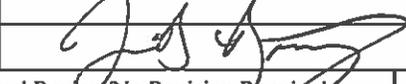


5 - DRUM HANDLING

Title: Drum Handling

Doc. No. 2015-MMTS-5

Approval Signatures and Date

Prepared/Reviewed by: 	Date: 10/29/15
Approved by: 	Date: 10/29/15
Approved by: 	Date: 10/29/15
Approved by: 	Date: 10/29/15
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NOTE: This document will be reviewed at least annually to ensure its suitability.

Revision History

Rev. No.	Change description	Author
3	Refer to "MMTS Operating Changes from Initial Operations Conducted in September 2015- October 13, 2015".	Burton Packard and Renee Rodriguez
2	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
1	Modified §5.3.2 in to add clarity to Facility Manager's actions in tracking placement of the 30 th flask into a dedicated six-pack tray. Modified description in §5.3.4 of actions of the Drum Handling Room worker to store dedicated six-pack tray at the end of a workday.	

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
Procedure 2015-MMTS-7	Fume Hood 2 – Mercury Transfer
Procedure 2015-MMTS-10	Waste Management

5.1 PURPOSE

This procedure describes operations in the MMTS: drum handling, flask removal, and flask placement in six-pack transfer trays (six-pack trays). Also covered is disposition of any drums containing loose mercury and management of empty drums, drip trays and pallets.

5.2 SCOPE

This procedure covers the drum and flask-related activities for operators in the Drum Handling Area. This procedure also covers waste handling activities by operators in the Drum Handling Area and by the forklift operator.

5.3 OPERATIONS

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

In addition to personal protective equipment, the following equipment is required for operations:

- Drum lift fixture,
- Flask-lift fixture and flask-foot fixture,
- Bag cutting blade,
- Waste containers

5.3.2 Drum Venting, Placement and Opening

- **Drum Handling Area worker**
 - Attaches a masking tape or equivalent label (lag) to the flask six-pack tray giving the pallet number and drum number.
 - Using a clipboard, a pen and form ORNL/MMTS/DHR-1 (see §5.5, Attachment 5.7), records the designated pallet number, drum number and flasks fed into the down-draft conveyor table and fume hoods. Retain the filled-out form in the MMTS Computer Room as a record of daily activities.

NOTE: A scanned electronic record copy of form ORNL/MMTS/DHR-1 should be retained by the Facility Manager. Facility Manager or designee updates inventory tracking spreadsheets, as appropriate, to follow the mercury in flasks that is removed from a drum and placed in a six-pack tray.

- Places the cart-mounted portable snorkel on the drum lid near the bung. Loosens the bung, removes the bung, and places an overhead snorkel into the drum lid. Repeats for each of the drums on the pallet, typically five (5). The snorkel must

remain in each drum for at least five (5) minutes. Replaces the bung (finger tight only) immediately prior to lifting the drum. Wear leather gloves for this operation.

- Follows the manufacturer's procedures for using the drum lift fixture (the drum lift fixture is shown in Section 5.4, Attachment 5.6).
- Lifts the drum and inspects the bottom for mercury leaks or damage. Positions the drum adjacent to the conveyor table and gently lowers the drum approximately onto the center of the 1000-lb capacity digital scale (see Section 5.4, Attachments 5.1 and 5.3).
- On a clipboard, records the drum weight and drum number compares the drum weight to the range of weights given in the following NOTE; notifies the Facility Manager if the drum weight is outside the acceptable range for a drum containing six (6) filled flasks.

NOTE: The expected weight of the drum, packaging, flasks and mercury is about 550 lb ± 25 lb. The range accounts for differing flask weights and small variations in the amount of mercury. Alert the Facility Manager if the weight is outside the given range. Weights substantially below the given range may indicate that the drum contains fewer than the typical six flasks of mercury. The mercury stockpile records indicate that only 24 drums have fewer than six (6) flasks, out of over 21,600 drums in the mercury stockpile. Each of these drums has a special tag on it to highlight this fact.

