UCD IMPROVE Technical Information #301B

Sample Changes for 8-Position Trays

Interagency Monitoring of Protected Visual Environments
Air Quality Research Center
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DOCUMENT HISTORY

Date Modified	Initials	Section/s Modified	Brief Description of Modifications
03/04/21	SRS	All	Separated TI: A-C into individual Tis.
7/29/2022	LMK	All	Update figures and wording. Added monthly sampling set to procedures.

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1. PURPOSE AND APPLICABILITY

The purpose of this technical information (TI) document is to describe the process of loading and unloading samples using standard cups in 8-position trays in the Epsilon 5 (E5) Energy Dispersive X-ray Fluorescence (EDXRF, referred to as XRF) instruments.

2. SUMMARY OF THE METHOD

XRF queue files are generated for each instrument based on IMPROVE set number, sampling month, and sampling year which includes the filter barcode, sample identity and application name. The scanning capabilities of the PANalytical software are used to ingest the sample information from the XRF queue file into the sample changer. Filters are transferred from Petri dishes into XRF sample cups immediately after scanning the barcode. The cups are placed into one of six 8-position trays (as assigned during barcode scanning). The instrument name, assigned tray and position number are recorded on the printed inventory sheet. The trays are placed into the E5 sample changer compartment then the samples are queued in the software. After analysis is complete, trays are removed and filters are transferred back into labeled Petri dishes.

3. DEFINITIONS

Not applicable.

4. HEALTH AND SAFETY WARNINGS

The Epsilon 5 produces X-rays, which can be dangerous when appropriate precautions are not followed. For safety precautions, refer to the Epsilon 5 EDXRF Spectrometer System User's Guide and UC Davis Environment Health and Safety (EH&S) website (https://safetyservices.ucdavis.edu/).

5. CAUTIONS

Once filters are placed into cups, they may be identified by the filter barcode. In some cases, filters do not have this information; these filters are completely unidentifiable beyond their positions in the tray. Be very attentive when transferring filters into cups and be sure to place every filter in the correct tray as well as the proper position. Similar caution must be taken when unloading filters from the cups. Ensure filters return to the proper labeled Petri dish.

Check the green "Free to Open" light on the control panel of the E5 before opening the sample changer cover. Only open the cover if the button is illuminated. If the E5 generates an error message or has a software malfunction, record it in both the physical log book at the station as well as the excel log on the U-drive (U:\IMPROVE_Lab\XRF_Epsilon5\Problems). If a filter is dropped or appears unusual

(hole, particles, uneven sampling, etc.), fill out a filter integrity form explaining the issue. No records in the XRF electronic or physical logbooks are required for filter issues.

6.   INTERFERENCES

Not applicable.

7.   PERSONNEL QUALIFICATIONS

Only trained lab personnel designated by the Lab Manager may perform sample changes for IMPROVE. Personnel must complete XRF courses, training, and certifications as required by UC Davis Safety Services, and instrument specific training with the Lab Manager or designated trainer.

8.   EQUIPMENT AND SUPPLIES

- Sample holder insert
- Sample holder cups
- 25mm filter holders
- 8-position sample trays (labeled A-F)
- 4-position sample tray (labeled S)
- Forceps
- XRF queue file generated from IMPROVE Management Site
- Barcode scanner
- Labeled IMPROVE trays with samples
- Printed inventory list (per tray)
- Log books (physical and electronic)
- Petri dish holder

9.   PROCEDURAL STEPS

Because the E5 instruments run twenty-four hours a day and seven days a week, trays must be unloaded before new filters can be loaded in trays. In order to stay consistent with how the procedure occurs in practice, the procedure section will begin with the unloading of filters.

9.1   Overview and General Definitions

The sample assembly components for loading 25 mm filters are shown in Figure 1.

