13 - DATA ACQUISITION AND INVENTORY MANAGEMENT

Title: Data Acquisition and Inventory Management **Doc. No.** 2015-MMTS-13

Approval Signatures and Date

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***NOTE:** This document will be reviewed at least annually to ensure its suitability.*

Revision History

Rev. No.	Change description	Author
2	Updated the Saber Engineering - 212057 Mercury Transfer Operation and Maintenance Manual, Revision 1.7, September 3, 2015. Refer to "MMTS Operating Changes from Initial Operations Conducted in September 2015- October 13, 2015"and "MMTS Operating Changes from Initial Operations Conducted in June and August 2015- September 24, 2015".	Burton Packard and Renee Rodriguez
1	Change description Crosswalk Between NDEP CAPP Review Comments (dated 2014-12-09, 2015-01-30 and 2015-02-26) and Mercury Storage and Transfer Program Document Contents March 10, 2015	Burton Packard and Renee Rodriguez

***NOTE**: Hard copies of this document may not be the current version. Refer to the "IAmTheKey" to verify the current version.*

Reference Documents

Document number	Document title
QP.EMS.HG.0006	Mechanical Integrity Procedure (Tier 1)
	Saber Engineering - 212057 Mercury Transfer Operation and Maintenance Manual, Revision 1.6, March 23, 2015"
	Video describing MMTS data acquisition system

13.1 PURPOSE

This procedure describes operations related to the MMTS data acquisition system.

13.2 SCOPE

This procedure covers the following types of activities related to operation and data archiving for the data acquisition system:

- Data acquisition system operation.
- Data archiving and backup.
- Report creation

13.3 OPERATIONS

13.3.1 Pre-Operations Check

Because the data acquisition system continuously monitors facility environmental conditions as well as process progress, it should be in operation at all times except during system maintenance or repair. At the start of a workday, the Facility Manager performs the following actions:

- Confirms that the computers for PCDAS and the MMS are turned on and the computer displays are working.
- If the computers are off, power up the systems by following the instructions in Section 13.8 on page 13-19.
- Inputs his name on the USERS screen under SUPERVISOR NAMES (see Section 13.8, page 13-10). Inputs the name of all MMTS staff present under STAFF NAMES.
- If the systems do not respond as expected, notify the Facility Manager who will contact Maintenance to correct the problem if he/she is unable to resolve the concern.

At the start of workday, a Flask Handling Area worker performs the following actions:

- Retrieves a wireless handheld data input unit and touches the screen to gain access. Verifies that the PCDAS input screen is present (an image of the input screen is shown in Section 13.8 on page 13-21).
  - If the input screen fails to appear, turns on the wireless handheld data input unit; checks for sufficient battery reserve; and initiates the PCDAS application by following the instructions in Section 13.8 on pages 13-19 through 13-21.
  - If the battery reserve is insufficient to turn on or to complete a full day of operations, attaches the wireless handheld data input unit to a charger and repeats the verification process with another wireless handheld data input unit.
- Verify that process equipment is in a safe and ready condition to begin operations.

NOTE: The Facility Manager shall be notified if any of the above checks are not satisfactorily met and cannot be corrected by the data acquisition system operator.

13.3.2 Data Acquisition and Control System Operation

The data acquisition and control system for the MMTS monitors local environmental conditions as well as manages all process control necessary to support mercury transfer operations and material inventory. Environmental monitoring includes 16 channels of mercury concentration in air, inside and outside temperature and humidity, and barometric pressure. MMTS process monitoring and control includes 1-MT container weighing during mercury transfer operations, mercury transfer pump monitoring and control, and any process annunciators to alarm off-normal conditions.

A camera monitoring system and a fire protection and security system exist to support the facility. However, they function completely independently of the data acquisition and control system. The fire protection and security system is part of the MMTS and HWAD site monitoring. The camera system operates as a standalone system. The camera system provides multiple views back to a dedicated computer in the Facility Manager's office (Computer Area).

13.3.3 Required Equipment and Supplies (PPE as specified on page XI of the Executive Summary under General Safety and Health)

- Sixteen (16) sensors/data recorders for mercury concentration in air
- Environmental data logging system [inside and outside thermometers and humidity and barometric pressure(equal inside and outside)]
- Process monitoring and control includes weight sensors/recorders for two scales
- Mercury transfer pump sensor

Process annunciators

13.3.4 Maintenance

- Maintenance on PCDAS should be performed as directed by and to the schedule suggested in the manufacturer's operation and maintenance manual (see reference in Section 13).

