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UCD IMPROVE Technical Information #251W

Tray Assignment

*Interagency Monitoring of Protected Visual Environments
Air Quality Research Center
University of California, Davis*

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DOCUMENT HISTORY

Revision	Release Date	Initials	Section/s Modified	Brief Description of Modifications
1.0	10/05/2026	RMA	All	New document. Tray assignment procedure replaces 1A/4D inventory procedure previously documented in TI 251H v3.1.

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1. PURPOSE AND APPLICABILITY

The purpose of this technical information document (TI) is to describe in the procedures used to assign 25 mm Teflon filters to inventory trays post gravimetric analysis. It is applicable to all routine filters in the IMPROVE network.

2. SUMMARY OF THE METHOD

At the tray assignment station, post-sampled Teflon filters are assigned to the appropriate tray for their month and analysis path by the IMPROVE Filter Processing Software (lab app). Post-weigh filters are physically moved out of carriers and into Petri dishes, and labels are placed on Petri dishes. The labeled Petri dishes are assigned to a tray and position by the lab app. Once a tray has been filled, all positions in the tray are checked, to ensure accuracy.

3. DEFINITIONS

- **1A Module:** IMPROVE sampling module for 25 mm Teflon filters that have a deposit composed of PM_{2.5}. Sometimes shortened to 1A or A modules.
- **4D Module:** IMPROVE sampling module for 25 mm Teflon filters that have a deposit composed of PM₁₀. Can be shortened to 4D or D module.
- **Analysis Path:** The sequence of analysis methods a given filter is going to be analyzed in.
- **Carrier:** A small metal item that holds a filter as it is analyzed in the MTL automatic weighing chambers.
- **Filter Serial Code:** An alphanumeric code printed on a Teflon filter. Typically referred to as a barcode.
- **IMPROVE Filter Processing Application:** Proprietary laboratory software for processing IMPROVE samples in the Sample Handling Lab. Also referred to as the lab app.
- **Post-weigh Filters:** Refers to filters that have returned to the field following sampling.
- **Set:** A group of organized filters. Usually contains eight trays.
- **Terminal Filter:** A status applied to IMPROVE filters that have been damaged or placed into the samplers incorrectly.
- **Tray:** A white plastic tray that can hold 50 Petri dishes.
- **Upside down filters:** A filter that has a deposit on the non-barcode side.
- **XGH:** A filter analysis path. Filters go through gravimetric analysis, XRF analysis, then HIPS.
- **XGHF:** A filter analysis path. Filters go through gravimetric analysis, FT-IR, XRF, then HIPS.

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4. CAUTIONS

Only one filter may be handled at a time; Attempting to handle multiple can cause filters to be placed incorrectly. Ensure the filter's image is captured, and the last Petri dish is placed in a tray before attempting to scan another filter.

When doing the preliminary tray check at the end, be sure to check that the tray has exactly 50 filters.

This station does not have a way to leave comments. If a filter is dropped or damaged at this station, fill out a filter comment form.

5. EQUIPMENT AND SUPPLIES

- Forceps for Teflon filters
- Computer with lab app
- Filter Camera system
- Trays of clean Petri dishes
- Container for carriers
- Printer for labels
- Rolls of labels
- Labels to put on tray top
- Empty inventory trays
- Barcode scanner
- Sealed containers to hold carriers with filters
- Dividers for sealed containers.

6. PROCEDURAL STEPS

6.1. Tray Orientation and Labels

Each white tray is oriented with the hinge on the left, and the logo on the top, as circled in Figure 1. Filters are placed in a tray with position 1 in the upper left corner, position 25 in the lower left corner, position 26 in the upper right corner, and position 50 in the lower right corner. Filters are placed with the Petri lid and label facing forward, towards the tray label.

When labeling filter trays, place the appropriate tray label on the front of the tray as seen in Figure 1.

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Figure 1. Tray orientation.



6.2. Assigning Filters to Inventory Trays

Open the lab app, select **Post-Sampling**, and then **Tray Assignment**. At the top of the tray assignment page is a live display of what is visible to the camera system. To the right of the live display is information regarding the printer connected to the station, including a check box that determines if labels are printed when a filter is assigned to an inventory tray. Below this, the tray assignment page will display eight empty positions (Figure 2). Tray numbers can be typed, or the tray label can be scanned into the Tray Id field (circled in Figure 2) to load information for the tray.

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Figure 2. Tray assignment page with no trays loaded.

1. Select a container of A or D Teflon filters that have been labeled as successfully post-weighed. Retrieve the container of filters is labeled with the earliest date.
2. Scan the barcode on the trays front to load all relevant trays for either the A or D filters.
3. Pick up a carrier and set the carrier on the camera platform. Trigger the camera.
 - a. There are three ways to do that: either press **T** on the keyboard with the lab app open, click **Trigger Camera** on the screen, or simply press the trigger at the base of the camera system and hold the carrier still until a filter image has been successfully captured.
4. If the camera system successfully captured all necessary information, the carrier code and filter code fields will populate onscreen, and a label will print from the label printer. The filter will automatically be assigned to a position in one of the available trays with the position highlighted in green (Figure 3). See section 6.6.1 if filter info does not auto populate.

