3.1.8.5.2 **Processing.** Update the container relationship records to show the puck, waste drum, or compacted empty drum is in the product drum.

3.1.8.5.3 **Output.** None.

3.1.8.6 Packet/Non-compliant Item Inventory. Process the packet/non-compliant item PIN and location messages from the PCS. Associates the packet/non-compliant item PIN with the last packet PIN scanned.

3.1.8.6.1 **Input.** Non-compliant item and packet message from the PCS.

3.1.8.6.2 **Processing.** Generate a container relationship record between the packet/non-compliant item PIN and the packet PIN previously scanned.

3.1.8.6.3 **Output.** None.

3.1.8.7 Aerosol Can Collection Container Inventory. Process the aerosol can and collection container messages from the PCS. Associates the aerosol can and the collection container into which the aerosol contents will be drained.

3.1.8.7.1 **Input.** Aerosol can and collection container message from the PCS.

3.1.8.7.2 **Processing.**

Generate a container relationship record between the Aerosol Can and the Collection Container.

3.1.8.7.3 **Output.** None.

3.1.8.8 Remove Item from Transfer Stand. Process the remove from transfer stand message and the non-compliant item for treatment message from the PCS. Removes the PIN from the current transfer drum inventory.

3.1.8.8.1 **Input.** Remove from transfer stand message or non-compliant item for treatment message from the PCS.

3.1.8.8.2 **Processing.** Remove the PIN in the message from the transfer drum inventory at that location.

3.1.8.8.3 **Output.** None.

3.1.8.9 **Add Item to Transfer Stand.** Process the add to transfer stand messages from the PCS. Adds the PIN to the current transfer drum inventory.

3.1.8.9.1 **Input.** Add to transfer stand message from the PCS.

3.1.8.9.2 **Processing.** Add the PIN in the message to the transfer drum inventory at that location.

3.1.8.9.3 **Output.** None.

3.1.8.10 **Treatment Container Inventory.** Process the treatment container PIN and location messages from the PCS. Associates the treatment container PIN with a non-compliant item or sample PIN, and associates the treatment container with a loadout drum.

3.1.8.10.1 **Treatment Container and Non-Compliant Items.** Process the treatment container and item container message from the PCS. Associates the treatment container and the non-compliant item in the message.

3.1.8.10.1.1 **Input.** Treatment Container and Item Container message from the PCS.

3.1.8.10.1.2 **Processing.** Generate a container relationship record between the non-compliant item and the treatment container.

3.1.8.10.1.3 **Output.** None.

3.1.8.10.2 **Treatment Container and Loadout Drum.** Process the Treatment Container and Loadout Drum message from the PCS. Associates the treatment container and the loadout drum in the message.

3.1.8.10.2.1 **Input.** Treatment Container and Loadout Drum message from the PCS.

3.1.8.10.2.2 **Processing.** Generate a container relationship record between the treatment container and the loadout drum.

3.1.8.10.2.3 **Output.** None.

3.1.8.11 **BWAS Message Pass Through.** The BWAS will send status messages concerning its operation to the DMS which will have to be forwarded to the PCS. The PCS will send an abort assay message to the DMS which will be forwarded to the BWAS.

3.1.8.11.1 **Input.** Status messages from the BWAS (BWAS Assay Started, Abort BWAS Assay, and BWAS Assay Complete) or abort assay message from the PCS.

3.1.8.11.2 **Processing.** Generate the complement of the BWAS to DMS message to send to the PCS or generate the complement of the PCS to DMS message to send to the BWAS.

3.1.8.11.3 Output. Send the BWAS status message to the PCS or the abort assay message to the BWAS.

3.1.9 User Review/Modification of WRAP 1 Waste Processing Data

WRAP 1 users will review the DMS data as applicable to verify that all data required to be generated in WRAP 1 was in fact obtained. Missing or incorrect data elements will be manually entered or corrected. Once the waste containers have been processed through the WRAP 1 facility and returned to the Shipping Area, satisfactory completion of this activity will allow the waste container to be flagged as "data review complete". This function will be performed from IBM personal computers on WLAN or HLAN.

3.1.9.1 Input.

- A. Select specific "Process Data Review" screen from "WRAP 1 DMS Main Menu".
- B. User selection of a container to review from a list of containers or a container PIN.
- C. User complete/modify those data elements requiring change.
- D. User may flag the container as "data review complete" or "data review unsatisfactory" in the DMS drum status field

3.1.9.2 Processing.

- A. Generate the selected "Process Data Review" screen.
- B. Display the process data for the selected container.
- C. Update the DMS database and log the change(s) with the user ID, old data element value(s), date, and time.

