

TI 251A Calibration and Test Weights

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe how the microbalances in the sample handling laboratory are calibrated and how external metal test weights and Teflon® filters are used to monitor balance measurements.

2. SUMMARY OF METHOD

Microbalances in the sample handling laboratory are manually calibrated once a day, in the morning, before routine weighing can begin. External test weights are measured three times a day, and RH and temperature values are recorded. Lab blanks and sampled “test” filters are weighed once a week.

3. CAUTIONS

Be careful when handling external test weights, lab blanks, and sampled “test” filters. Dropping and/or damaging these can change their weight measurements significantly, creating a discontinuity in the data. Report any drops or filter tears while weighing the lab blanks and sampled “test” filters, as they do not have replacements.

4. PERSONNEL QUALIFICATIONS

Trained laboratory technicians are the only personnel who perform calibrations and external test weights.

5. EQUIPMENT AND SUPPLIES

- Microbalances
- Computers with balance applications
- Metal calibration standards (200mg, 100mg, 50mg)
- Forceps with ceramic tips
- 10 laboratory blanks (labeled 1-10)
- 4 sampled “test” filters (labeled E,F,G, and H)

6. PROCEDURE

6.1 Mettler XP6 Balance Calibration Information

When the Mettler XP6 microbalance is calibrated, it generates a 3-point calibration equation using two internal masses. The weights of these internal masses combined are in the range of 5-6 grams. The balance will then perform a 2-point test of the calibration equation, showing temperature (°C), nominal percentage (always 100.00000% accuracy), reported accuracy (must be between 99.9998 and 100.00003), and difference (must be 0.00003% or less).

Balance adjustment history can be found locally on the balance by navigating through “Setting> System> Adjust/Test> Test History-Define > Adjustment History-Show.”

There are a variety of ProFACT adjustments available on the Mettler XP6 balance, but the only one activated on the balances in the sample handling laboratory is ProFACT Auto-Zero. This allows the balance to automatically tare for minute deviations away from zero.

Static may cause the balance not to zero. In this case, tare the balance, wait for a zero weight to stabilize, and then press the "Test Internal" button. Perform an internal calibration if the internal test does not pass.

Do not weigh filters while the gauss meter shows a change in the magnetic field. It is typical to wait 5-10 minutes after a change in the gauss meter to ensure a stable weighing environment before resuming work at the balance.

There are guides on the pan for centering the filters and standards; make sure to use them.

When the balances are calibrated by a Mettler technician, the internal calibration masses are compared against Mettler's own traceable external calibration weights. Essentially, the yearly calibration is an adjustment of the balance electronics.

6.2 Balance Calibration Procedure

- 1) Perform calibrations in the morning prior to test weights and routine weighing. Check that the balance is level by making sure the bubble is within the circle on the top of the balance. Also check to be sure that the balance reads zero before beginning.
- 2) To begin, press the "Internal Adjustment" button on the bottom left of the balance screen. This takes several moments.
- 3) When the internal adjustment has finished, press OK to exit.
- 4) Press the "Internal Test" button. The internal test takes several moments.
- 5) Note the nominal value, actual value, and difference, which will all be displayed on the screen. If the difference is greater than $\pm 0.00003\%$, confirm gauss meter stability and repeat the internal calibration and test. If the gauss meter does not stabilize, check with the cyclotron operators.
- 6) If three repeated internal calibrations do not meet the criteria and the gauss meter is stable, "exercise" the balance by weighing a 2-5 grams mass on the balance several times. Then, repeat the internal calibration.
- 7) If the balance will not pass internal test tolerances after performing the steps above, contact a Mettler technician.

6.3 Stainless Steel External Test Weights

External test weights are weighed three times a day; at around 8:15am after balance calibrations, at noon, and at 4pm. For about four months, three metal calibration standards were weighed. Two of them (200mg and 50mg) were recorded through the FoxPro POST balance application. Their values were stored in U:\IMPROVE\BALCTRLS\calib.dbf. An additional 100mg weight was used offline and the values were recorded in an Excel file located in J:\User\AnnexRear\Kawamoto\Lab Instructions\RH and TEMP.xls. As of February 20th 2013, only the 100mg and 50 mg are weighed and recorded using the FoxPro POST balance application.