- The Facility Manager or designee should shut down the PCDAS and MMS, including the computers, prior to maintenance or power outage by following the instructions in Section 13.8 on pages 13-17 and 13-18.

- Following maintenance or power outage, the Facility Manager or designee should restore power to the PCDAS and MMS by following the instruction in Section 13.8 on page 13-19.

13.4 RECORDS

The data acquisition system can generate reports from the records it collects automatically (see description of data acquired in Section 13.2) and the data input into it. The reports may be generated from the PCDAS computer in the Computer Area. The Facility Manager or designee accesses the computer screen shown in Section 13.8 on page 13-9. Instructions for creating a new report or retrieving a previously created report are given in Section 13.8 on page 13-16.

The details of the two report types (summary and detailed) are given below.

- Weekly/monthly summary report
  1. Reporting period – accumulated weekly and reports generated as needed.
  2. Amount of mercury transferred from 3-L to 1-MT containers during the reporting period.
  3. Number of 1-MT containers filled during the reporting period.
  4. The specific warehouse(s) receiving 1-MT containers and the number of 1-MT containers received during the reporting period.
  5. The specific warehouses(s) contributing 3-L containers, drums and pallets and the number of each removed during the reporting period – make a note of any deviations from six flasks per drum and five drums per pallet.
  6. Maximum and minimum environmental parameters measured during the reporting period with the date and time of each measurement (timestamps).
  7. Maximum and minimum mercury concentrations measured during the reporting period with timestamps.
  8. Summary of any unexpected/off-normal events that occurred during the reporting period with timestamps (where possible) and all personnel involved.

- Weekly/monthly detailed report
  1. Reporting period – accumulated weekly and reports generated as needed.
  2. Amounts of total and daily transfers of mercury from 3-L to 1-MT containers during the reporting period.
  3. Total and daily number of 1-MT containers filled during the reporting period.
  4. Mercury content of each of the 14 warehouses at the beginning and end of the reporting period, designate any buffer stocks in Building 110-66 as such.
  5. The specific warehouses(s) contributing 3-L containers, drums and pallets and the number of each removed during the reporting period – make a note of any deviations from six flasks per drum and five drums per pallet – list drum and pallet numbers with timestamps – present incremental (time period) and total datasets.
  6. The specific warehouse, the drip tray locations within the warehouses [locations should be equivalent between warehouses (e.g., 110-52-1 should be at the same relative location as 110-93-1)] and number of 1-MT containers on each drip tray, including timestamps – present incremental (time period) and total datasets.

7. Daily maximum and minimum environmental parameters with timestamps.
8. Daily maximum and minimum mercury concentrations with timestamps.
9. Detailed explanation of any unexpected/off-normal events that occurred during the reporting period with timestamps (where possible) and all personnel involved.

The data acquisition system is designed to run periodic operating system backups and data archiving. Operating information is provided in the Saber operation and maintenance manual and in the video featuring the representative of the data acquisition system supplier.

13.5 MAXIMIZING THROUGPUT WHOLE MINIMIXING DATABASE ERRORS

Data entry should not limit mercury transfer throughput and mercury transfer should not create database errors. Achieving these goals requires coordination between operators in the Drum Handling Room and Flask Handling Room. Efficiently performed coordination and data entries should take less than a minute

NOTE: Wear clean nitrile gloves only (not leather gloves) when making data entries on an iPad ***OR*** *make data entries using a stylus or similar pointing device*

13.5.1 Starting a New 1-MT Container

- Coordination between Drum Handling Room and Flask Handling Room occurs without additional operator action for the first six-pack of a 1-MT container

- Follow the steps for MT Filling on page 13 of the Saber Engineering O&M Manual (see §13.6, page NNN) [was page 100, SOC fill in the correct page number and remove this text in square brackets] for the first six-pack

13.5.2 Starting a New Six-Pack

- Follow the steps for presenting a new six-pack on page 13 of the Saber Engineering O&M Manual (see §13.6, page NNN) [was page 100, SOC fill in the correct page number and remove this text in square brackets] and repeat as needed

- Note the second step of the procedure in the Saber Engineering O&M Manual: The operator releases the foot switch and the pump stops.