3.1.9.3 Outputs.

- A. Display the selected "Process Data Review" screen and the data for the selected PIN.
- B. Flag as necessary the waste container record as "data review complete" or "data review unsatisfactory".

3.1.10 Reports

This section describes those reports that will be required in addition to those described in the previous sections. Reports generated can be viewed on the screen, printed, or sent to a file.

3.1.10.1 Facility Performance Data Reporting. Provide facility performance information such as numbers of containers received, numbers of containers of various waste types processed per day/shift, cumulative number of containers of various waste types processed, waste volume reduction factors, running

fissile material inventories, etc for specific time periods (weekly, monthly, quarterly, or annually). Other types of reports will include number of containers inconsistent with generator certification data and waste containers shipped to various sites.

3.1.10.2 Waste Data Reporting. Waste data reporting provides a set of reports about the containers and materials currently in the WRAP facility. These reports will cover such areas as empty containers, facility storage, awaiting shipment, shipments, and sample status. There may also be reports required by regulatory agencies.

3.1.10.3 Reference Table Reporting. Reference table reporting provides the formatted printing of the data in a particular reference table. This report will label the data in a readable format so the user can decide whether the data is still current or necessary entries are missing.

3.1.10.4 Ad Hoc Reporting. This section will provide the authorized user with the capability to select information from the DMS database and display it on the terminal or print it at a printer.

3.1.10.4.1 Inputs.

- A. Select the "Ad Hoc Reporting" screen
- B. Input the structure query language (SQL) commands and procedural logic necessary to retrieve the data needed.
- C. If desired, invoke the print function.

3.1.10.4.2 Processing.

- A. Generate the "Ad Hoc Reporting" screen.
- B. Invoke Oracle's SQL*Plus program.
- C. Using the SQL commands and procedural logic input by the user, search the database in a read-only mode and formate the requested data for the terminal screen.
- D. If the print function is selected, formate the selected data for the selected printer.

3.1.10.4.3 Outputs.

- A. Display the "Ad Hoc Reporting" screen with the entered SQL commands and the selected data.
- B. If selected, print the selected data at the selected printer.

3.1.11 Maintenance

This section describes those maintenance functions that need to be performed to ensure the efficient and correct operation of the DMS. These

functions will be performed by the System Administrator or the Database Administrator.

3.1.11.1 SWITS Compatible Table Maintenance. There are a number of fixed data tables in the DMS database that are identical to tables in the SWITS database. These tables are added to or modified on an occasional bases. These tables need to be identical between the two systems, so when a SWITS table is update, the corresponding DMS table needs to be updated. These tables will be updated on SWITS and copied to the DMS database. These will be maintenance functions performed by the System Administrator or Database Administrator.

3.1.11.2 DMS Table Maintenance. There are a number of tables that are specific to the internal operation of the DMS database in the WRAP environment. They will be modified frequently as personnel change, user notices change, and the system is upgraded with new functions. These will be maintenance functions performed by the System Administrator or Database Administrator.

3.1.12 Error Detection and Recovery.

Error detection and recovery shall be a integral part of the design. Diagnostic software to test the health of the DMS and the status of the communication interfaces will be provided. Software will also be provided to facilitate restoration to normal operation following a failure. Specific error detection and recovery functions to be provided will be determined during design.

3.2 EXTERNAL INTERFACE REQUIREMENTS

This section describes the external interfaces. External interfaces are those interfaces outside the application software product that is being developed. These include interfaces with the user, the hardware and other software products. User interfaces describe the characteristics of the human interface to the system, such as the user accesses the DMS using an IBM personal computer (PC) connected to the HLAN. Hardware interfaces describe the interface of the application software with the hardware, such as devices to be supported and protocols to be used.

3.2.1 User Interfaces

User interfaces consist of the inputs, outputs, and displays on a display terminal used or seen by a DMS user. All user interfaces will be menu driven down to the function to be performed and tailored to the needs of the functional user. For instance, the main menu might be displayed as four items -- INPUTS, DISPLAYS, REPORTS, and EXIT. Then, if INPUT is selected, another screen providing a menu of input screen functions to be selected would appear. Selecting a particular input screen would allow the input of data to the database, providing the user has the appropriate accesses.

All primary screens will have a "fast access" capability, thus allowing direct access to screens, skipping intermediate menus, submenus, and screens.

this methodology will be utilized for all functional requirements. Each screen displayed will be structured for ease of use. Programmed function keys will be available to aid the user in navigating through the system. Error messages, along with possible resolution options that the user can understand, will be displayed on the screen when the system detects an error. Help screens will be structured to accommodate a menu driven system. User training will be addressed in the *WRAP 1 DMS training manual* and *WRAP 1 DMS user manual*.