Through these external tests, it is possible to track balance consistency throughout the day. These external tests show that the balances will maintain a reliable balance equation throughout the day.

- 1) Starting with Mettler 1, open the FoxPro POST program. Press <F1> to enter the test weight page. The program will prompt for a zero weight. When the balance captures a zero, press enter. Wait several seconds, and the program will display a prompt to press the spacebar.
- 2) After pressing spacebar, the program will then ask for the "calibration" weight. Put the 100mg weight on the balance and press enter after the program displays a stable weight.
- 3) The program will display a prompt to remove the test weight and to press spacebar. Follow the prompt. The program will then ask for the "test weight," which is the 50mg test weight. Put the 50mg weight on the balance and press enter when the weight is stable. Remove the weight.
- 4) The program will then ask for a gauss measurement. Type in the gauss reading. Press enter to finish the online test weights.
- 5) Note the RH and temperature from the probe located between the balances. This only needs to be done at the Mettler 1 station.
- 6) Repeat steps 1-4 on Mettler 2.
- 7) If one external test mass weighs 0.003mg or more outside of the expected average (calculated from the .dbf file), reweigh that mass. If one external test mass continues to weigh ± 0.003 mg or more different than the average, test it on the other balance to see if it agrees.
- 8) If one or more weights are out of range on only one balance, re-run internal adjustment and test procedures.
- 9) If both balances agree that one external test weight is out of range, consider sending that weight back for recertification and replace it with a "backup" weight.
- 10) Through these external tests, consistency between balances can be tracked. Each mass should weigh within 0.003mg when compared between balances. If this test fails, reweigh that mass on each balance. If one or more of the masses still disagree, this indicates straying balance equations. Note historical averages for each mass for each balance, and internally recalibrate the balance that shows the most inconsistency or drifting average. If repeated internal calibrations of one balance do not fix the problem, attempt internal adjustment on the other balance.
- 11) If repeated internal calibrations fail and the balance equations do not match, consider contacting a Mettler technician. If both balance equations disagree, most likely both weights will not weigh consistently between balances. Monitoring of the 50mg weight (which is in the range of Teflon[®] filter weights) is more critical.
- 12) The 100mg mass is recertified yearly to compare balance equations to traceable standards.
- 13) The 200mg weight was replaced with the 100mg weight in February 2013.
- 14) Record the RH and temperature in the Excel file found in J:\Kawamoto\Lab Instructions\RH and TEMP.xls. Also add the online measurements into this Excel file, which are located in U:\IMPROVE\BALCTRLS\calib.dbf.

6.4 Lab Blanks

Ten lab blanks are weighed once a week (Monday morning) for each balance. The filters are located in the cupboard where the controls and calibration standards are kept. They are in Petri dishes labeled #1-10.

- 1) Starting with Mettler 1, open the Excel file on the desktop labeled "Mettler1 Controls.xls." This file is stored in U:\IMPROVE\BALCTRLS.
- 2) Make sure that the correct tab is open for Mettler 1.
- 3) Weigh each of the ten filters, typing in the weights as each filter is weighed. Only reweigh filters if the original weights seem unreasonable.
- 4) Add any comments in the "Notes" column if anything unusual happened or if the procedure has changed. Save and close the file.
- 5) Repeat steps 1-4 on Mettler 2. Make sure the Mettler 2 tab is open before entering weights.
- 6) When finished on Mettler 2, return to the Mettler 1 tab. Save the file and then close it.

6.5 Sampled "Test" Filters

Four filters that have undergone special sampling are weighed once every Monday morning after the lab blanks. They are located in the same cupboard as controls, calibration standards, and lab blanks. The filters are in Petri dishes labeled "E," "F," "G," and "H."