- Removes the drum lid, cuts a 3 to 4 inch slit in the polyethylene liner bag, inserts the snorkel tube into the bag for venting, and loosely replaces the drum lid (wears leather gloves for this operation).
- Removes the snorkel tube and drum lid. Makes visual check for loose mercury in the bag and/or drum. If loose mercury is observed, replaces drum lid without the locking ring, notifies Facility Manager and follows operations in Section 5.3.3.
- Positions the Airfiltronix[®] snorkel (located on the conveyer table) adjacent to the top of the open drum to collect vapors from the open drum-liner bag.
- Cuts the bag completely open to gain access to all the flasks (wears leather gloves for this operation); removes the cardboard flask separator and places it into the adjacent waste drum; inspects for loose mercury at the bottom of the drum using additional lighting.
- Slides back the cover over the fume hood conveyer table to access an empty flask tray.
- Places an empty bag (18"x20" re-sealable/3-mil) in each six-pack flask space prior to placement of a flask in the six-pack.

- Attaches the appropriate lift fixture (see notes below) to a flask and slowly raises the flask sufficiently to clear the six-pack tray on the conveyer table; and lowers the flask into the six-pack tray.
- Positions the hoist directly above the flask that is to be lifted.
- Lifts each flask a few inches and visually inspects the integrity of the connection prior to lifting the flask beyond the plane of the drum.

NOTE: Lift fixtures were designed, fabricated and tested for suitable use at ORNL. A multi-purpose lift fixture that can accommodate the different sizes of flask plug and the cross-drilled holes in the flask plugs can be used for lifting flasks out of the drum. This device is shown in Section 5.4, Attachment 5.2a. A second multi-purpose lift fixture that can also accommodate differently sized flask plugs and cross-drilled holes is shown in Section 5.4, Attachment 5.2b. All devices must be certified for service. The second lift fixture is designed to allow the lifting pin to be placed through the hole in the flask plug prior to grasping the pin and securing the fixture for the lift and is expected to be the primary device used. There are spare pins available and a cable attachment is utilized to ensure the pin is retrievable in the event the operator drops it.

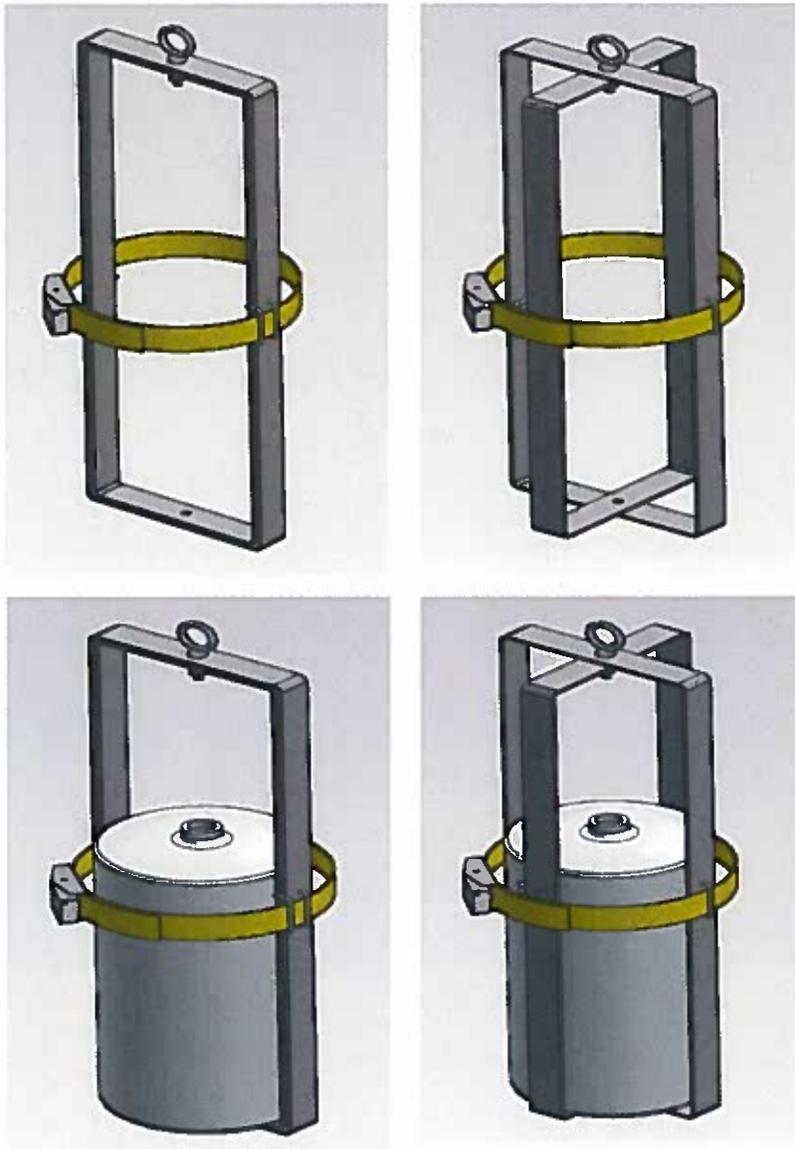
NOTE: Occasionally, a flask plug without a cross-drilled hole may be encountered; for that situation, the worker shall use the flask foot fixture (see Section 5.4, Attachment 5.5) for lifting after the "normal" flasks have been removed from the drum.

