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Post-Weigh Chamber Prep
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UCD IMPROVE Technical Information #251G

Post-Weigh Chamber Prep

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

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Version 3.2*

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DOCUMENT HISTORY

Revision	Release Date	Initials	Section/s Modified	Brief Description of Modifications
	02/15/2022	SRS	All	Previously anthologized version separated into individual TIs.
	04/19/2022	GRM	All	Updated wording to accommodate new procedures
3.1	01/31/2024	TAK	All	Updated terminology for terminal-status filters
3.2	10/05/2026	RMA	All	Reorganized procedural steps and section content for improved readability. Updated wording and content for consistency across SHL TIs. Added and revised figures to reflect lab-app updates and procedural changes.

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1. PURPOSE AND APPLICABILITY

The purpose of this technical information document (TI) is to describe in detail the procedures used at the Post-Weigh Chamber Prep station. It is applicable to all routine Teflon filters in the IMPROVE network.

2. SUMMARY OF THE METHOD

All IMPROVE Teflon filters, regardless of status, are transferred from cassettes to carriers to be weighed through the MTL AH500 chambers. Each filter is photographed using a camera system, allowing the software to link the filter barcode and a carrier code together.

3. DEFINITIONS

- **1A Module:** IMPROVE sampling module for 25 mm filters that have a deposit composed of PM_{2.5}. Sometimes shortened to 1A or A modules.
- **2-3-2 Cycle:** One possible box cycle for IMPROVE sites. While all IMPROVE filters sample on the same days, cartridges are delivered to the sites in one of two cycles offset by one week. 2-3-2 cycle bins are delivered one week sooner and are processed through the lab in yellow bins. The cycle also has a different physical cartridge configuration.
- **3-2-2 Cycle:** One possible box cycle for IMPROVE sites. While all IMPROVE filters sample on the same days, cartridges are delivered to the sites in one of two cycles offset by one week. 3-2-2 cycle bins are due one week later and are processed through the lab in blue bins. These cycles also have a different physical cartridge configuration.
- **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.
- **Cassette:** A white plastic item that holds one filter in place. Made up of two halves; a cassette bottom and top.
- **Cartridge:** A set of four cassettes with a clear plastic base. Holds four cassettes, with typically 2-3 of these cassettes containing filters
- **Carrier:** A small metal item that holds a filter as it is analyzed in the MTL automatic weighing chambers.
- **Field Blanks:** IMPROVE filters with the abbreviated purpose 'FB'. These filters don't have air pumped through them when they are in the sampler and serve as a control group for ambient lab and field contamination.
- **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. Can also be referred to as the lab app.
- **Post-weigh Filters:** Refers to filters that returned from the field following sampling.
- **Routine filter:** Filters from the IMPROVE network with no special studies associated with them.
- **Terminal Status:** A status applied to IMPROVE filters that have been damaged or placed into the samplers incorrectly.
- **Trays:** A white plastic tray that can hold 50 Petri dishes.

4. CAUTIONS

Ethanol is used for cleaning equipment during this procedure. Ethanol is a highly flammable solvent and must be kept in the approved containers. It is also a skin and eye irritant. A lab coat, safety glasses, and gloves must be worn while working with it. For more information, see the Ethanol Safety Data Sheet.

The containers holding chamber-prepped Teflon carriers are stored above the benchtop. The contents of these containers frequently shift when the containers are moved. Ensure dividers are in place before moving the container.

Many site codes are similar; verify the site information on the screen matches the cartridge labels before performing work.

Handle only one cassette at a time. Having two or more cassettes open while processing filters increases the risk of filter swaps. Make sure the filter date being unloaded matches that of the lab application.

5. EQUIPMENT AND SUPPLIES

- Computer with Improve Filter Processing Application (lab app)
- Forceps
- Grid disks for workspace
- Container for used loose A and D Module screens
- Clean Petri dishes
- Arbor press
- Clean MTL carriers
- Ethanol
- Nitrile gloves
- Safety glass or goggles
- Laboratory coat
- Sealed containers to hold carriers with filters

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- Handheld barcode scanner
- Dividers for sealed containers.