Figure 1. 8 position tray and contents.
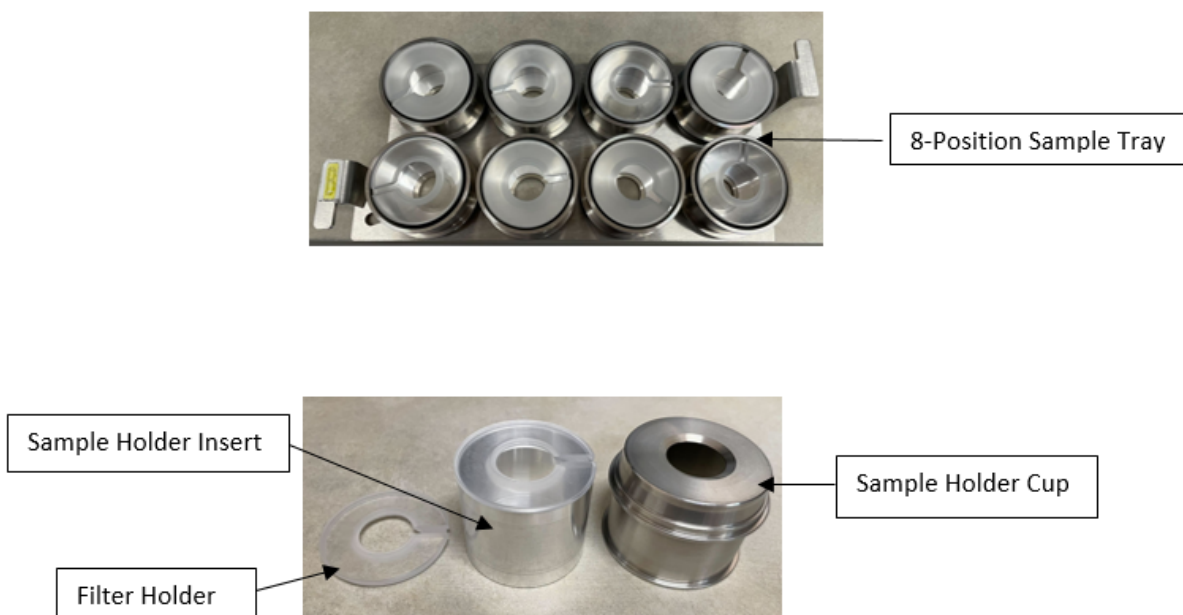
The E5 sample changer compartment holds six 8-position sample trays labeled A-F. Positions in the tray are numbered 1-8, the number denoting each position is etched on the tray. There is also one 4-position tray labeled S. The "S" tray houses the daily quality control filters consisting of a Teflon® blank and a multi-elemental reference filter. Each E5 has an assigned "S" tray that is analyzed daily for monitoring instrument performance.

Figure 2. Sample changer compartment with trays.

The letter on the handle of each sample tray matches an etched letter on the surface of the sample changer. The trays are keyed to prevent them from being loaded backwards in the sample changer; this ensures samples 1-8 are in the proper order.

Figure 3. Tray keys.
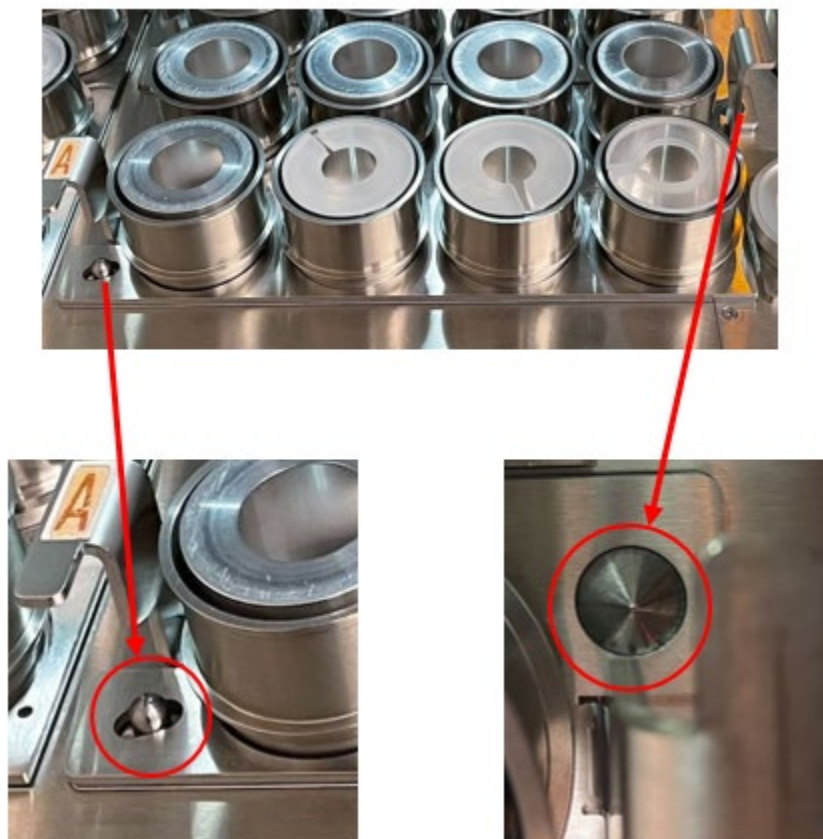
The Epsilon software displays the configuration of the trays in the compartment. The individual samples are color-coded based on analysis status. Examples are shown in the figure below:

- Orange/Gray: Not queued to be measured (e.g. Tray B)
- Yellow/Orange: Queued to be measured (e.g. Trays A, C, D and E, S1 and S2)
- Green/Orange: Measured and okay (e.g. F1-F7)
- Gray/Yellow: Currently analyzing (F8)

Figure 4. Color-coded samples.
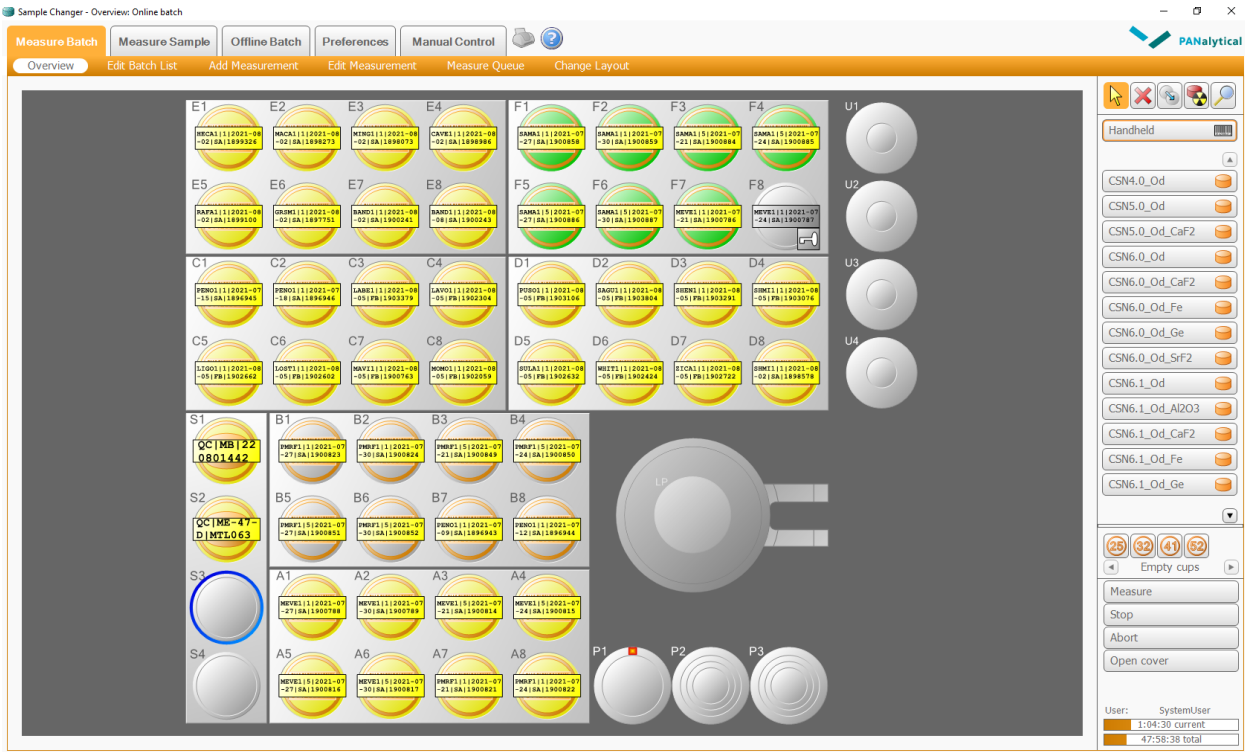
The samples loaded in the sample changer compartment correspond with the empty Petri dishes located in the Petri dish holder. Each Petri dish holder is labeled with the instrument it is used with. Each compartment is labeled with a letter that matches one of the E5 sample trays (A-F, S). The top Petri dish in the stack in each compartment corresponds to the filter in Position 1 for that tray.

Figure 5. Petri dish holder.

9.2 Procedure for Unloading Analyzed Samples

Sample changes can be made while the instrument is analyzing as long as the green "Free to Open" light is illuminated.

Figure 6. Green "Free to Open" light.
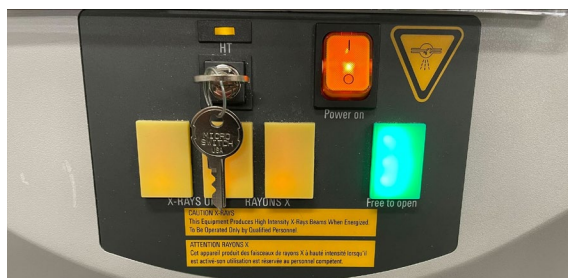
1. IMPROVE samples are assigned an XRF tray and position during the loading process. At the end of the week a laboratory technician may load a partial tray to maximize the number of samples analyzed over the weekend. Before you begin unloading/loading samples check the printed inventory sheets for notes. Never remove a tray if the instrument is currently analyzing a sample from this tray. Removing an active tray may result in alignment issues, error or a halt in analysis.