A multiple screen capability shall be available to allow the user to skip to other screens to perform separate functions while suspending the operations on the current screens. It will also allow the system to pop-up another screen to alert the user or request data on an immediate bases.

User reports will fall into two categories, reports that generate certification and transportation papers for disposal and transport and reports that support the facility operations such as drum/box inventories, dose equivalent curie inventory for the facility, AS/RS pick lists, etc. Provisions will be made to assure that the printing of reports will not adversely impact facility operations.

3.2.2 Hardware Interfaces

The DMS host hardware has been selected to meet anticipated capacity and performance requirements (disk space, main memory, and peripheral devices) of the system. The interfaces with the hardware will be transparent to most users. The users will access the host using IBM-PC compatible personal computers and/or X-terminals operating over the HLAN or WLAN. Each user will be required to have a user name/password and a signature password if they will be updating or modifying critical data. The steps to access the computer will be provided in the *WRAP 1 DMS user manual*.

3.2.3 Software Interfaces

Software interfaces are interactions between the DMS and other software products, such as data management systems, operating systems, mathematical packages, or other application systems.

These interfaces will also include the remote access to the SWITS database, the remote access to/from the PCS, and the remote access to/from the SIE and BWAS. It is anticipated that SQL calls to/from the SWITS database will allow this remote access. Software interfaces describe the application software interfaces to the vendor supplied software products, such as the use of Oracle and its interface products such as SQL*Forms, SQL*Reports, and SQL*Net.

3.2.4 Communications Interfaces

The communication interfaces to the DMS are the HLAN and WLAN. Operations users and development staff will access the DMS server through the Ethernet connections to one of the available local area networks.

The DMS will use the HLAN time to set the DMS system clock at startup. The DMS will provide a reference clock service to the other computers on WLAN as described in SII 1994.

Electronic transfer of data to WIPP is a future requirement and will not be provided in the initial system. Electronic exchange of data with Retrieval and the analytical laboratories may also be required in the future.

3.3 PERFORMANCE REQUIREMENTS

This section specifies both the static and dynamic numerical requirements placed on the software or on human interaction with the software as a whole. The numbers provided are the initial requirements for the system. The system must accommodate a minimum future expansion of 25% of initial capability without replacing existing hardware or software.

3.3.1 Number of Terminals to be Supported

The DMS must support 10 IBM compatible computers used as terminals plus 5 X-terminals concurrently.

3.3.2 Disk Storage

Disk storage capacity will be required for the following components:

1. Operating system and database products.
2. Production code libraries.
3. Database system and tables.

3.3.3 Printing

1. One bar code printer in the Shipping/Receiving Office.
2. Three facility printers.
3. One HLAN printer.

3.3.4 Response Times

The DMS shall, on the average, perform the following activities within the specified times.

1. Confirm required data on SWITS for twenty drums (3.1.1.2.2) in 30 seconds or less with SQL*Net interface. Includes user request to confirmation on the DMS terminal.
2. Retrieve drum container data from SWITS for twenty drums (3.1.1.2.4) and generate DMS drum container records (3.1.1.2.5) in

three minutes or less with SQL*Net interface. Includes user request to confirmation of DMS database update.

3. Receive PCSDMS message RSIE and send DMSSIE message DMSRSIE message in 3 seconds or less.
4. Display the TRU glovebox fissile material inventory (3.1.7.3) in less than 3 seconds.
5. Perform a data field validity test in less than one second.

3.4 DESIGN CONSTRAINTS

This section discusses design constraints imposed on the implementation of the application, including compliance with site standards.

3.4.1 Standards Compliance

The system will be compatible with applicable site standards. The system will be compatible with the site naming standards for those items (e.g., buildings) that have site standard names. The system will be compatible with the Site Naming Conventions found in WHC-CM-2-6, Section 3.6 "Business Naming Standard." Modularity, program identification, program documentation, and program constructs will be used. The DMS will be designed to satisfy site production standards.

3.4.2 Hardware Limitations

Hardware limitations have been addressed in Section 2.5 of this document.

3.5 ATTRIBUTES

This section describes the attributes of the system that place specific requirements on the software. These include ease of use, availability, security, maintainability, and transferability/conversion.