- The peristaltic pump **MUST NOT** be operated during data entry for a six-pack

- Care must be taken to avoid making multiple entries of the same information – multiple entries will produce database errors

- Flask Handling Room operator enters the new six-pack

13.5.3 Starting a New Drum – COORDINATION REQUIRED

- Follow the steps for presenting a new drum on page 14 of the Saber Engineering O&M Manual (see §13.6, page NNN) [was page 101, SOC fill in the correct page number and remove this text in square brackets] and repeat as needed.

- Note the second step of the procedure in the Saber Engineering O&M Manual: The operator releases the foot switch and the pump stops.

- The peristaltic pump **MUST NOT** be operated during data entry for a new drum.

- Drum Handling Room and Flask Handling Room operators **MUST** coordinate actions for new drum input.

- Description of Coordinated Actions

  - Via signaling
    - Flask Handling Room operator finishes a six-pack and changes an indicator from stop to go (possibly turns a red/green sign from red to green).

    - Drum Handling Room operator changes an indicator from go to stop (possibly turns a red/green sign from green to red) and efficiently enters new drum data.

    - Drum Handling Room operator changes an indicator from stop to go (possibly turns a red/green sign to green).

    - Flask Handling Room operator changes an indicator from go to stop (possibly turns a red/green sign from green to red) and starts new six-pack.
  - Via direct communication – headset/radio/intercom
    - Flask Handling Room and Drum Handling Room operators performing data entry communicate directly.
    - The actions and hand-offs described in Via signaling (above) are performed using direct communication

13.5.4 Starting a New Pallet – COORDINATION REQUIRED

- Follow the steps for presenting a new pallet on page 14 of the Saber Engineering O&M Manual (see §13.6, page NNN) [was page 101, SOC fill in the correct page number and remove this text in square brackets] and repeat as needed.

- Note the second step of the procedure in the Saber Engineering O&M Manual: The operator releases the foot switch and the pump stops.

- The peristaltic pump **MUST NOT** be operated during data entry for a new pallet.

- Drum Handling Room and Flask Handling Room operators **MUST** coordinate actions for new pallet input.

- Description of Coordinated Actions
  Perform the coordinated actions described in §13.5.3 for starting a new drum.

13.6 CONDUCT QUALITY ASSURANCE REVIEW OF THE INVENTORY AND ENVIRONMENTAL DATA

NOTE: Typical examples of data entry errors include 1) Initial test entries – archival to be deleted, 2) redundant / erroneous entries, 3) missing entries, e.g., June 2015 count of metric ton containers in 110-66, 4) MMS to PCDAS data flaws from communications interface.

- Prior to operations each workday, the Facility Manager or designee uses the PCDAS computer in the MMTS Control Room to create a detailed report of mercury transfers that occurred the previous workday.
- Each day use the PCDAS computer to create a detailed report of mercury transfers.
- Perform a daily quality assurance review of database contents, including data entry errors, using the detailed report.
  - Identify data entry and associated errors in the inventory portion of the detailed report based on comparisons of the detailed reports with daily forms filled out by Drum Handling Room and Flask Handling Room operators.
  - Identify data entry errors in the environmental portion of the detailed reports based on applied experience.
- Compare results and resolve discrepancies with the mercury mass balance maintained in spreadsheets as directed in 2015-MMTS-27, Defense National Stockpile Mercury Inventory Control.

13.7 CORRECT PCDAS DATABASE ERRORS

- Follow the instructions at Manually Editing the Database in Saber Engineering Operation and Maintenance Manual, Version 1.7 on pages 27-30 of 47.
- Exercise caution; any changes made are applied immediately
- Conduct an exhaustive search for errors. The database is comprised of 15 tables; errors identified in one table may be present in others. The list of tables is shown on page 29 of 47.

13.8 ATTACHMENTS

Pages containing images of pages 7-22 from Saber's O&M Manual, Version 1.6

6 GUI Interface

There are 4 pages available to the operator for system control and reporting control.
Main
Trend
Alarms
Reports

