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UCD IMPROVE Technical Information #251F

Post Sample Processing

Interagency Monitoring of Protected Visual Environments
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DOCUMENT HISTORY

Revision	Release Date	Initials	Section/s Modified	Brief Description of Modifications
	02/11/2022	SRS	All	Previously anthologized version separated into individual TIs
	3/21/2022	GRM	All	Updated wording to accommodate adjusted procedure
	6/29/2022	TAK	5.4, 5.5	Updated order for field blank processing
3.1	12/27/2023	TAK	All	Updated terminology for terminal-status filters

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1. PURPOSE AND APPLICABILITY

The purpose of this TI is to describe in detail the procedures used at the Post-sample Processing station. It is applicable to all routine filters in the IMPROVE network.

2. SUMMARY OF THE METHOD

Once all items have been unloaded at box receiving for a bin, the bin is ready for the first station of Post-sampling. A custom designed application IMPROVE Filter Processing (lab app) is used to process nylon and quartz filters. At the Post-sample Processing station, sampled nylon and quartz filters and associated field blanks are placed into Petri dishes and put away in a specific order generated by the web app, this order is inventoried by the lead lab tech before they are sent out for analysis. For terminal-status filters, only nylon, quartz and associated field blanks are removed at this station. These filters are also ordered according to a generated list and stored permanently.

3. CAUTIONS

Many site codes look similar. It is important to make sure that the correct bin is being processed by scanning the barcode associated with the specific bin.

Be careful to make sure that the correct forceps are used for each filter medium. Quartz filters flake very easily and can contaminate other filter types; therefore, it is important to use the appropriate forceps when processing these filters.

Do not clean nylon cassette bottoms with a lab wipe that has been used to clean quartz cassette bottoms. Instead, discard each lab wipe after cleaning all quartz cassette bottoms and use new lab wipes for the next bin.

Be careful to place the correct sampling date cassette label on the corresponding Petri dish. There is no other form to confirm which filter sampled on which date. Be sure to stack the filters in ascending order. If the filters are not found in the correct order during inventory the associated filters must be given a Questionable Data (QD) status.

4. EQUIPMENT AND SUPPLIES

- Forceps for nylon filters
- Forceps for quartz filters
- Forceps for removing stickers
- Computer with “IMPROVE Filter Processing” application
- Three empty Petri trays (one for nylons, one for quartz, and one for terminal-status filters)
- Brush for quartz
- Ethanol in appropriate container

- Nitrile gloves, lab coat, safety glasses (must be worn when using ethanol)
- Laboratory wipes
- Container for loose C screens
- Arbor press
- Clean Petri dishes

5. PROCEDURAL STEPS

5.1 Petri Dish and Tray Setup

The counter includes trays full of Petri dishes with already processed 2B and 3C filters. The top of the Petri dishes (the sides without the Pall logo) should have a sticker placed on them and be facing forward when placed in the tray. The Petri dishes are placed in the tray starting from the back left and moving forward in the order processed. Within each site, the oldest dates go in first. Terminal-status filters should be placed in a separate tray labeled “Terminal-status” with the oldest date first as well. If terminal-status filters share a date, place them in the order of their cartridge letters, with 2B (first) to 3C (second) and 5B or 5C (last if applicable). Field blank (FB) terminal-status filters follow the associated filter type.

All trays are labeled with the name of the type of filter that belongs in them. Trays labeled “B Filters” are for the nylon filters, and the trays labeled “C filters” are for the quartz filters. Terminal-status trays are labeled as “Terminal-status.” It is important to make sure that the processed filters are placed into their proper tray.

Prior to beginning work, open the IMPROVE Filter Processing lab app. Open Post-sampling, then select Post-sample Processing and check if there are any sites in the queue. Do not start processing a box if there are no sites in the queue.

If sites are available, then 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 on the queue, ask a lead lab tech for help. If there are multiple bins to choose from, select the higher priority bin based off the IMPROVE calendar. The Post-sample Processing screen will include site name (top of screen), below the site name are two or three tables; one for 2B module (nylon filters) one for 3C module (quartz filters) and one for 5B or 5C module if applicable (Figure 1). Each table contains the following columns “STAT” for filter status, “SAMDAT” for sampling date, “QTR” for calendar quarter, “POS” for position number and “!” for problems.

A field blank will appear in its module’s column based on cartridge position (Figure 1).

The “!” button will open a pop-up window to report sample problems (Figure 2). Filter status can be normal or terminal. Normal statuses include NM, SW, SP, SO and QD. The terminal statuses are also called “problems” and will be highlighted in red: PO, EP, NS, BI, OL, and XX (Table 1).