3.5.1 Ease of Use

To facilitate the system's ease of use, the following capabilities will be provided:

1. Menu Driven - Menus will be provided for the user interface to the system.
2. Function Keys - Programmed function keys will be provided. At a minimum, the user will be able to insert, recall, and scroll through the data.

3. Error Messages - Error messages will be unique and useful to the user. Error messages will help the user in recovering from abnormal conditions that might occur while inputting or reporting on the data.
4. Update Messages - Messages will be provided that clearly indicate the successful entry of data into the system.
5. The DMS will provide, at the time of entry, automatic checks and verification of data entry with established acceptance criteria. These checks and data verification will be identified during detailed design.

The system will provide a user interface for data entry and information display that is easily understood with minimal training and does not arbitrarily impede use of the system.

3.5.2 Availability

The DMS operational availability shall be a minimum of 99% of scheduled plant operating time during normal operations as described in WRAP 1 Specification Sections 13461/13462. Normal plant operation is 6:00 AM to 8:00 PM on weekdays.

3.5.3 Security

Host access control shall be used to protect the system from unauthorized access. In addition, certain data fields shall be protected against update access. Access to the system functions will be based on user roles. This decision will be made during the design phase. Modifications to selected data fields will be tracked to the originator of the data revision.

3.5.4 Maintainability

Analysis support will be provided during all phases of the project including the maintenance or operational phase of the project for user support functions, including user help, training, and recover from failures.

Global changes of data type or unit will be handled as enhancements/system changes. Specific data types and units will be determined during detailed design specifications. Procedures, screens, and global change methodology will be determined during detailed design.

Modifications to DMS in the form of system changes or reprogramming will be made by analysts under change control.

3.6 OTHER REQUIREMENTS

This section outlines other general requirements. Because of their unique nature, these requirements are addressed in separate categories. These

areas do not fit any of the categories previously addressed and are discussed in Sections 3.6.1 through 3.6.13. These unique areas are:

1. The DMS is primarily a database application system and therefore this item is specifically addressed.
2. The DMS has specific operations requirements in order to meet the user needs and to provide system integrity for a critical application.

3.6.1 Database

The DMS shall use the Oracle RDBMS on the computer's standard operating system. The DMS database development will require some modifications to the SWITS database tables. A historical database will be maintained on the DMS for all waste containers that have been shipped from the facility.

3.6.2 Operations

Selected operational users will be able to start the DMS without the DMS system administrator's presence. The selected users will also be able to shutdown the DMS without the DMS system administrator's assistance.

System backup and recovery will normally be done by the DMS system administrator.

3.6.3 Site Adaptation

No special site adaptation requirements have been identified for the DMS. The computer will run in a normal office environment. The DMS shall use the Oracle RDBMS on the computers standard operating system.

3.6.4 Options

No specified options for the DMS have been identified. Facility design documentation has dictated that this system will be similar to the Hanford SWITS application. Facility design has defined DMS-PCS/SIE/BWAS interfaces.

3.6.5 Scheduling

The DMS will be on-line and available from 6:00 AM to 8:00 PM on weekdays (minimum). Some operations such as backup and large report generation may be performed during off hours.

3.6.5.1 General. Data will be retained on the system to support year-end report/processing (15 month retention). The generation of these reports will not impact routine operations.

3.6.5.2 Daily. The majority of the on-line processing is expected to occur between 6:00 AM and 8:00 PM Monday through Friday. However, the DMS will be

available for extended shift operations when necessary, except for regularly scheduled maintenance periods.

3.6.6 Reliability and Recovery

All computer systems have a finite life before a hardware or software problem causes the system to crash. To overcome this problem, the system will maintain a transaction log and the system administrator will do periodic system backups.

3.6.6.1 Transaction Log. Provide a transaction log on a disk other than the one the database is on to facilitate reconstruction of the database if the disk is damaged.

3.6.6.2 System Backup. Provide a system backup capability that can be used in conjunction with the transaction log to reconstruct the system up to the point of disk failure.

3.6.7 Audit

An audit trail capability shall be provided to report manual data entry and database changes at the data table level. Data tables to be audited shall be identified during design. It shall be possible for the data administrator to turn the audit trail on or off and to change the selection of data tables audited. The audit trail shall maintain a record of the date, time, previous value (for data changes), current value, and the identity of the person entering the data (identified through the logon or signature password).

3.6.8 Transferability

It is anticipated that the WRAP 1 DMS, when fully developed will be used as the basis for other Solid Waste Operations Complex facility data management systems.

3.6.9 Conversion

The Hanford SWITS programming will be used as a basis for a portion of the DMS design.