- 1) Starting with Mettler 1, open the file named "Mettler1&2 Hege's E, F,G,Hfilters.xls." It is on the desktop or in U:\IMPROVE\BALCTRLS.
- 2) Make sure the Mettler 1 tab is active.
- 3) Enter the date, time, and gauss reading.
- 4) Weigh the filters. Type in the weights as each filter is weighed. Only reweigh when weights seem unreasonable.
- 5) Add any additional comments in the "Notes" column.
- 6) Save and close the file.
- 7) Repeat steps 1-5 on Mettler 2. Make sure that the Mettler 2 tab is active. When finished, return to the Mettler 1 tab, save, and close the file.

7.0 DATA AND RECORDS MANAGEMENT

The 200mg and 50mg weights were stored in U:\IMPROVE\BALCTRLS\calib.dbf until late February 2013. Currently, the 100mg and 50 mg weights are stored in U:\IMPROVE\BALCTRLS\ calib.dbf and the 200mg test weight is not used. Be careful when editing the .dbf file and only make changes if absolutely necessary. This information is also copied and pasted in an Excel file, located in J:\User\AnnexRear\Kawamoto\RH and TEMP.xls.

Relative humidity values, temperature measurements, and 100mg weights were all entered in the Excel file listed in the previous paragraph until late February 2013. Currently, only the relative humidity values and temperature measurements are recorded offline here.

In the future, the relative humidity and temperature will be recorded automatically every fifteen minutes, and the new balance applications in development will allow an unlimited number of test weights to be weighed online so no calibration standards will routinely have to be recorded offline.

The Excel files for the lab blanks and “test” filters are both located on the desktops for each balance station or in U:\IMPROVE\BALCTRLS.

8.0 QUALITY ASSURANCE

Test weights are monitored by laboratory staff in order to ensure that the balances are both accurate and precise in their measurements. If laboratory personnel notice a consistent, significant change in weight for a calibration standard, the standard is sent for recertification and a “backup” calibration standard is introduced. Any holes or tears in the Teflon® test filters are noted.

TI 251B Controls

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to weigh control filters in the sample handling laboratory. Control filters are important to the IMPROVE operation because they provide a practical approach to monitoring balance performance. The exact same media is used for control filters as is used for those that go out into the field, so the behavior of these filters should be comparable to network filters. Also, IMPROVE network filters are typically pre-weighed on one balance (Mettler 1) and post-weighed on another (Mettler 2); by weighing control filters on both balances, it is possible to confirm that both balances have equivalent equations. This ensures that weights are not skewed by using alternate balances at different points of the process. Finally, the 33 business days in between re-weighing each control filter mimics the approximate timing between pre-weighing and post-weighing IMPROVE filters. The results of controls confirm that the balance equations remain relatively constant over time, as control filter post weights are usually very close to their pre weights.

2. SUMMARY OF THE METHOD

A pair of control filters is weighed two times a day, once in the morning at around 8:30 and once in the afternoon at 4pm. One of the filters is a clean filter that is prepared before the morning weighing, and the other filter has been pre-weighed and stored for 33 business days. Control filters are weighed on both balances each time.

3. CAUTIONS

It is important not to damage or contaminate the control filters in any way. Dropping a filter on a work surface or tearing a hole in the membrane may cause the Teflon® filter to weigh significantly more or less than it otherwise would; thus, it would not be a true representation of balance performance. Any incidents that occur must be noted in the comments field of controls.dbf.

4. INTERFERENCES

A change in the gauss will affect the balance reading. If a change in the gauss occurs during controls, wait for the gauss to stabilize and then re-weigh the filter to ensure that an accurate value is recorded.

5. EQUIPMENT AND SUPPLIES

- 32 filter cassettes with small red caps to cover the top
- 2 Petri slide trays
- Yellow circular stickers
- 36 red caps for cassette bottoms
- Forceps with rubber tips
- Microbalances
- Computers attached to each balance, with FoxPro® programs installed
- Ionizing units
- Pen

- Box for archived filters
- Teflon® filters

6. PERSONNEL QUALIFICATIONS

Laboratory technicians are the only personnel who weigh control filters. Lab techs must have been trained by an experienced lab tech and must have read the SOP for control filter procedures.