2. Visually check which trays have completed analysis, this is shown on the sample changer software. The trays are unloaded in alphabetical order. After unloading the "F" tray continue with the "A" tray.

3. After checking all eight samples in the tray have been analyzed, open the sample changer cover and remove the first tray of filters. As a precautionary measure, perform sample changes for one tray and one instrument at a time.

4. Set the tray on the sample handling bench and close the sample changer cover.

5. Remove the empty Petri dishes in the corresponding compartment of the Petri dish holder and place them on the sample handling bench

6. Begin with the Petri dish on the top of the stack, verify the information on the Petri label matches the filter information on the sample changer screen. Place this Petri dish on the sample handling bench.

Figure 7. Layout of Petri dishes.

7. Pick up the sample holder cup from position 1 in the tray being unloaded. Place one finger on the inner sample holder insert for support, then turn the sampling cup upside down and place it on the sample handling bench. Only handle one filter at a time.

Figure 8. Sample holder cup handling and positioning.

8. Remove the sample holder cup by lifting it up and off of the sample holder insert. Place the sample holder cup back in the tray position it was removed from. Pick up the filter by its outer support ring using forceps and place it in the Petri dish. Make sure the sample side remains face-up. Start a new stack of petri dishes with the filter that was just unloaded. Remember to keep this stack separate from the empty petri dishes.

9. Place the empty sample holder insert back inside the empty sample holder cup. Position the empty sample holder insert with the filter holder visible (this is

opposite to how the sample holder insert is positioned when there is a filter loaded).

Figure 9. Petri tray and inventory label.

10. Repeat steps 6-8 for positions 2-8. Once all 8 filters have been unloaded from a tray place this stack of petri dishes in the white petri tray. Confirm the order of filters matches the inventory label on the white petri tray, refer to figure 9.

11. Repeat steps 5-9 for the rest of the completed trays except for the "S" tray. The "S" tray should not be unloaded during routine sample changes unless there are samples loaded to S3 and S4. See Section 9.9 below for instructions regarding analysis of the "S" tray. Empty trays may be placed back into the sample changer compartment if necessary to keep them out of the way until loading occurs.

12. NOTE: Remember for now, some Teflon® filters have no functional identifier of any kind. Therefore, it is extremely important to keep everything in the proper order while the filters are separated from their corresponding Petri dishes.

9.3   Removing the Analyzed Filters from the Queue

After removing the analyzed filters, they need to be deleted from the E5 sample changer software. Towards the right side of the sample changer window, there is a ☒ symbol. Click on the symbol to activate the "Delete" function. Then, move the mouse over the middle of the picture of the completed tray and click once to delete the entire tray. It is also possible to delete one sample at a time by clicking on each position. Do not delete the daily QC samples from the S tray.

9.4   XRF Queue Generation

An XRF queue file is generated via the IMPROVE web app for all valid IMPROVE samples. Once generated, instrument specific queue files will need to be moved from the U-drive to the local drive on each instrument.

1. Navigate to the IMPROVE web app (*https://improve.aqrc.ucdavis.edu/)* and login in with your credentials.
2. Click on **XRF** at the top of the page.
3. Click on **Tray Files**, loading the Generate XRF Queue page.
4. Fill in the requested information Set Year, Set Month, Inventory Set #, and Analyzer. Once the analyzer field is selected the application field will auto-fill, then click **Submit** (example in figure below). If a set does not have a set month listed on the white petri tray this field can be left blank.

Figure 10. Generate XRF Queue web page.

5. Save the text file here *U:\IMPROVE_Lab\XRF_Epsilon5\Queue Files*, each instrument has its own subfolder organized by sampling year and month. Before hitting save rename the file adding the sampling month, sampling year, and set number (example; E5_queue_imp_June_2022_set1.txt).
6. Upload the queue file to the instrument in the directory *C:\PANalytical\Epsilon5\Programs\Changer\Barcode Scripts*
7. If there is already a queue file there from a previously analyzed set, delete this file. The new queue file must be saved as a txt file and named as follows for the PANalytical software to recognize it, *E5_queue.*

9.5   **Generating Inventory Tray Labels and Performing Tray Checks**

Before loading samples at XRF, inventory tray labels need to be generated and tray checks must be performed. Inventory tray labels are used to ensure samples are in the same order as the electronic inventory.

9.5.1   Generating Inventory Tray Labels

1. Before generating labels, check the next available filter for analysis in the XRF lab. To do this, locate the filters awaiting XRF analysis in the XRF lab. These filters are located on the right-hand side of the white shelving unit labeled "Ready for XRF analysis".