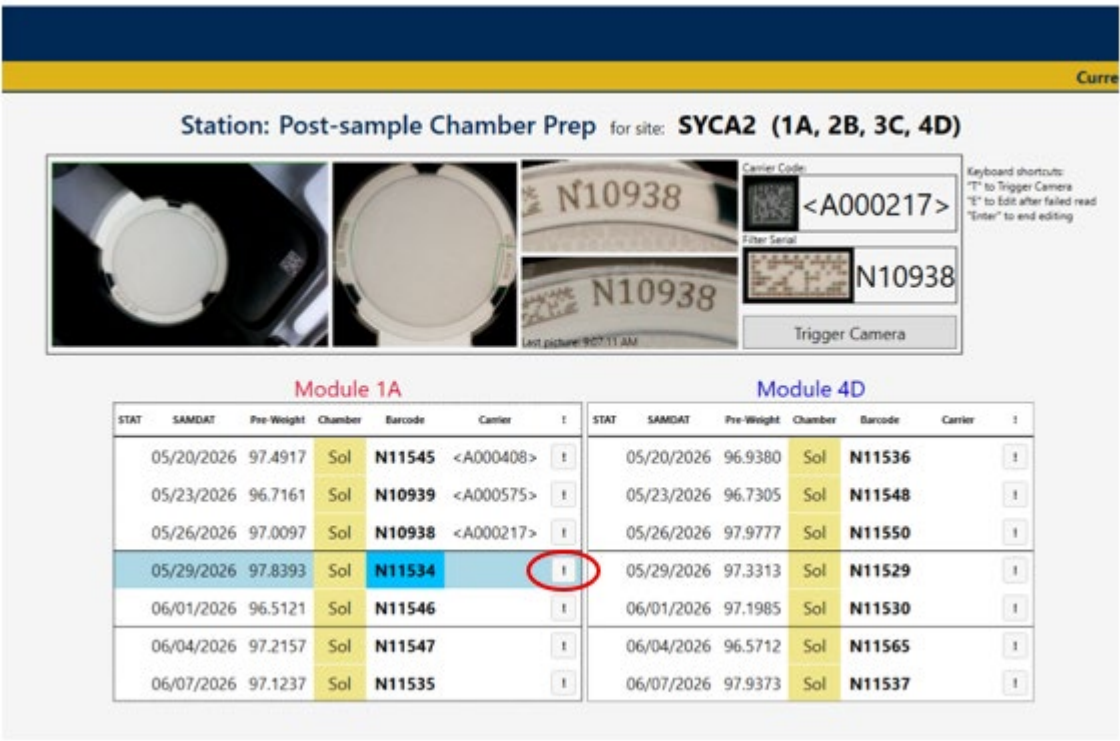
6. PROCEDURAL STEPS

6.1 Lab App Navigation, Sample Priorities, and On-screen Information

1. Prior to beginning work, open the lab app. Click on post-sampling, then select Post-sample Chamber Prep and check if there are any sites in the queue.
2. If sites are available, select a bin that appears in the queue and use the scanner to scan the barcode associated with the site. If there are site bins ready to be processed that do not show up in the queue, ask senior lab staff. If there are multiple bins to choose from, select the highest priority bin available.
 - Check the Velcro tag on the front of the bin. The priorities are as ordered, from highest to lowest: bins with a priority tag on them > bins with yellow tags > bins with green tags > bins with pink tags > bins with Post-Process only tags.
3. The post weigh chamber prep screen (Figure 1) will display:
 - The site code in bolded text.
 - Several camera boxes and two fields for the carrier and filter serial code.
 - Two or three tables. One for module 1A (PM_{2.5} Teflon filters), one for module 4D (PM₁₀ Teflon filters), and one for the 5A/5D module if applicable.
 - Within each table, each row is an individual sample date. Each week of samples is separated within the table by a black line.
 - A blue highlight in the table indicates the filter that is currently in progress.
 - The ! button to the right of each sample, which will open a pop-up window to report sample problems (circled in Figure 1.)

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Figure 1. Post-weigh chamber prep processing.