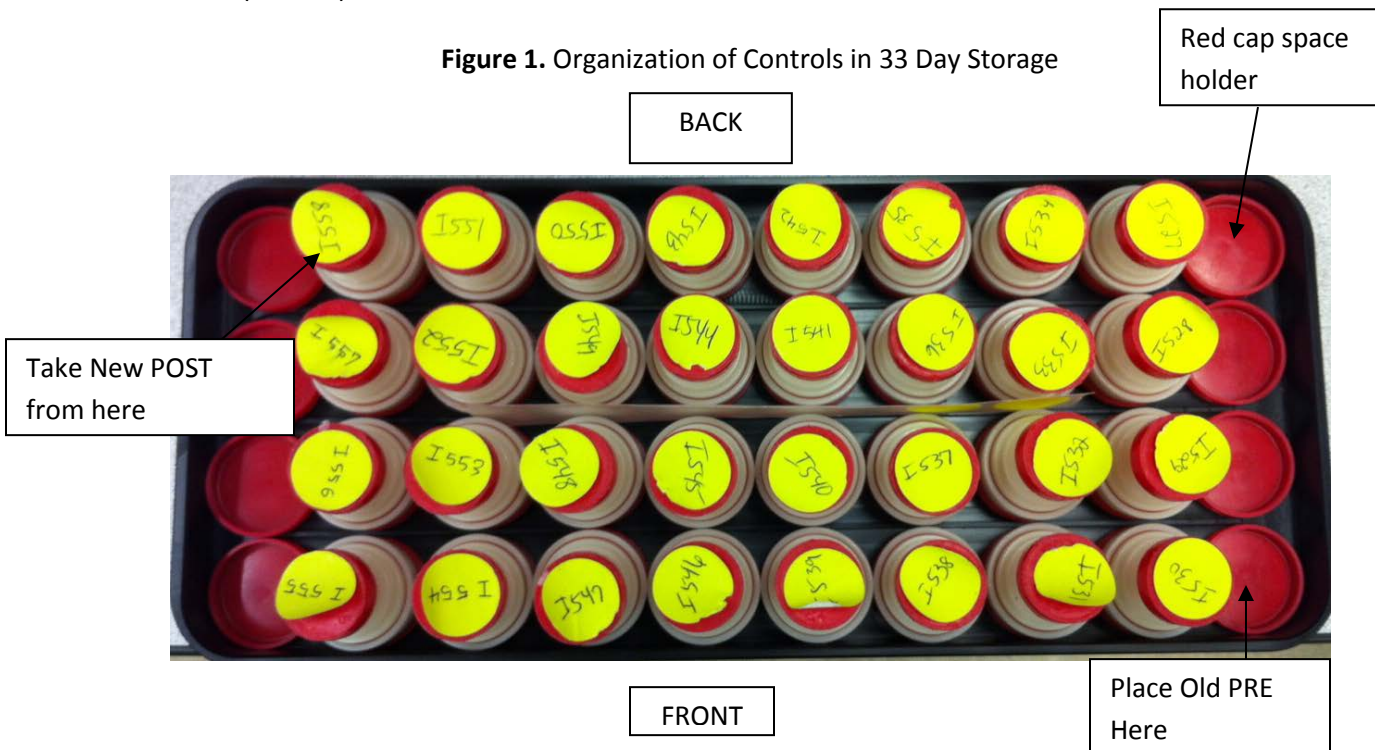
7. PROCEDURES

7.1 Circulation of Controls

There are two control filters to be weighed every day, twice a day: a PRE control and a POST control. A lab technician prepares control filters for the day every morning after calibration and test weights have been performed.

The PRE control is a brand-new filter from the current Teflon® lot being used for production filters. It must be free of any visible blemishes. Filters are labeled with the letter "I," followed by three numbers. New filters will increase in number up to 999 and then start over again at 000. After the filter has been used as a PRE control for one day, the filter is placed into a cassette and stored for 33 business days in a black tray (Figure 1). The tray is oriented so that smaller numbers are on the left, with increasing numbers towards the right (0→999).