Figure 1. Post-sample processing with 5C Module.

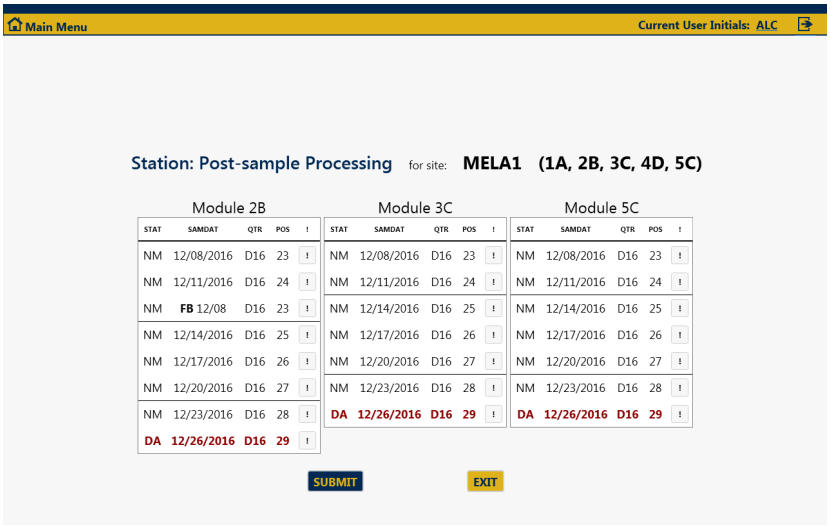


Figure 2. Post-sample processing reporting problems.

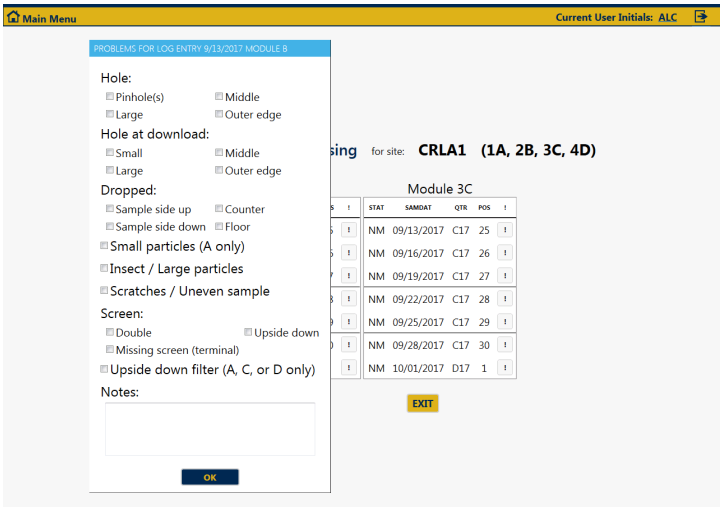


Table 1. Filter statuses.

NM	Normal
QD	Questionable Data, process as Normal
PO	Power Outage
EP	Equipment Problem
NS	No Sample
BI	Bad Install
OL	Offline
XX	Destroyed/No filter
SW	Swapped Sample Dates, process as Normal
SP	Field Blank/ Sample Swap, process as Normal
SO	Still Out

5.2 Organization

1) Confirm that the bags are in numerical order in the bin, with week 1 in front to week 3 in back. Take the cartridges out of the week 1 bag and place them on the counter in order (1A, 2B, 3C, 4D, 5X; or, red, yellow, green, blue, orange). Make sure that the cartridges are oriented correctly so that the stickered side faces up and position 1 is the bottom right cassette for each cartridge. Do the same for week 2, placing the cartridges behind week 1, then again for week 3.
2) Verify site name and that the dates and position number from the lab app match the cassette labels. This is to confirm that all cartridges were placed in the correct bag. If there is any concern that the dates are not in order, let a lead lab tech know. Also confirm that the cartridge configurations are correct for the cycle that the bin is on. Notify lead lab tech if cartridge configurations are incorrect.

5.3 Rearranging the Cassettes

Yellow bins: Look at the cartridges in week 2. There should be a missing cassette in position 3 for each cartridge, 1A, 2B, 3C, 4D, and 5X. Now look at the cartridges in week 3. The third position cassette from week 3 is removable. It will be the only cassette attached with a black O-ring instead of a white C-clip. Pop the third position out of each cartridge of week 3 and insert them into the appropriate week 2 cartridge (1A to 1A, 2B to 2B, etc.) in the open hole.