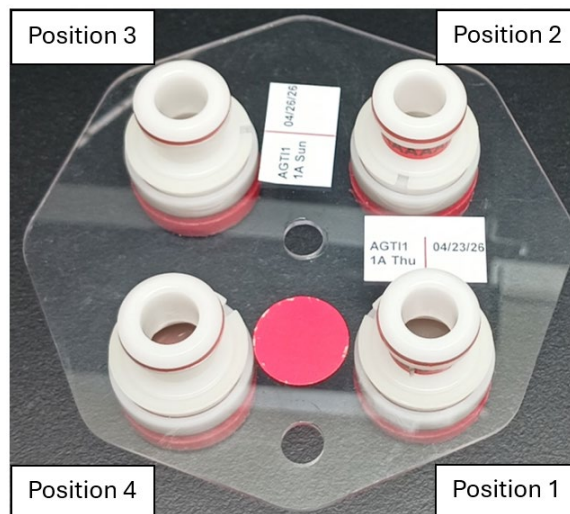
6.2 Filter Processing Order

Filters are unloaded one module at a time, following the blue highlighted area on screen (seen in Figure 1). All A and D filters must be unloaded and weighed regardless of status.

With the physical cartridges, start with week 1 position 1. This position is located on the bottom right of the Week 1 cartridge with the hole in the cartridge facing down towards the user (Figure 2). Filters are then unloaded counterclockwise. Any position with a label should contain a filter and must be unloaded. Once all labeled positions in each week are unloaded, proceed to that module’s next week cartridge and repeat.

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Figure 2. Cartridge positions.



6.3 Unloading and Processing Teflon Filters

1. Remove 1A, 4D and 5A or 5D modules from the bags, and place them on the counter in order by week, with week 1 in the front. Check the dates on the labels to ensure they match the dates listed in the lab app.
2. Remove the red caps from the 1A cartridge and place them in the front of the bin.
3. Open one cassette at a time with the arbor press. Flip the cassette bottom upside down over the grid disk while touching the top edge of the cassette bottom to the grid disk. This will leave a loose screen and a filter on the grid disk.
 - a. The filter will be deposit-side up when it comes out of the cassette bottom. Typically, the deposit is on the side of the filter with a legible alphanumeric code (also referred to as a barcode) on the outer ring. This is the proper orientation. See section 6.4, point h if filter is not properly oriented.
4. Remove the loose screen and place it in the labeled container for used screens.
 - a. If the screen sticks to the filter, try holding the filter with one set of forceps while trying to separate the two with another pair of forceps. If there is concern about ripping the filter, ask for assistance to separate them.
5. Pick up the filter from the grid disk and load it into a carrier with the deposit side face up. Once the filter is in a carrier, rotate it so that both barcodes are not over the black protrusions of the carrier (Figure 3).

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Figure 3. Properly placed filter in carrier.



6. Closely inspect each filter; all filter anomalies, such as filter damage, visible particles, or an uneven deposit, must be reported in the lab app. Click on the “!” button (circled in Figure 1) for the relevant filter to open the reporting screen. For details on how to log filter issues, see section 6.4.
7. Place the carrier containing the filter on the camera platform with the opening of the carrier facing out. Slide the carrier back and press the trigger. A successful trigger will result in the carrier code and filters barcode automatically populating on the screen, and the blue highlighted area moving down to the next filter date.
 - a. If the camera does not capture the barcode and carrier code, see section 6.5.1
8. The lab app will automatically check if the barcode matches what was previously assigned to this sampling date.
 - a. A pop-up will trigger in the lab app if the barcode captured does not match what the lab app has listed. If the barcode does not match, stop unloading the bin immediately (see section 6.4.1).
9. Begin a stack with the loaded carrier that was just scanned into the software. Continue unloading and stacking all 1A filters from the bin, as described in section 6.2.
10. Repeat the same process used for 1A filters on the 4D filters. Start a new stack for the 4D filters, keep this stack separate from the 1A filters.
11. If the site contains a fifth module (5A or 5D), process it exactly as its counterpart. The order of stacking will follow the 4D filters.
12. Place the empty 1A and 4D cartridges for week one off to the side, keep them in order so the weeks do not get mixed up.
13. Repeat the above steps for Week 2 and then Week 3.
14. Place the stack of 1A filters and 4D filters in the appropriately labeled bin. Repeat for any 5th module filters.