3.6.10 Testing and Acceptance Criteria

Acceptance criteria will be generated and documented in an officially released document. The acceptance criteria are contained in the *WRAP 1 DMS software project management plan*.

The system developers in conjunction with the users will design and execute test cases to verify that software modules/packages perform according to the design criteria. These test cases will evaluate the WRAP 1 DMS database as stated in the *WRAP 1 DMS test plan*. The results of the formal test cases will be released as supporting documents. These test reports will

summarize the results of the designated testing activities and should provide evaluation based on the results.

3.6.11 Documentation

The documentation required for the design, development, and implementation of the DMS will be prepared in accordance with the guidelines provided in *WHC-CM-3-10, Software Practices*, *WHC-CM-4-2, Quality Assurance Manual*, and *WHC-CM-6-1, Standard Engineering Practices*. The *WRAP 1 DMS software project management plan*, contains documents to be produced.

3.6.12 Training

The IRM/ISS software engineers will prepare a *WRAP 1 training plan*, which provides a guide for training on the DMS.

3.6.13 Security and Privacy

A WRAP 1 operations manager will have the authority to add, change, or delete user access to the DMS. Once the manager has approved the changes, the system administrator will be empowered to make the necessary changes.

The system administrator will work with the computer protection program manager to assure the integrity of the system.

There is no classified or proprietary information in the system. The data will be reviewed before being released for general use.

There are three privileged users on the system, the system, database, and network administrators. The system administrator may add, change, and delete users and perform other administrative functions. The database administrator may add, change, and delete user access control to various parts of the database, perform maintenance functions to ensure the data integrity of the database, and perform other database administrative functions. The network administrator may perform network monitoring and network configuration changes.

4.0 REFERENCES

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- WHC, 1994c, *WRAP 1 Computer Interface Definition Document*, WHC-SD-W026-CSWD-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

5.0 GLOSSARY

5.1 ACRONYMS

AS/RS	Automatic Stacker/Retriever System
BWAS	Boxed Waste Assay System
Ci	Curies
DMS	Data Management System
FGE	fissile gram equivalent
GEA	gamma energy assay
HLAN	Hanford Local Area Network
LLW	low level waste
NDA	non-destructive assay
NDE	non-destructive examination
OIU	Operator Interface Unit
PAM	Packet Assay Monitor
PAN	Passive Active Neutron
PC	personal computer
PCS	Plant Control System
PIN	Package Identification Number
RDBMS	relational database management system
RWM	restricted waste management
SIE	System Integration Equipment
SII	Systems Interface, Inc.
SQL	Structured Query Language
SRS	Software Requirements Specification
SWITS	Solid Waste Information and Tracking System
SWSDR	Solid Waste Storage/Disposal Record
TRU	transuranic
UHWM	uniform hazardous waste manifest
WHC	Westinghouse Hanford Company
WIPP	Waste Isolation Pilot Plant (Carlsbad, NM)
WLAN	WRAP Local Area Network
WRAP	Waste Receiving and Processing

5.2 DEFINITIONS

Application. The data manipulation and processing operations that are related to specific requirements of an information system.
Software or program that is specific to the solution of a specific business problem or process.

Application System. A collection of applications that uses the services provided by the human-computer interface, communications facility, and data management system to perform the processing necessary to meet the requirements of the information system.

Architecture. The manner in which hardware, software, or data are structured. Architecture typically describes how the system or program is constructed, how its components fit together, and the protocols and interfaces used for communication and cooperation among modules or components of the system.

Archive. To save data for possible later use.

Background Drums. Drums containing an uncontaminated waste matrix. Drums are assayed at the start of each operating shift. (Also referred to as "white" drums)

Characterization/Default Data. Data is expressed as a decimal fraction representing the Ci of activity attributed to a given isotope divided by the Ci of activity attributed to the entire waste package. Also referred to as **RELATIVE** abundance data.
Example: Pu-239 0.22

Certification. The process of certifying that waste is compliant with the regulatory requirements for shipment and/or disposal of the waste.

Certification data. Data used to certify that the waste is compliant with the regulatory requirements for shipment and/or disposal of the waste.

Certification Drums. (1) Drums generated in the WRAP 1 Process Area. The assay data generated in WRAP for these drums will be the certification data that is used to support disposal of the waste in a final repository. Radionuclide abundance data will not be available (except for GEA data for pucks). (2) Drums comprised of newly-generated wastes which have been shipped to WRAP for verification of the waste certification data provided by the waste generator. These drums do not go into the Process Area. Radionuclide abundance data will be available and will be verified by SIE

Change Control. (1) The process of managing changes to individual components within each version of information that may include source code, version control, documentation, and system configuration. (2) The process of controlling, authorizing, and tracking changes to manual or automated data.