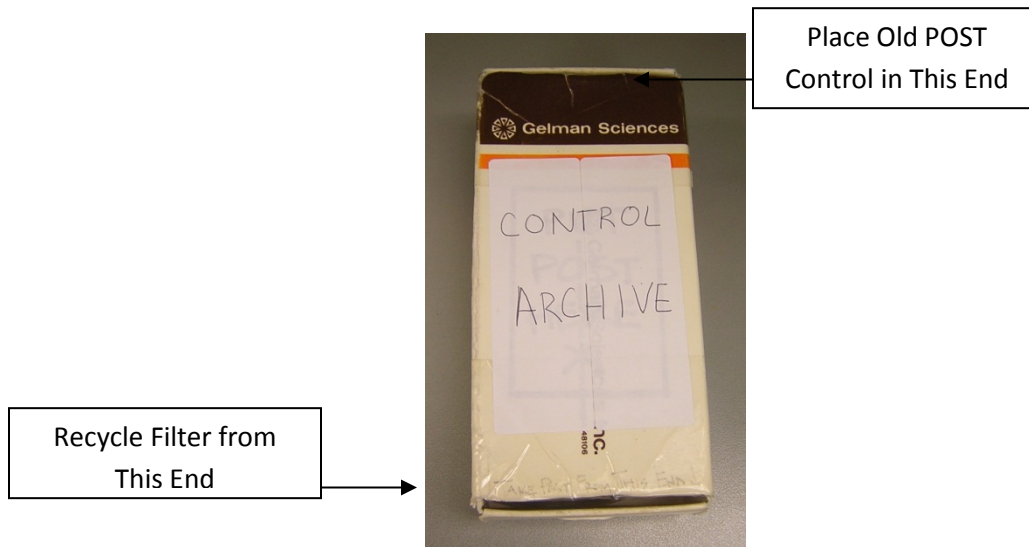
Figure 1. Organization of Controls in 33 Day Storage



The old PRE control from the previous day is always placed in the far right of the tray. The order of rotation is youngest to oldest, from right to left. Column rotation alternates with the

highest numbers going from front to back in the far right column, and then back to front in the next, etc. throughout the tray. Six red caps hold unused places in the tray and should be rotated into new empty spots created by PRE and POST filter circulation. When a row of four red caps becomes empty at the POST end, that row of empties is moved to the PRE end and all rows are moved one position to the left.

Figure 2. Control Archive Box



After storage in the black tray, the former PRE control is removed from its cassette and becomes a new POST control. New POST controls are taken from the far left position (the position where the oldest cassette is located). After use as a POST control, the filter is placed into the back end of the white control archive box for 24 business days (Figure 2). Once 24 business days have passed, that filter is taken out of rotation and disposed of.

7.2 Changing the POST Control Filter

1. Retrieve the prior day's PRE and POST control filters found in labeled Petri slides. The PRE control will always be labeled with a higher number than the POST control. Retrieve the control archive box and the black control storage tray.
2. Orient the control box as pictured in Figure 2. Find the number on the filter at the back of the box; this number should be one lower than that of the POST control from the previous day. Place the POST control from the day prior in the back of the control archive box.
3. Remove the filter from the very front of the box for disposal. Remove and discard the label on the Petri slide as well.

4. There should now be one empty, unlabeled Petri slide. Remove the oldest filter from the black storage tray (this will be in the far left position).
5. Move the label from the cassette to the empty Petri slide.
6. Open the cassette with the arbor press and place the filter into the newly labeled Petri slide using rubber-tipped forceps. Make sure not to touch or damage the filter in any way. Put the new POST control to the side to minimize confusion.