- Carefully pushes a filled tray to an unoccupied position on the conveyer table and closes the table cover.
- In the now empty drum, places the pillow in the polyethylene liner bag and, using an available snorkel or vacuum line, evacuates the bag liner resulting in a smaller waste package; seals the package with vinyl tape; and places package into the waste drum. The cardboard divider material should be folded to reduce volume as much as practicable prior to evacuating the bag.
- Returns the empty drum to the pallet. Places the drum lid and locking ring on the drum. Tightens the locking ring sufficiently to prevent the drum lid from falling off (wear leather gloves for this operation).
- Wraps the pallet of empty drums with plastic or secures the drums in an equivalent fashion to prevent any drums from falling from the pallet while the pallet is being moved by forklift.

- **Facility Manager**

Ensures the operations of Section 5.3.2 are repeated to maintain a full inventory of flasks ready for transferring mercury into the MT containers. Updates inventory tracking spreadsheets, as appropriate, to follow the mercury that is removed from

ATTACHMENT 5.5 Flask foot fixture



The flask foot fixture allows a worker to safely remove from a drum a flask that has a damaged flask plug or a flask plug without a cross-drilled hole. This fixture is used after as many flasks as possible have been removed using a lift fixture shown in Attachment 2a or 2b.

ATTACHMENT 5.6. Drum lift fixture



**ATTACHMENT 5.6. Metric Ton Container and Weight Tracking – Drum Handling Room
[Form ORNL/MMTS/DHR-1]**

Metric Ton Container and Number of Flasks Fed Tracking – Drum Handling Room

Date: _____

Employee Name(s): _____

Pallet Number	Drum Number	6-Pack Filled (Yes/No)	5-Pack Filled (Yes/No)	1 flask to Big Orange (Yes/No)	Big Orange 6-Pack Fed to MT container (Yes/No)	NOTES
Filled MT container number						

Employee signature: _____ Date: _____

Supervisor signature: _____ Date: _____

The purpose of this form is to provide a back-up for PCDAS and comprises an administrative control to manage flask count to 29 flasks per metric ton (MT) container. The design standard for the mercury MT container was followed to hold 29 three-liter flasks. One form is required for each MT container.

Each MT container has a unique serial number and holds the mercury from four 6-packs and one 5-pack. These stainless-steel carriers roll on the hood rollers and were designed to hold six flasks. The 6-pack was chosen for handling use because there are six flasks per drum. Each pallet has five drums and holds a total of 30 flasks. After four 6-packs have been loaded in the Drum Handling Room (DHR) and fed to the Flask Handling Room (FHR), a 5-pack is loaded and used for the last carrier specific to that metric ton container. A sized piece of PVC pipe with an end cap is inserted into the 5-pack to block one flask slot. One flask comprising the 30th flask specific to a pallet goes into the Big Orange 6-pack located adjacent to the Airfiltronix snorkel on the DHR table. After six pallets are processed, the first Big Orange 6-pack is full. This will be the first 6-pack for the next MT container.

The Process Control and Data Acquisition System (PCDAS) require pallet and drum numbers for each filled MT container. The pallet and drum number for a Big Orange 6-pack is BigO-xxxxx, where xxxxx is the sequential number of the Big Orange 6-pack, e.g., the first Big Orange 6-pack is BigO-00001 and the next one is BigO-00002. When transferred, the Big Orange 6-pack number is inputted for both the pallet and drum number blank on this form. The process is iterative and is repeated for filling 6-packs, 5-packs and Big Orange for the follow-on MT containers.