Collection Container. A container used in the RWM gloveboxes to collect liquids from aerosol cans for sampling and storage prior to treatment. Collection containers are stored in transfer drums.

Commit. The process of storing new, changed, or deleted records from the work space to a table in the database.

Computer System. A collection of hardware that is managed as a single unit by software such as an operating system, which may also provide common services such as access control, interprocess communications, and a graphical user interface.

Context Diagram. A drawing that shows the boundaries of a system and the interfaces associated with the system.

Data Dictionary. (1) A description of the characteristics of data. The system tables that contain descriptions of the database objects and how they are structured. (2) An inventory that describes,

defines, and lists all of the data elements that are stored in a database.

Data Element. The logical definition of a unit of information, apart from its actual use (that is, physical rendering) within any given program, file, database report, screen, and so on; the smallest unit of physical data about which attributes are defined; the lowest level of addressable data in which data value(s) are physically stored.

Data Flow. A representation of the passage of data or relationships among business processes, data stores, data flows, and external entities.

Data Flow Diagram. A graphical representation, following a certain style, of business processes, data stores, data flows, and external entities.

Data Integrity. The ability to preserve the completeness, currency, and accuracy of the data without unintentional changes; the ability to produce results that are correct to a predefined level and to maintain data availability; conformance of data values to a specified set of rules.

Data Standards. The definition of how facts are to be referred to, how they are to be represented, what they will mean, and the rules governing their informational use throughout the enterprise.

Database. (1) A collection of data logically organized to meet the information and time requirements of a universe of users. (2) A collection of interrelated, largely unique data items or records, in one or more computer files, that may be processed by many different application programs.

Database Management System (DBMS). A computerized system consisting of numerous components which have as their collective purpose the implementation, processing, management, and protection of databases.

Design. The process of defining the software architecture, components, modules, interfaces, test approach, and data from a software system to satisfy requirements.

Drums for Processing. Drums containing a contaminated waste matrix. Drums are destined for processing in the WRAP 1 facility and require an assay to support the processing of the waste. Waste drums are generally "retrieved" from the burial grounds, however, approximately 10% of these drums will be newly-generated waste which is processed to remove non-compliant items.

Field. In a table, the information stored at the intersection of a row and a column. In a block, a highlighted or underlined area on the screen that can display an output value or accept an input value.

File. (1) A collection of related data that is stored and retrieved by an assigned name. Synonymous with data set. (2) A collection of rows (or records) that have associated columns (or files). The logical equivalent of a table. (3) A named set of records stored or processed as a unit.

Hardware. All or part of the physical components of an information system or computer environment.

Isotopic Quantity Data. Data is an absolute value for a given radionuclide. The units (not transmitted between DMS and SIE) are expressed in Ci or Grams. Also referred to as abundance data
Example: Pu-239 17.45 grams

Local Area Network (LAN). A local area network connects information processing equipment, such as PCs and printers, in a limited geographical area to allow high-speed communications for information resource sharing.

Module. (1) A program unit that is discrete and identifiable with respect to compiling, combining with other units and loading. (ANSI); (2) A logically separable part of a program.

Network. A computer communications system linking a series of computer elements. A system of interconnected computing devices that can communicate and share resources. Networks may be private (for one user) or shared (for many users).

One Trip Drum. A 55 gallon drum used for TRU loadout.

Oracle. A commercial relational database management software package. It includes software for data entry, database queries, and reports from the database.

Overpack Drum. An 85 gallon drum containing a 55 gallon waste drum.

Packet. A package containing non-compliant or suspected non-compliant waste which has been removed from a waste drum in a process glovebox. Each packet is labeled and placed in a transfer drum for transfer to an RWM glovebox.

Pallet. A platform used to hold up to four drums during transport and storage in the AS/RS. Pallets are not uniquely identified.

Parent Item. Parent items are non-compliant items removed from packets and may be sampled in the RWM glovebox. Parent Items are stored in transfer drums until sample results have been received and/or treatment procedures specified.

Pig. A labeled shielded container used to transport purge ports and samples.

Pop-Up Windows. Screen areas that overlay all or a portion of the display screen. Pop-ups have unique functionality but all pop-ups

display information to the user while maintaining context in the session.

Primary Key. A single attribute that uniquely identifies a particular entity instance and has been chosen to be the standard way to access the entity.

Process. (1) A predetermined course of events defined by its purpose or by its effect, achieved under given conditions. (2) An active component of an information system.