7.3 Changing the PRE Control Filter

1. There should now be an old PRE control and an empty, unlabeled cassette.
2. Remove the label from the old Petri slide and place it on top of the empty cassette.
3. Remove the filter from the old PRE Petri slide and place it in the newly labeled cassette using rubber-tipped forceps. Close the cassette using the arbor press and place the red caps (both the small one for the cassette top and large one for the cassette bottom) back on.
4. Place the cassette into the correct place in the black tray (see Figure 1). An empty, unlabeled Petri slide should remain.
5. Find a new, undamaged filter from a clean box of Teflon® filters.
6. Using rubber-tipped forceps, place the new filter in the empty, unlabeled Petri slide; this is the new PRE control.
7. Find a new yellow circular sticker. Label the sticker with an "I" and number it by one higher than that of the previous PRE filter that was just stored in the black tray. Use this sticker as the new PRE control label and place it on the Petri slide. The PRE and POST controls are now ready for measurement.

7.4 Conducting Control Measurements: Background Information

The PRE and POST control filters must be replaced every morning before control measurements are conducted. Controls must be measured after the balance calibrations and test weights are completed in the morning and after test weights are taken in the afternoon (at 4pm). No network filters are weighed before controls are performed in the morning. Controls must be done on Mettler 1 (the balance located closest to the door) before they can be performed on Mettler 2 (the balance located closest to the wall). Be careful not to damage the control filters. Before weighing any of the controls, pass them through the ionizing unit with forceps to remove any static that could affect filter weight.

7.5 Control Measurements Procedure

1. Obtain the new PRE and POST control filters (Sections 7.2 and 7.3).
2. Begin control measurements on Mettler 1. Controls must be completed on this balance before they can be done on Mettler 2. Enter the POST Microsoft FoxPro® program by typing user initials. The top right screen offers two options: "F2=controls" and "F3=calibration." Press "F2" for controls.
3. Pass the PRE filter through the ionizing unit and place the filter on the balance pan. Ensure that the PRE control filter number on the Petri slide matches the number for the PRE control listed on the screen.
4. Wait for the balance to stabilize. If the wrong weight is picked up, press "D" for discard and wait for the computer to pick up the correct weight. If the computer does not pick up a weight in a reasonable amount of time, press "F1" and then the "Query Balance" option to force the computer to take a weight from the balance.
5. Press "Enter" to accept the stable filter weight. Remove the PRE control from the balance and place it back into its Petri slide. Make sure that the balance stabilizes at zero. Pass the POST control through the ionizing unit and place it on the weighing pan. Check that the POST control filter number on the Petri slide matches the number on the computer screen.
6. Let the balance stabilize and take the correct weight value as in Step 4. The difference between the original PRE weight (taken 32 days previously) and the POST weight (weight that is currently being taken) for the POST control filter is listed on the bottom right of the screen. A difference of ± 0.003 or less is desired, but if the difference is larger, accept the weights anyway. Control filters are not to be re-weighed unless an unannounced change in the magnetic field occurs during the weighing process or the weight difference seems unreasonably large ($\pm 0.010\text{mg}$). If either of these events occurs, re-weigh the filter on both balances once conditions are stable and record the corrections in the comments field in controls.dbf. Any problems that occur during the controls process should be noted in the comments field for the appropriate control filter.
7. Repeat steps 1-6 on Mettler 2.

8.0 DATA AND RECORDS MANAGEMENT

The Controls database is primarily accessed through the POST program and is organized to include the following information: filter identification; pre-weight date; number of days between pre and post; mask type; name of the balance operator responsible for each measurement; any comments; Pre, Post, re-Pre and re-Post weights; Post minus Pre weights; re-Pre minus Pre-weights; and differences between the Pre, Post, re-Pre, and re-Post weights measured on the microbalances.

The Controls database can also be accessed through the U drive at U:\IMPROVE\
BALCTRLS\controls.dbf. Caution is warranted when making any changes to this database; make sure
any changes are entered correctly.

9.0 QUALITY ASSURANCE AND QUALITY CONTROL

Several checks are provided by the POST program when taking control weights. The
Identification numbers of the control filters that need to be weighed are shown on the screen while
weights are taken, allowing the balance operator to confirm that the control filters they have are the
ones that need to be weighed.