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15. Move the plastic bin dividers so that the carriers are supported and cannot move around if the bin is tilted or moved.
16. Don PPE. Clean all cassette bottoms and tops using ethanol and laboratory wipes. Also clean the cartridge plate and the insides of the red caps.
17. Place all the clean red caps into the week 1 bag.
18. Put all cassette bottoms back onto the cartridges with the arbor press when finished cleaning. Place each week's cartridges back in their labeled bag.
19. Click **submit** on the screen and place the completed bin on the rack at cartridge preparation.

6.4 Filter Anomalies

Teflon Filters can have a variety of issues. Selecting the ! symbol (circled in figures 1 and 4) opens a pop-up menu titled "Problems for Log Entry" (Figure 4).

Figure 4. Problems for log entry.

PROBLEMS FOR LOG ENTRY 5/29/2026 MODULE 1A

Hole:

- ☐ Pinhole(s)
- ☐ Large
- ☐ Middle
- ☐ Outer edge

Hole at post processing:

- ☐ Small
- ☐ Large
- ☐ Middle
- ☐ Outer edge

Dropped:

- ☐ Sample side up
- ☐ Sample side down
- ☐ Small particles (A only)
- ☐ Insect / Large particles
- ☐ Scratches / Uneven sample
- ☐ Counter
- ☐ Floor

Screen:

- ☐ Double
- ☐ Missing screen
- ☐ Upside down filter (A, C, or D only)
- ☐ Upside down

Notes:

OK

Module	Carrier	!	STAT	SAMDAT	Pre-Weight	Chamber	Barcode	Carrier	!
1545	<A000408>	!		05/20/2026	96.9380	Sol	N11536		!
0939	<A000575>	!		05/23/2026	96.7305	Sol	N11548		!
0938	<A000217>	!		05/26/2026	97.9777	Sol	N11550		!
1534		!		05/29/2026	97.3313	Sol	N11529		!
1546		!		06/01/2026	97.1985	Sol	N11530		!
1547		!		06/04/2026	96.5712	Sol	N11565		!
1535		!		06/07/2026	97.9373	Sol	N11537		!

SHOW COMMENTS

EXIT

From top to bottom, the options available to log comments are:

- a. Hole: refers to existing rips or holes (filter was damaged prior to current station). Select a hole size. Pinholes are the size of a needle or smaller. Select **Large hole** for anything bigger than a pinhole. Also select hole location, middle of the filter or the outer edge. Notify senior lab staff if more than 25% of a filter's membrane is missing or damaged.

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- b. Hole at download: the filter was damaged at the current station. Select, a hole size. Select **small** if the hole is the size of the tip of a pinhole; anything larger is a **large hole**. Then select a location. Notify senior lab staff if more than 25% of a filter's membrane is missing or damaged.
- c. Dropped: If a filter is dropped on the benchtop or on the floor, it should be reported in the lab app. The lab app needs two pieces of information when a filter is dropped. Mark how the filter landed when it fell; deposit side up, or deposit side down. Mark where the filter fell; counter or floor.
- d. Small particles (A filter only): select if visible particles are on the filters.
- e. Insect/Large particles: select if bugs or large particles are visible. If it can be done without damaging the filter, remove the bug or large particle prior to weighing and throw it away. Ask senior lab staff for assistance if necessary.
- f. Scratches/Uneven sample: select if specks, nonhomogeneous, or a patterned deposit (on A's only): The color of any speck on a filter should also be noted (usually white or black). Note if there are multiple specks.
- g. Screen: select **Double** if more than one screen present, select **Missing** if no screen present, and select **Upside Down** if screen was loaded on the wrong side.
- h. Upside down filter: select if the deposit is on the side without the alphanumeric code. If weighed through the chamber, ensure that the deposit side is facing up in the carrier.
- i. Anodized Dust (D filters only): Anodized dust looks like wispy dark specks on the filter.
- j. Peeling/Flaking: if deposit is peeling or flaking, notify a senior lab technician. Peeling will typically occur at the edge of a filter.
- k. Water spots: enter a note into the lab app.