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Figure 3. Tray assignment with successful image capture.

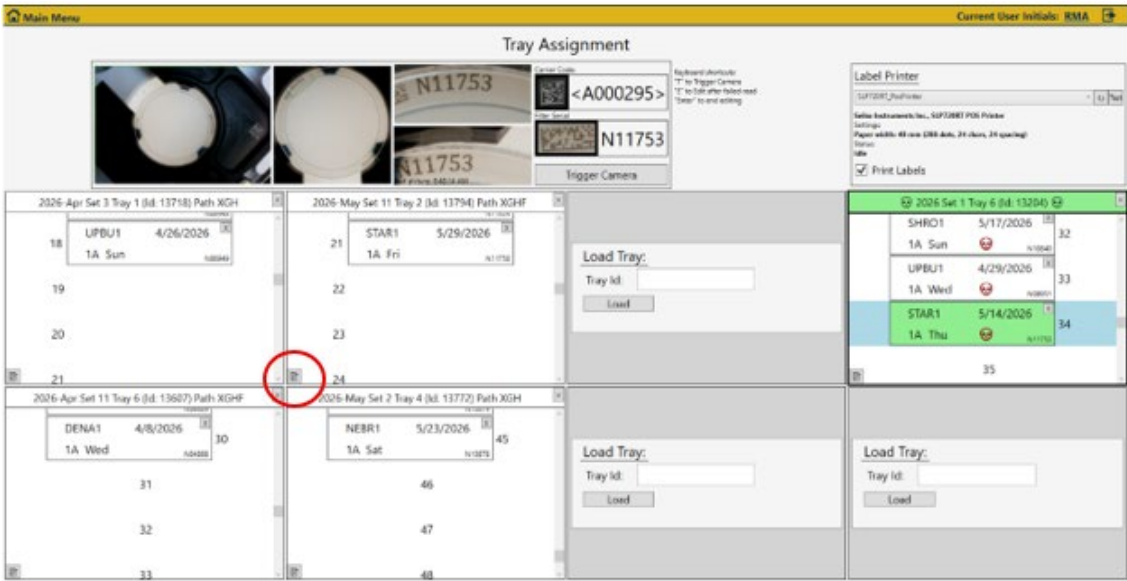
5. Remove the label from the printer and apply it to the lid of the Petri dish. Confirm the information on the label matches the information on the screen for this filter.
 - a. The deposit side should already be faced up in the carrier. The deposit side is typically on the side with the printed alphanumeric code. If it is not, an error message will pop up saying the filter is upside down. See section 6.5.
6. Continue this process until all filters have been assigned to a tray or until a tray is full. A full tray will contain 50 filters and must be validated, refer to section 6.3 for the validation process.
7. Get an empty tray and add the next label in the set to its front, see section 6.4 for more details.
8. Work at the tray assignment station can be stopped at any time. Progress is automatically saved when each filter is placed into a tray. When finished, exit out of the lab app.

6.3. Performing Initial Tray Checks

1. If a tray contains 50 filters, it is considered full and an initial tray check is performed. Press the **Validate** button in the lower left corner of the full tray to open a pop-up window showing the tray contents (Figure 4).

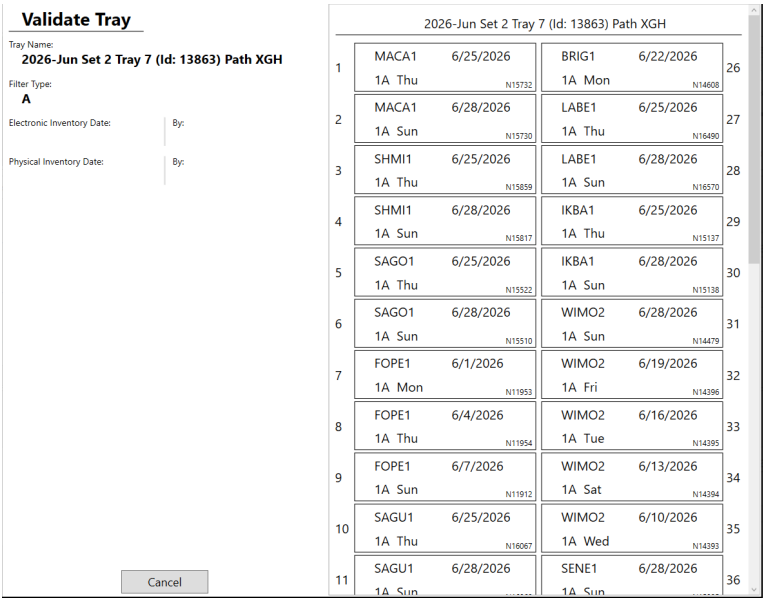
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Figure 4. Tray Assignment interface.