6.1 Main

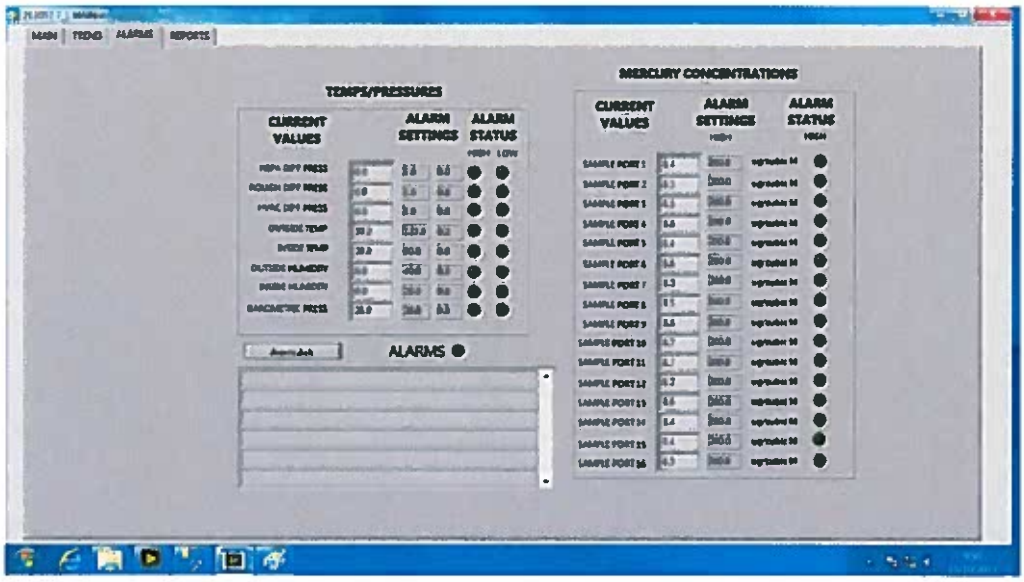
The main screen is where the operator will enter information for transferring MT's and filling MT containers.

There are three operations that happen on the **Main** screen
Transferring MT's to warehouses
Listing the names of current users
Filling MT's

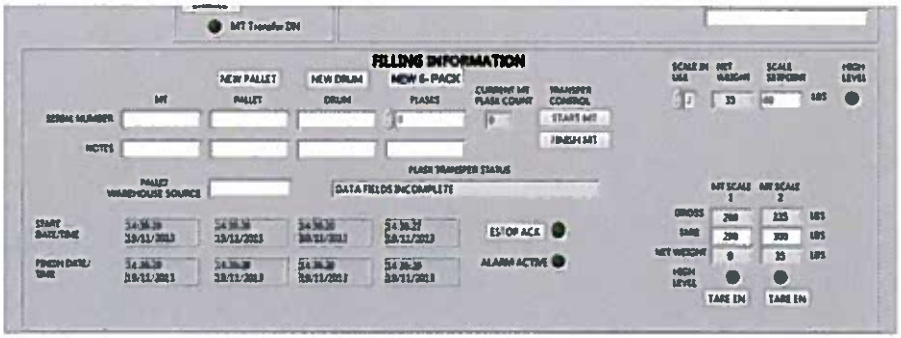
Transferring MT's and Listing Staff Names

6.2 Alarms

The alarm screen provides feedback for the user to identify if a measured value is out of range. It also provides access to the user to set the limits of the alarms and provides the current value of the measured variable. Also available on the alarms screen is a list of alarms that have occurred.