Puck. A compacted empty drum or supercompacted drum containing low level waste. All pucks are low level waste and are placed in 85 gallon drums for storage and/or disposal.

Purge Port. A container used to remove and transport samples from gloveboxes. The purge port acts as an air-lock and provides contamination control.

Relational database. (1) A database that is organized and accessed according to relationships between data items. (2) A data structure perceived by its users as a collection of tables. A relational database consists of tables, rows, and columns. Most mini-computers and mainframes today have relational database systems available for business use. Relational databases differ from non-relational databases in that there are no system dependencies stored within the data; for example, hierarchical databases are not relational because they contain pointers to other data. Oracle is a relational Database Management System.

Revisit Drums. Revisit drums are drums that have been assayed in WRAP prior to receipt of characterization data. The drums are transferred from the WRAP facility, but the assay data is retained in the SIE until such time as the characterization data becomes available. The original assay is then revisited and the final assay results generated.

Sample. A labeled package of material to be transported to the laboratory for analysis. Samples may be random confirmatory samples from the process gloveboxes or restricted waste samples from the RWM gloveboxes. Samples are returned from the laboratory when analysis is complete. Returned restricted waste samples are treated with the corresponding parent item.

Software. (1) A compilable piece of code. (2) All or part of the programs, procedures, rules, and associated documentation of an information system.

Software Design Description (SDD). A representation of a software system created to facilitate analysis, planning, implementation, and decision making. A blueprint or model of the software system. The SDD is used as the primary medium for communication of software design information.

Structured Query Language (SQL). A standardized language for requesting data from a database.

Table. A named collection of related information stored in the Oracle database.

Transfer Drum. A 55 gallon Drath & Schrader drum used to move and store packets, parent items, and collection containers.

Treatment Container. A container used in the RWM gloveboxes to collect parent items and samples for treatment.

TRUPACT Assembly. A seven drum or single box assembly forming the upper or lower portion of a TRUPACT cask load.

TRUPACT Cask. The shipping container used to transport TRU waste to WIPP. A TRUPACT cask can be used to transport 14 drums or two boxes.

Verification. Comparing newly generated waste data with existing certification data from SWITS to insure the values are within a specified tolerance.

Verification data. Data collected to verify existing certification data.

Verification Drums. Drums containing a waste matrix with known levels of radionuclide quantities. Drums are assayed at the start and the end of each operating shift. There are two different Verification drums; a high standard and a low standard. (Also referred to as "pink" drums). These drums have also been referred to as "QC" drums by WHC operations.

Waste Drum. A labeled 55 gallon or 85 gallon drum containing waste.

X Windows. X Windows is a bit mapped user display. It uses the client-server model, where the client is the windowed application and the server is the window system. The client-server model allows the user almost complete machine independence. Although X Windows is currently a de facto standard, the National Institute of Standards and Technology plans to adopt the X Windows System as a Federal Information Processing Standard (FIPS).

5.3 TRADEMARKS

1. Oracle is a trademark of Oracle Corporation, World Headquarters, 500 Oracle Parkway, Redwood Shores, CA 94063
2. IBM is a registered trademark of International Business Machines Corporation
3. Hewlett-Packard is a trademark of Hewlett-Packard Corporation

APPENDIX A - REQUIREMENTS TRACEABILITY MATRIX

WHC-SD-W026-CSRS-001 REV 1

WRAP 1 DATA MANAGEMENT SYSTEM
SOFTWARE REQUIREMENTS SPECIFICATION
REQUIREMENTS TRACEABILITY MATRIX

Reference	Requirement	SRS Section	Comments
WHC-SD-W026-FDC-001 2.2.1, p. 12	Review shipping and packaging documentation and enter applicable information into the central Plant Management System	3.1.5.1 3.1.9	
WHC-SD-W026-FDC-001 2.2.2, p. 12	Allow direct input of weight data into the central Plant Management System	3.8.1	Weight data received from PCS.
WHC-SD-W026-FDC-001 2.2.3, p. 12	Allow direct input of the assay data into the central Plant Management System	3.1.2.2 3.1.3.3.3	Assay data received from SIE, BWAS, and PAN.
WHC-SD-W026-FDC-001 2.2.4, p. 13	Allow direct input of examination data into the central Plant Management System	3.1.2.1 3.1.3.1.4 3.1.3.3.3	DMS provides for manual entry of observations. Images are stored by the NDE system.
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Generate all required permanent and backup records to include magnetic media, laser discs and hard copies	3.1.10 3.6.5.1	No laser disk data storage on DMS.
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Generate all required shipping papers	3.1.5.1 3.1.5.3.3	
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Compile and display estimated fissile content within all process components, enclosures, and areas	3.1.7.1	
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Track status of all incoming waste containers and contents as they are processed through the facility	3.1.8	