2. The set of filters up next for XRF analysis will numerically follow the set currently being analyzed for a given sampling month. For example, if the current set being analyzed is set 1 of a given sampling month and year then set 2 of the same sampling month and year will be analyzed next. Locate the first tray in the set and check if it has an inventory tray label or not, see image below for example.

3. When you come across the first tray without an inventory label, open the tray to check the first filter (top, left). Check the corresponding filter inventory sheet (will be folded inside the tray) to verify the filter information matches the first filter in the tray. Make a note on a scrap piece of paper of the set, tray and first filter, this information will be used to generate the inventory tray label.

4. From the U:\ drive, open the inventory sheet folder U:\IMPROVE_Lab\XRF_Epsilon5\Labels\Inventory Tray Labels and navigate to the "Printout template". You will paste information found in another file into this template.

5. From the U:\ drive navigate to the "Lab Gravimetric" folder here: *U:\IMPROVE_Lab\Lab_Gravimetric.*

6. Navigate to the Applications and Macros folder: *U:\IMPROVE_Lab\Lab_Gravimetric\Applications and Macros.*

7. Select the **XRF** folder.

8. Click on the folder for the year corresponding to the year you need to print (example 2022 Closed), within the year you will see a folder for each

month, open the folder for the month you are generating labels for. Then open the excel file for the set number you are generating labels for.

9. Copy the information from the "Master List" in columns A-H (starting with Row 2), then paste this information into the "Printout template" under the worksheet "Master". You will paste the information starting in cell B2 (the row is highlighted in yellow).

10. Columns J and K will auto populate once information is pasted into columns B-I.

11. Columns H and I of the "Reference" worksheet will auto populate with the information from columns H and K of the "Master" worksheet.

12. Click on the "Reference" worksheet and update the cells highlighted in green. This information includes the inventory month, year, set number and tray numbers.

13. Click on the worksheet **print** and verify the information looks correct. You may also want to double check the trays start and end with the correct filter. To do this navigate back to the file you opened in step 8 above. You will see sheet 1-8 for the given set. Check the first filter on sheet 1 matches the first filter on your first label. Then check the 50th filter on sheet 1 matches the 50th filter on your first label. Check those same two positions for the remaining labels. If you find a discrepancy verify it is not a copy and paste error. Once you have verified it was copied/pasted correctly (before printing the labels) you will need to go physically check the filters in the tray to locate the discrepancy.

Once the information is correct, print and save the file to the current year subfolder in the "Inventory Tray Labels" folder in the following format "set year-set month-set#", example 2022-June-set1.

9.5.2   Performing Tray Checks

After generating inventory tray labels, a physical tray check is performed to ensure the correct filters are assigned and prepared.

1. Printed inventory tray labels are taken to the XRF lab to perform a physical tray check.

2. Trays that are not yet analyzed will be located in the XRF lab on the white shelving unit, right-hand side labeled "Ready for XRF Analysis". Locate the tray that corresponds to the first generated inventory tray label, remove this tray from the shelf.

3. Starting with the Petri dish in position 1 (top, left) physically check the Petri dishes (samples) are in the same order as the inventory label. A red pen is used to make a small dash on the left-hand side of the label next to each filter.

4. Once all the Petri dishes in a tray have been verified initial the bottom of the inventory label next to tray check.

5. Place the inventory tray label on the top-left side of the white Petri tray, see figure below.

6. After completing tray checks remove the printed inventory sheet, hole punch them and place them back in the inventory trays. These inventory sheets will be used when loading filters for XRF analysis.

9.6 Adding New Samples with the XRF Queue File

An XRF queue file is generated based on the samples in a set, with each set typically containing 8 trays. The set numbers are assigned by the sample handling lab via the IMPROVE web app before reaching XRF. The sample changer software uses the data within the queue file to link the filter barcode ID with the sample identity and the instrument specific application. The filter barcode ID is etched on the support ring of 25 mm Teflon filters.

9.7 Loading New Samples into the Sample Changer

1. Remove the designated 8-position tray from the E5 and place it on the sample handling bench.

2. Remove the sample holder inserts from the sample holder cups and place on the sample handling bench.

3. Locate the white Petri tray with samples awaiting analysis and remove the next eight filters to be analyzed according to the printed inventory sheet. Place the inventory sheet in the binder for the instrument being loaded. When removing Petri dishes from the Petri tray remember to keep them in the proper order for loading (position 1 on top of the stack with position 8 on the bottom of the stack of Petri dishes). While the filters can technically be scanned in any order, the best way to maintain an orderly filter inventory is to scan filters in the same order as the filter inventory sheet/label.