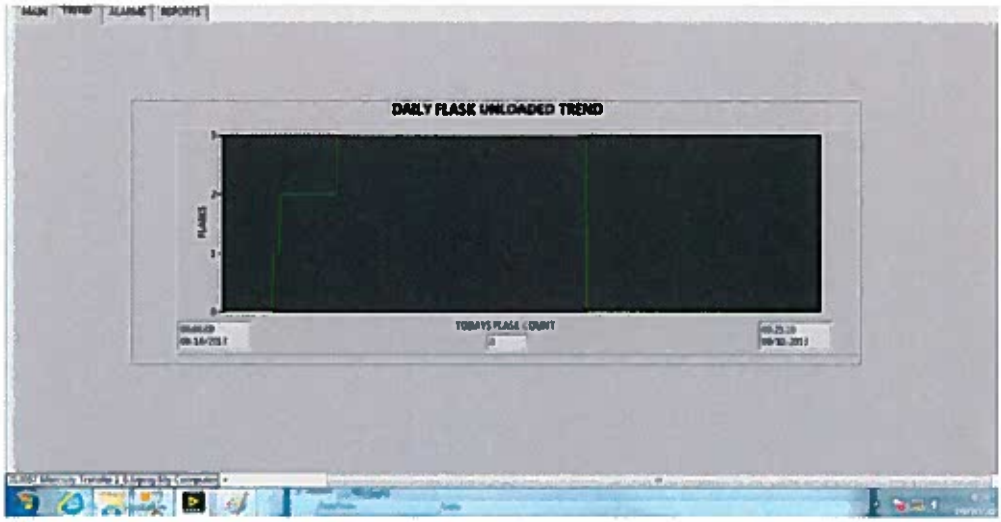


6.3 Filling MT's



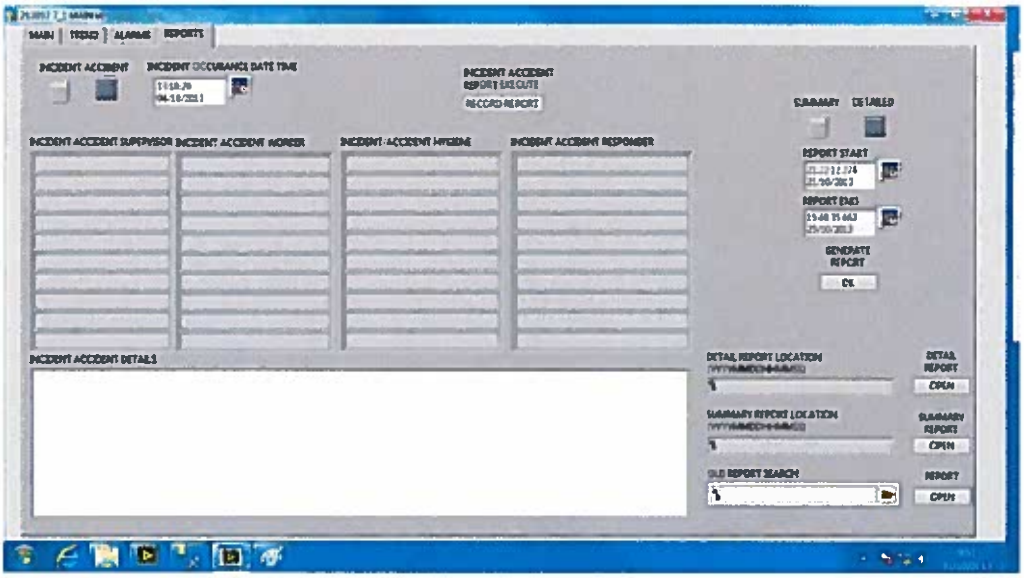
6.4 Trending

The trending screen displays how many flasks have been transferred in the last 24hrs. The current daily flask count is also displayed at the bottom of the screen.



6.5 Reports

The reports screen allows the user to create a incident/accident report as well as generate a report from the transfer data. The reports are created in ".PDF" format.



6.6 System Operation

The system is operated from the 4 screens listed above. The following instructions are to document the operation sequence of the different functionality of the system.

6.6.1 User Entry

The user entry section allows data entry of the staff on duty. Supervisors, workers, and hygiene staff must log in for the system to track whom was present during alarms.

1. Click in a box below the user column appropriate to the user's duty.
2. Type the first and last name of the user.
3. Click anywhere outside the box.

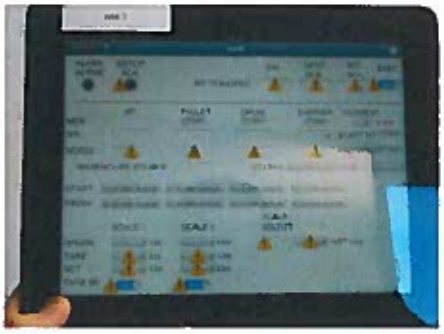
6.6.9 Powering up the IPAD (wireless terminals)

1. Press and hold the power button at the top right corner of the IPAD.
2. Screen will show an apple to indicate the boot process has begun.
3. When boot is complete the following screen will be shown
4. Touch the screen and slide the white button in the direction of the arrow. This will unlock the screen.
5. From the page shown, touch and slide the screen to the left.

6. Double touch the "dashboard" icon.

7. You will see a "National Instruments" screen when the application is booting.
8. Single Touch the play button.

9. The application is now running. You may see warning icons as shown below. This indicates that the screen has not been updated yet. When the user begins entering data, the fields will update with each change. This only occurs when the system is powered off or the data connection is broken.



10. The wireless terminal is now ready to use. The controls are the same as that of the PC.