2. The validation pop-up window displays all 50 filters in a two-column view (Figure 5).

Figure 5. Validate Tray window.



3. Starting with the filter in the first position in the upper left corner of the tray, physically check that every filter in the tray matches the position and information displayed on the screen.
4. Select the **Finished Check** button at the bottom of the page (Figure 6).

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Figure 6. Validate Tray window upon check completion.

The screenshot shows the 'Validate Tray' window. On the left, there are input fields for 'Tray Name' (2026-Jun Set 2 Tray 7 (Id: 13863) Path XGH), 'Filter Type' (A), 'Electronic Inventory Date', and 'Physical Inventory Date'. The main area displays a list of trays with columns for Tray ID, Date, and Tray Name. The 'Finished Check' button at the bottom right is circled in red.

Tray ID	Date	Tray Name
15	6/28/2026	MOOS2 1A Sun
16	6/25/2026	FCPC1 1A Thu
17	6/28/2026	FCPC1 1A Sun
18	6/25/2026	PRIS1 1A Thu
19	6/28/2026	PRIS1 1A Sun
20	6/4/2026	BRIG1 1A Thu
21	6/7/2026	BRIG1 1A Sun
22	6/10/2026	BRIG1 1A Wed
23	6/13/2026	BRIG1 1A Sat
24	6/16/2026	BRIG1 1A Tue
25	6/19/2026	BRIG1 1A Fri
40	6/28/2026	CRMO1 1A Sun
41	6/25/2026	CRMO1 1A Thu
42	6/28/2026	COHU1 1A Sun
43	6/25/2026	COHU1 1A Thu
44	6/28/2026	GRGU1 1A Sun
45	6/25/2026	GRGU1 1A Thu
46	6/25/2026	VOYA2 1A Thu
47	6/28/2026	VOYA2 1A Sun
48	6/28/2026	HOOV1 1A Sun
49	6/25/2026	FRRE1 1A Thu
50	6/28/2026	FRRE1 1A Sun

5. Move the finished tray to the designated labeled storage shelf.
6. If the filters do not match the positions listed, **do not** select the Finish Checked button. Obtain a Tray assignment Validation Issue form from the labeled bin at the station. Place this inside the tray, then place the tray in the designated labeled area. Select the **Cancel** button to leave the validation pop-up window.

6.4. Selecting a Label for the Next Tray

When a tray is finished, replace the finished tray with a new tray. To find the correct pre-printed label, look at the tray just finished and figure out what type it was.

1. Valid A filters: Red labels. Set numbers are assigned in numerical order with single digit sets (1, 2, etc.) belonging to the XGH analysis pathway and double-digit sets (10, 11, etc.) belonging to the XGHF analysis pathway. Within a set, trays can be labeled 1-8, once tray 8 is labeled for a given set that set is considered complete and a new set is started.
 - a. For example, if Set 1 Tray 1 was just completed, select the label for Set 1 Tray 2. If the tray just completed was Tray 8, select the next set's tray 1. E.g., if Set 1 tray 8 was just finished, select the Set 2 Tray 1 label.
2. Terminal A filters: Pink labels, new trays added to one continuous yearly set. Select the next available tray label in that year's set.

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3. D filters: Blue labels, new trays added to one continuous yearly set. Select the next available tray label in that year's set.

6.5. Dropped, Damaged, or Upside-down Filters

1. **Dropped or Damaged Filters:** If a filter is dropped or damaged at tray assignment, please fill in a filter integrity form, and leave it in the bin labeled "Completed Filter Integrity Forms." Pre-existing damage or holes in filters do not have comments applied to them at this station, as existing filter issues have already been recorded at post-weigh chamber prep.
2. **Upside down filters:** If a filter is found to be upside down at tray assignment, place it in the Petri deposit side up, with the filter's barcode side down. At the station is a folder full of upside-down filter labels. Place one upside down filter label on the Petri dish lid without covering the barcode label and the other on the Petri bottom.

6.6. Troubleshooting the Camera System

6.6.1. Troubleshooting Individual Filters

1. Reposition the filter with the forceps if both filter codes are not already visible.
2. Try turning on the light next to the station.
3. Manually enter the filter's barcode into the filter serial field. Click the **Edit** button (indicated by the arrow in Figure 7), then type the barcode which can be found on screen in the boxes to the left of the Trigger Camera button.
 - a. If the barcode is not there, the camera system may not have autodetected it. Move the green rectangles circled in Figure 7 to change the view of the zoomed in area.

Figure 7. Tray Assignment interface for troubleshooting.



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6.6.2. Troubleshooting the Camera System

1. The camera may have been disconnected. Unplug and re-plug all cords connected to the camera system.
2. If that does not work, try closing and reopening the lab app in use.
3. Contact a senior staff member if the above steps fail.
4. A senior staff member may close all instances of the lab app open.