4. Record the tray letter on the printed inventory sheet in the instrument binder. Place a small dash next to the first filter of the eight filters loaded to a tray, then place a dash next to the last filter loaded to this same tray. Between the two dash marks write the letter denoting the tray loaded (typically A-F). The instrument name should be written on the top of the printed sheet. If filters are loaded to multiple

5. Click on **handheld scanner** on the sample changer software screen. Then, click on the first empty position being loaded; typically position 1 of the tray you will be loading. This will open the "scan barcode for position" popup.

6. Using a Cognex scanner, scan the filter barcode. To do this, remove the lid from the Petri dish. Place the Petri dish with the filter on the designated circle of the loading platform (marked with a small circular groove on the white platform). The scanners have either a built-in camera or a proximity sensor built into the loading platform, either mechanism will trigger the scanner when a filter is placed on the loading platform. If successfully scanned the filter sample identity will appear on the sample changer screen (in the position selected in step 4).

7. Verify the information on the screen matches the information on the lid of the Petri dish (site and sample date).

8. Using forceps lift the filter by the outer support ring and place it on the filter holder. The sample side should be face up.

9. Place the sample holder cup over the top of the sample holder insert. Tip the cup slightly and support the sample holder cup and insert by applying gentle pressure on the bottom of the cup/insert. Then, turn the assembly upside down and place it in the position of the tray that matches the position the filter was scanned into on the screen, typically position 1 is loaded first.

10. Place the lid back on the empty Petri dish and set the Petri dish upside-down (starting a new stack, the next empty Petri dish will be added to this stack in the same manner until the 8 empty Petri dishes have been added.)

11. Repeat steps 5-9, for positions two through eight.

12. Invert the stack of empty Petri dishes, position 1 should now be the top of the stack. Double check the order of the empty Petri dishes matches the physically loaded filters on the "overview" screen. Place the Petri dishes in the appropriate compartment (A-F) of the Petri dish holder.

13. Make sure the green "Free to Open" light is illuminated. Then, open the sample changer cover.

14. Load the filled sample tray into the sample changer compartment with the letter written on the sample tray matching the etched letter in the sample changer.

15. Close the sample changer cover and repeat steps 1-14 for the remaining empty trays.

16. Add the newly populated filters to the analysis queue by selecting the symbol (in the "Overview" screen of the "Measure Batch" tab. Then, select the newly-loaded trays. The samples will change from gray to yellow.

Refer to Section 9.10 for Recording Sample Changes.

9.8   Adding QC Samples utilizing "Add Measurement" function

1. To add Quality Control (QC) samples to the queue, double click on the first position that will be loaded in the sample changer software. This will open the *Add Measurement* screen.
2. The *location* should already be the correct position, it can be manually changed if needed.
3. For *Application*, select the current version of the application being run on the particular Epsilon 5 for QC analysis.
4. Place the cursor in the *Sample Identification* box.
5. Type or scan the QC code for each QC sample.
6. Press F8 to save the entry and the program will automatically move on to the next position.

9.9   Analyzing the QC Samples

The daily QC samples in the "S" tray are analyzed once every day. If the queue needs to be re-ordered for the "S" Tray to be analyzed, refer to Section 10.2 of Additional Checks/Procedures.

9.10   Recording Sample Changes

1. Each instrument has its own physical log book as well as an electronic log in Microsoft Access. The physical log book is labeled with the instrument name and is located on the shelf above the respective computer, while the Access log is located on the computer desktop.

2. Open the physical log book to the first available row. Write the date, time, first and last samples loaded, and the letters of the trays loaded. Sign the entry with your first initial and full last name. Make sure to follow the same format as previous entries.

3. Open the Access log by clicking on the icon entitled "Enter_LogBooks.accdb". Click on **Add New Record**. The date and time will automatically fill in. The default Code Action is LD, for "Loading". Fill in the first and last filter information and the "Initials" box. Then select **Save This New Record**. Close the log.

10.   ADDITIONAL CHECKS AND PROCEDURES

10.1   Additional Procedure for Adding New Samples without a Filter Barcode

New samples can be loaded to an XRF instrument by manually typing the sample identification into the sample changer software or through the generation of a QR code label.

10.1.1 Manually Typing Sample Identifications

1. To add filters to the queue, click on the first position that will be loaded in the sample changing software, this position will now have a blue ring. Next click on **Add Measurement** towards the top of the sample changer screen, opening the "Add Measurement" screen.