Finally, if there is anything not listed above that is found on the filter and is abnormal, make sure to enter a detailed comment in the notes section at the bottom of the menu.

6.4.1 Mismatched Barcodes

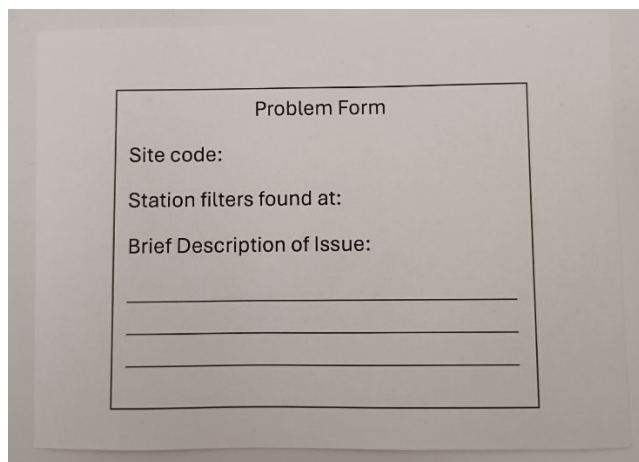
If a pop-up appears on screen saying "the filter serial code does not match the expected code", do not continue processing the bin. This issue needs to be addressed by senior staff. For more information on how this will be resolved, see *UCD IMPROVE TI #251V: Replacement Filters & Swaps*.

To prepare these filters for inspection by senior staff, place the carriers unloaded so far in a sealed container. The containers can be found next to the shelf labeled "problem shelf." Obtain a problem form found on that shelf. Fill out the problem form to document the issue, then place the bin onto the problem shelf (See Figure 5 for an example). Place the

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sealed container, the form, and the bin containing the rest of the filters onto the problem shelf to be addressed later.

Figure 5. Problem form.



Exit out of the selected bin in the lab app.

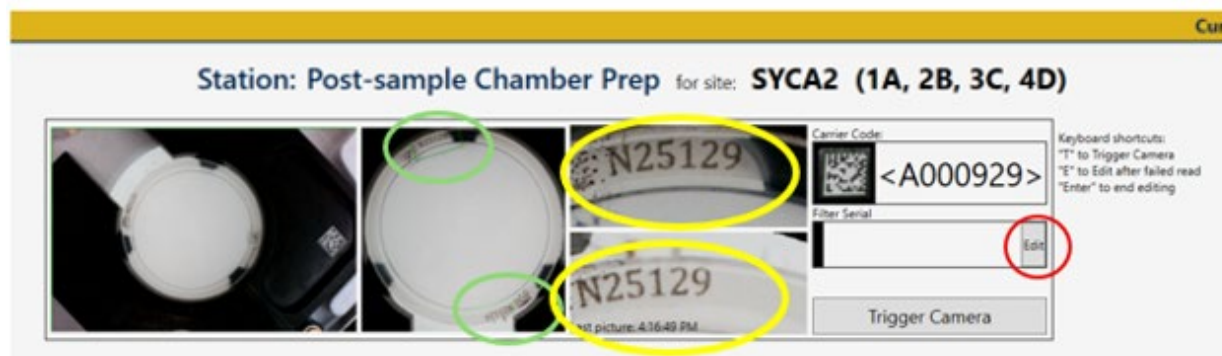
6.5 Troubleshooting the Camera System

6.5.1 Filter Serial Code Won't Capture

1. Reposition the filter with forceps if both filter barcodes are not already visible.
2. Turn on the light next to the station.
3. Manually enter the barcode into the filter serial field. Click the **Edit** button (circled in red in Figure 6) to do so. The barcode can be found on screen in the box 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 green) to change the view of the zoomed in area (circled in yellow).

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Figure 6. Incomplete Capture.



6.5.2 Blank Camera Feed

The camera feed can appear blank or freeze, when this happens try the following:

1. The camera may have become 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.