Blue bins: Look at the cartridges in week 1. There should be a missing cassette in position 3 for each 1A, 2B, 3C 4D, and 5X. Now look at the cartridges in week 2. The third position cassette from week 2 is removable. The third position cassette from week 2 is removable. It will be the only cassette attached with a black O-ring instead of a white plastic C-clip. Pop the third position out of each week 2 cartridge and insert them into the appropriate week 1 cartridge (1A to 1A, 2B to 2B, etc.).

Immediately notify a lead lab tech if the configuration of the cassettes is incorrect

5.4 Processing of Normal Nylon and Quartz Filters

1) If there are any red highlighted statuses, refer to the instructions below on how to handle terminal-status filters. If the lab app indicates that all filter statuses are normal, set the 1A and 4D cartridges aside. Remove all the red caps from the 2B 3C, and 5B/C cassettes and place the caps in the week 1 bag. Do not remove the red caps for A and D cassettes.
2) From this point forward, handle only one cartridge at a time. Start with the 2B cartridges and then move on to the 3C then 5B/C cartridges. If any field blanks are present, treat them in the same manner as other cassettes. Field blanks will have handwritten labels and should be put in either the B or C trays when processed, depending on filter type. NOTE: A field blank should be processed and stacked in the order that the filters in the cartridge are unloaded – cartridge positions 1→3.

3) Remove the label from the first position B cassette from week 1 and place it on top of a clean Petri dish. Remove the bottom of the cassette using the arbor press and place the filter that lies in between the bottom of the cassette and the screen into the Petri dish. Close the Petri dish. If necessary, use the labeled forceps for the B filters. As the filters are processed, stack the Petri dishes from the earliest date (on the bottom) to the latest (on top). Proceed to process all the B filters in this fashion for all three weeks. Then, place the Petri dishes into the tray marked for B filters (nylons). The proper order of placement in trays is left side first from top to bottom with the oldest date placed in first. Again, field blanks should be placed in front of their counterpart sampled filter. If the tray is filled, continue with the Inventory instructions below.
4) Clean all the cassette bottoms and fixed screens using ethanol and laboratory wipes. Also make sure to clean the cartridge plate.
5) Process the quartz filters in the same order as the nylons. Note that the quartz cassettes have loose screens, so when the cassette bottom is inverted, both the filter and the loose screen will come out. Place the loose screens in the used quartz screen container, which is on the counter at the Post-sample Processing station. Ensure that the filters end up in the correct Petri dish.
6) Clean the 3C cassette bottoms and cartridge plates with laboratory wipes and ethanol. If there is a lot of quartz residue on the cassette bottom, take the quartz brush and brush the cassette bottom while holding it over a garbage can. This ensures that no quartz residue gets on the counter. Then wipe the cassette bottom with ethanol and a lab wipe. As mentioned previously, discard laboratory wipes after the 3C cartridges have been cleaned. Stack the Petri dishes with processed filters in the same fashion as the 2B filters and place them in the tray marked for 3C filters (quartz). If the tray is full, follow the instructions below for Inventory.
7) If there are 5B or 5C cartridges, process and clean these cassettes in the same manner as the 2B or 3C filters. They will go in the B or C inventory directly after the whole set of 2B or 3C Petri dishes.
8) Stack cartridges from each of the three weeks in pairs: 1A+4D and 2B+3C. Place them back in their corresponding bags. 2B and 3C cartridges should be in the bottom of the bag and the 1A and 4D cartridges on the top. This makes it easier for the person at the Post-weigh Chamber-prep station.
9) If a filter is dropped or punctured in any way, then report the problem by selecting the correct problem(s). Make sure to the correct sample date, and medium of the filter was selected. If it was dropped, select sample-side up or sample-side down and counter or floor.
10) If a quartz filter has no screen or double screen report it on the “Problems for Log Entry screen”.