2. The "location" should already be the correct position.

3. The "Type" should already be set to routine.

4. For "Application", select the current version of the application being run on the particular Epsilon 5.

5. Place the cursor in the "Sample Identification" box. Type in the filter sample identity in the following format SITE1|1|YYYY-MM-DD|SA|#######, for example OLYM1|1|2019-06-08|SA|1722441. The SA stands for sample, if the filter is a field blank this SA is replaced with FB. If the filter is from a 5A module, the |1| is replaced with a |5|. The last 7 digits are the filter id, which can be found on the IMPROVE web app and is not always 7 digits.

6. Check repeat is set on "1" and priority is set on "normal".

7. Click on **Add** located on the right-hand side of the screen.

8. Repeat steps 1-7 for any additional filters.

9. Once finished, click on **Overview** at the top of the sample changer software to go back to the main sample changer screen.

10. Queue the samples

10.1.2 Adding New Samples with QR Code Labels Generated in Bulk

The following details how to make QR code labels for 80 filters at once:

1. Before generating QR code labels check the next available filter for analysis in the XRF lab. To do this, locate the filters ready for XRF anlaysis in lab. These filters are located on the right-hand side of the white shelving unit labeled "Ready for XRF Analysis".

2. The set of filters up next for XRF analysis will numerically follow the set currently being analyzed. For example, if the current set being analyzed is

June set 1 then June set 2 will be analyzed next. Locate the first tray in the set and open the tray to check for QR code labels starting with the filter in position 1 (top, left). If this sample already has a QR code label then move to the next sample until you come across the first sample without a QR code label. Write down the sample information; sampler, sample date and filter ID. Remember to note this information is for the QR code labels.

3. From the U:\ drive, open the Petri QR label folder-
    U:\IMPROVE_Lab\XRF_Epsilon5\Labels\Petri Labels
4. Select the worksheet titled "1-80Barcode_templates.xlsx" you paste information here copied from another file.
5. Select the Applications and Macros folder:
    U:\IMPROVE_Lab\Lab_Gravimetric\Applications and Macros
6. Click on the **XRF** folder
7. Navigate to the folder for the year corresponding to the year you need to print (example 2022 Closed), within the year you will see a folder for each month, open the folder you are generating labels for. Then open the excel file for the set number you are generating labels for.
8. Click on the **Master List** worksheet within the workbook. Verify the first filter matches the information you recorded in step 2.
9. Copy the information in columns A-H starting with row 2, then paste into the "1-80Barcode_template" worksheet "Master" in B2. Columns I, J and K will auto-populate.
10. Copy the information in column J and click on the **List** worksheet, paste this information into column A. Then copy Column K from "Master" and paste into column B on "List". Then copy column C from "Master" and paste in column C on "List".
11. Verify the information is correct and then select the **Barcode** worksheet and click **Add-ins**. This will open the TbarCode Panel add-in. From the TbarCode submenu click **Select all Barcodes**, then **Refresh all Barcodes**.
12. From the barcode tab select print from the menu.
13. Copy the next 80 samples from the "Master" worksheet you generated in step 9 and repeat steps 10-12 until all QR code labels are printed for the set being analyzed. The only difference is you will copy the information for the next 80 filters each time you print the previous 80.
14. When you have finished printing all the labels for a set save the file, this will only retain the last 80 QR codes generated.

15. Printed QR code labels are then taken to the XRF lab to label samples.

16. Find the sample that matches the first QR code on the printed sheet.
17. Verify the site name and sample date match the label already on the Petri before adding the QR code label (these labels are placed on the sample by the Sample handling lab). Place the Petri dish back in the tray in the same place you removed it from. Repeat with the rest of the filters.

18. Once the entire tray is labeled place the tray back on the shelf and continue labeling with the next tray.
19. The labeled filters can now be scanned into the sample changer software with a barcode scanner, by clicking on the position you want to load the filter to and selecting "Add-measurement". Verify the location is the position you just clicked on and that "type" is set to routine.
20. For "Application", select the current version of the application being run on the particular Epsilon.
21. Place the cursor in the "Sample Identification" box and scan the QR code label, verify the information is correct for the sample and click **next**. Repeat this step for any additional filters being loaded with QR codes.