WHC-SD-W026-CSRS-001 REV 1

Reference	Requirement	SRS Section	Comments
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Identify location of all waste containers within facility	3.1.8	
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Store information on each incoming waste container	3.1.1.2.5	
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Interface with the Hanford and WIPP solid waste databases and laboratory data management systems	3.1.1.2 (SWITS) 3.1.5.2 (SWITS) 3.2.4	Requirements for interfacing with WIPP and laboratory data management systems have not been defined. These requirements will be added to the SRS by ECN when defined.
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Provide for data transmission to and from the Hanford Local Area Network (HLAN)	3.2	
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Provide facility performance information such as numbers of containers of various waste types processed per shift, cumulative number of containers of various waste types processed, waste volume reduction factors, running fissile material inventories, radiation exposure per time, average and peak radiation levels of containers	3.1.10.1	DMS SRS requirements do not include radiation exposure per time, and average and peak radiation levels of containers.
WHC-SD-W026-FDC-001 2.2.10, p. 16	(PMS) Store and transmit data required by the WIPP-WAC data reporting requirements on each container	3.1.5.3.3	

WHC-SD-W026-CSRS-001 REV 1

Reference	Requirement	SRS Section	Comments
WHC-SD-W026-SDRD-001 2.6.1, p. 32	The DMS will track characterization information for the waste. This characterization information will be used for process and certification purposes.	3.1.1 3.1.2 3.1.3 3.1.5 3.1.9	
WHC-SD-W026-SDRD-001 2.6.2, p. 32	Software changes shall be controlled by password or keylock controls.	3.6.13	Password access control.
WHC-SD-W026-SDRD-001 2.6.2, p. 32	(PMS) Access shall be made internally only, except that access to the Data Management System (DMS) for data management only may be accomplished through the HLAN.	3.2	DMS access to the PCS, SIE, and BWAS is through the WLAN.
WHC-SD-W026-SDRD-001 2.6.2.1, p. 32	The Centralized Database will consist of dynamic facility operational information and relatively static administrative information required to efficiently operate the facility. Specific data requirements and report formats shall be determined during definitive design.	3.6.1 Appendix B	
WHC-SD-W026-SDRD-001 2.6.4.1, p. 33	The system shall interface with WIPP via modem through the Hanford Local Area Network (HLAN), Retrieval via HLAN, SWITS (Solid Waste Information Tracking System) via HLAN, and LIMS (Laboratory Information Management System) via HLAN. The SWITS interface shall be a focal point for any inter-site waste transfers.	3.2 (SWITS) 3.2.4	Requirements for interfacing with WIPP, Retrieval and LIMS have not been defined. These requirements will be added to the SRS by ECN when defined. HLAN interface is provided.

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Reference	Requirement	SRS Section	Comments
WHC-SD-W026-SDRD-001 2.6.4.2.1, p. 33	The PMS will provide an interface with each NDA and NDE station, obtaining information and providing data upon request.	3.1.2 (NDE/NDA) 3.1.3.3.3 (PAM)	
WHC-SD-W026-SDRD-001 2.6.5.1.1, p. 33	Plant downtime due to PMS problems shall be less than 1% of the scheduled plant operating time.	3.5.2	The DMS SRS requirement is for a minimum of 99% availability for the DMS
WHC-SD-W026-SDRD-001 2.6.5.1.2, p. 33	The system (PMS) shall be designed to utilize software diagnostics to determine system state-of-health and to localize failed hardware modules.	3.1.12	
WHC-SD-W026-SDRD-001 2.6.5.1.3, p. 34	The (PMS) design shall accommodate a minimum future expansion of 25% of initial capability, without replacing existing hardware, software, or firmware components.	3.3	
WHC-SD-W026-SDRD-001 2.6.5.1.5, p. 34	The system (PMS) shall contain a clock which will provide current date and time for all hard copy, CRT, CCTV and other displays. This time-of-day clock shall be the master clock for the facility, shall be controlled by the master system clock via the HLAN, and shall provide update signals as required.	3.2.4	

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Reference	Requirement	SRS Section	Comments
WHC-SD-W026-SDRD-001 2.8.3, p. 40	The Plant Management System of this facility is not required to provide any classified information on any output device and will not interface with any classified data processing capability.	3.6.13	
END			

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