5.5 Handling of Terminal-status Cassettes

1) If any statuses within a bin are highlighted in red, take a red pen and write the terminal-status status abbreviation (e.g., PO) directly on the label(s) belonging to the terminal-status cassette(s). Make sure the proper cassette is identified by double-checking the sample date and the cartridge letter with the lab app. If there is a field blank that shares a date with a regular filter that has a terminal-status , the field blank may have a different status from the regular filter (usually it will remain NM), and should be treated accordingly.
2) Once all terminal-status cassettes are labeled, proceed with processing the terminal-status filters. To begin processing the terminal-status cassettes, handle only one cartridge and cassette at a time. Start with the oldest date and the earliest letter.
3) Move the label from the first cassette to the top of a clean Petri.
4) Remove the bottom of the cassette using the arbor press. For the 2Bs, place the filter into the Petri dish and close. For 3Cs, invert the cassette bottom to remove the filter and the loose screen. Place the loose screens in the appropriate container. Loose screens for Cs go in a container at the Post-sample Processing station. The 1A and 4D terminal-status filters are weighed at the Post-sample Weigh-In station.
5) Clean the cassette bottom with ethanol and a lab wipe. If it is a 2B cassette, make sure to clean the fixed screen as well. Remember not to use laboratory wipes that were used on a quartz cassette on a cassette of any other filter type.
6) Repeat steps 3-5 for every terminal-status 2B or 3C cassettes in the bin.
7) Once all terminal-status filters have been processed, then place Petri dishes in the Terminal-status tray. Make sure to fill the left side of the tray first, from back to front. Oldest filters should be placed in first, going from 2B, 3C, 5B/C. NOTE: A field blank should be processed and stacked in the order that the filters in the cartridge are unloaded – cartridge positions 1→3.
8) If either tray is full, refer to the appropriate inventory instructions below.
9) Continue with the Post-sample Processing procedure for normal 2B and 3C cassettes in the manner described in the previous section.

5.6 Preparing Trays for Inventory

If any tray is filled, start inventory preparations by finding an empty Petri tray. Empty trays are typically found between the Post-sample Processing station and the Cartridge preparation station. Find six small round stickers to use to label the tray. For nylon (B) filters, the stickers should be yellow. For quartz (C) filters they should be green. Terminal-status and terminal-status FBs are labeled with pink stinkers. Four stickers will be used on top of the tray (Figure 3) and two will be placed on the end (Figure 4). The top left sticker should be labeled with the number 1 and the top right sticker with the number 26. Both of these stickers should have a downward pointing arrow written after

the number to indicate the order of the Petri dishes. The bottom left sticker needs to be labeled with the four-digit year and the bottom right needs to be labeled with the identification number(s). These last sticker labels are repeated and placed on the side of the carton, directly under their corresponding stickers.

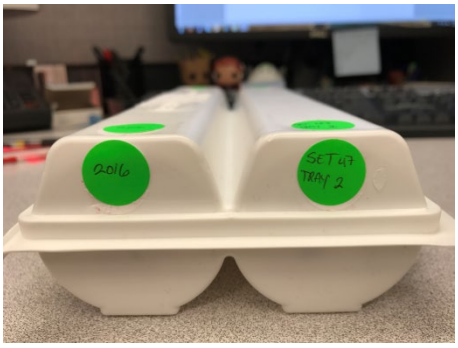
5.7 Identification Numbers for Bs and Cs

The identification numbers for B and C trays are the set number and tray number. To find out what set and tray number to label the tray with, check the inventory list. The last tray inventoried should be marked off. If the tray number on the previous carton is seven or less, copy the set number and add the next sequential tray number to the stickers, then place them on the carton. If the previous carton is labeled as tray 8, the current carton is the start of a new set.

Label the carton's stickers with the next sequential set number and the tray number will be 1 (one).

Figure 3. Top view of labeled inventory tray.

Figure 4. End view of labeled inventory tray.



5.8 Identification Numbers for Terminal-status Trays

The identification numbers for terminal-status filters are done in the same way as the B and C trays, with eight trays per set.

5.9 Tray Checking – Inventory

Tray checking, or Inventory, will be performed by the lead lab technician using the web app's Inventory tab. After labeling the trays, they are stored at the lead lab tech's desk. The lead lab tech will inventory the filters when a full set is ready and then deployed to analysis labs.

5.9.1 B and C Inventory Boxes

From http://improve.aqrc.ucdavis.edu/Storage Boxes, select **View** on the most recent set number, click **Generate Tray** to start a 9th tray and copy down the first filter information. This will be the first filter of the new box. Do not complete creating the 9th tray. Instead, click back to box, then back to list to exit out to the Inventory Boxes page. Click the **Add Box** button, fill in the set year and info for the first filter. Click **Find filters**, then select the correct filter. Change the **Set Number** from 0 to the correct number, then select **Save Box** at the bottom of the page. From here, generate trays 7 through 8. The process for doing a thorough check and shipping filters is found later in this document, in *UCD IMPROVE TI #251M: BC Filter Shipments*.

5.9.2 Terminal-status Filters

Find the first filter of a box in the same way as stated above for B and C filters. Use the list to check all of the filters rather than doing a quick check. The B and C terminal-status filters are kept in a storage tray at the Post Processing Station, the A terminal-status filters are kept in a storage tray at the Post Sample Weigh-In Station.