10.1.3 Adding New Samples when Generating Individual QR Code Labels

1. If generating labels for less than 80 filters the lab technician can manually update the barcode worksheet.
2. From the U:\ drive, open the Petri QR label manual template- U:\IMPROVE_Lab\XRF_Epsilon5\Labels\Petri Labels\Barcode_templatemanual.xlsx
3. On the list tab the only entry in the sample identity column should be in Row 2, this is an example of the format needed for making QR code labels manually.
4. Open the IMPROVE web app (https://improve.aqrc.ucdavis.edu), and from the homepage click on **Filters**.
5. Click on the **filter results** icon [▼] to open the filter search criteria screen.
6. Type in the 4-letter site code in the sampler box and select the dates needed from the start and end date boxes.
7. Click on the **Module Type Code** box and select **A-PM2.5 Mass/XRF** from the dropdown menu.
8. Click on **search**. This will load all A filters within the set date range from the selected site.
9. Click on the **view filter details** icon [▤] to see the filter ID number, listed as "Id" at the top of the filter details page. Copy the "Id".
10. Return to the Barcode_templatemanual.xlsx worksheet and paste the "Id" into the last portion of the 1st entry in column A, currently filled in as "FilterID".
11. Next type in the site name, module #, date and filter type, making sure you maintain the required format.
12. In column B of the same row type in the site name and date in the specified format.

13. In column C only update the module for 1A if the filter being analyzed is from a 5A module.
14. Repeat steps 21-30 for any additional QR code labels needed.
15. Click on the **barcode** tab. From the ribbon select **Add-ins** and click on **TBarCode** Panel, opening the barcode add-in.
16. On the barcode software sub-menu click on **select all barcodes**, then click **refresh all barcodes**. This will update all the QR codes on the sheet.
17. Before printing, if there are additional barcodes on the screen that are not linked to a label being generated delete them before printing.
18. From the barcode tab select print from the menu, close the file without saving.
19. Place the generated labels on the Petri dishes
20. The labeled filters can now be scanned into the sample changer software with a barcode scanner, by clicking on the position you want to load the filter to and selecting **Add-measurement**. Verify the location is the position you just clicked on and that "type" is set to routine.
21. For "Application", select the current version of the application being run on the particular Epsilon.
22. Place the cursor in the "Sample Identification" box and scan the QR code label. Verify the information is correct for the sample and click **next**. Repeat this step for any additional filters being loaded with QR codes.
23. Queue the filters after verifying the information is correct.

10.2 Changing the Order of the Queue (Usually for "S" Tray)

1. In the "Measure Batch" tab, click on **Measure Queue**.
2. Highlight the samples in the "S" tray (or any samples needing to be moved).
3. Use the **Move Up** or **Move Down** buttons on the right as many times as needed to change the order.

10.3 Aborting Sample Analysis

1. To abort a sample while in mid-analysis, go to the "Measure Batch" tab, then "Overview".
2. Click the **Abort** button towards the bottom right.
3. The instrument will first come to air; then, the sample will be removed and put back to its original tray position. No new analysis will begin until the **Measure** button is clicked or the ☢ button is used to re-queue.

10.4 Special Circumstances When Using "Stop" to Suspend Analysis

1. When activated, the "Stop" button will let the current sample finish analyzing, then stop all actions without emptying the queue. The only issue with this button

is that it does not change the current sample to green when completed, even though the data is in the "Results" file.

2. To be sure that the filter was successfully analyzed, click on **File**, then **Open**.

3. On the left of the window that pops up, click on **Results**.

4. Then, click on the current version of the application being run on the particular Epsilon. Click **Open**.

5. Check the boxes for "Routine", "Measured", "Standard", and "Blank". Then type the name of the sample, standard, or blank. Click **Apply**.

6. If the filter was analyzed, it will appear on the list. Otherwise, use the ☢ symbol to queue it for analysis.

10.5 Weekly Check of Blank Identities-only Applicable if Blank Subtraction is Utilized

1. On a weekly basis, the blank filter is checked to make sure it is properly designated before new samples are loaded during the sample change. To do this, look up the blank used for the last sample analyzed by first clicking on **File**, then **Open**. On the left of the window that pops up, select **Results**.

2. Select the current application. In the window that pops up, type a ***** in the Sample ID box. Make sure "Routine" and "Measured" are checked. Then, click **Apply**.

3. The list generated should be in descending order so that the top filter is the last filter that was analyzed. Select the top sample to highlight it and the analysis data will appear.

4. Check that the Blank ID is correct for the Epsilon in use. Refer to the laboratory manager or spectroscopist for the current Blank IDs for each Epsilon. If the blank is not correct, make a note of it and inform the lab manager and spectroscopist immediately. If the blank is correct, close the "Results" window and continue.

10.6 Changing Inserts in Sample Holder Cups

The filter holder inserts in the sample holder inserts are changed as needed. Inserts are removed from the filter mount cups and placed in a bin, which is located in a cabinet drawer in the XRF Lab. These used inserts will later be cleaned with ethanol. Clean inserts can be found in a labeled drawer in the XRF lab. Exchange used inserts for clean inserts, place the clean inserts in the sample holder inserts, and continue with the sample change.