The differences in weights between control filters are displayed on the screen while controls are
being performed, which can assist the user in spotting filter mix-ups or bad weights. During morning
controls, the POST filter shows the difference between the weight taken that morning and its PRE
weight, taken a month previously. If the difference is very large, that could imply that the wrong
filter is being weighed. During afternoon controls, the differences between the morning weight and
the afternoon weights are displayed for both the PRE filter and the POST filter. If filter differences
are significant, that could mean that conditions in the lab or a problem with the balance caused a bad
weight to be taken. Any weights considered invalid should be noted in the comments field of
controls.dbf.

Control filters are kept in an archive box for 24 business days before being disposed of in case of
any potential POST filter mix-up. Filters can be retrieved and reweighed as necessary during that
time.

TI 251C Filter Inventory and Acceptance

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the process of acceptance testing for the Teflon[®], nylon, and quartz filters, as well as detailing how these filters are inventoried. The procedures described apply to all filters used for IMPROVE sampling.

2. SUMMARY OF THE METHOD

Teflon[®] and nylon filters undergo preliminary testing before lots are delivered. When lots are delivered, acceptance testing is performed before the filters are cleared to be uploaded and sent out into the field. Quartz testing is done by the quartz contractor before being sent to the gravimetric laboratory. All filter types have inventory sheets that are used to track usage and to estimate when a new lot must be ordered.

3. CAUTIONS

Be sure to track filter inventory carefully and to order filter shipments well in advance to accommodate any delays in the delivery process.

Be very careful when performing acceptance testing and interpreting results. The quality of the filters is important to sampling and analysis.

4. EQUIPMENT AND SUPPLIES

See individual sections for detailed equipment lists for the tasks involved in filter acceptance and inventory.

5. PERSONNEL QUALIFICATIONS

Laboratory technicians or principal investigators can carry out filter acceptance and inventory procedures. Lab technicians must be trained by a PI or another lab technician familiar with the procedures before performing these tasks.

6. PROCEDURES

6.1 Teflon[®] Filters

6.1.1 Receiving a Teflon[®] Filter Lot

Teflon[®] filters are sent directly from Pall Corporation to Crocker Nuclear Laboratory (CNL). Shipments of Teflon[®] filters are sent with an invoice and a packing slip. Shipments can range from two boxes of filters to as many as 1100 boxes (enough for a year); each box contains 50 Teflon[®] filters. Test lot shipments will usually contain two boxes, while approved lot shipments will usually contain the full number of boxes used for the year (~1100). Sometimes lot shipments are split and sent within a day or two of each other. When filters are received,

count the number of boxes present in order to verify the packing slip. Sign and date the packing slip and give it to the CNL employee in charge of accounting. Keep the invoice and file it away in the laboratory.

The received Teflon® filter boxes are placed in a large container (ex., Bankers box) and stored in the bookcase by the front door of the lab and upstairs in the chemistry lab (CNL Room 201).

6.1.2 Teflon® Filter Inventory

The Teflon® filter inventory files are located in V:\AQG_Ops\IMPROVE\Lab_Information\Filters. There is a separate folder for each year. Within each yearly folder are separate Excel files for nylon, quartz, and Teflon® filters.

Each Excel file contains numerous spreadsheets for logging in sets of boxes of filters. These sheets are created when a shipment of filters arrives and are completed as filters are used. A printed copy of each log sheet is supplied to the lab staff so they can add entries as the filters are used.

There is also a "RATE LOG" sheet that keeps track of filter usage and provides an estimated depletion date for the filters on hand. The Teflon® files also include "LABELS" sheets that are used to create and print labels to be affixed to each box of filters.

Teflon® filters come in large shipments, typically around a year's supply. A new set of log sheets and a set of labels to affix to each box of filters need to be created for each new shipment.

Open the most recent Excel file for the Teflon® filters and rename it with the date of receipt of the shipment. Some cutting and pasting is needed to create the new file, and enough sheets must be created within the file to accommodate the size of the new shipment.

- 1) Highlight all sheets of interest (sheets beginning with "SHEET") holding "SHIFT" and selecting the first and then last sheet. Viewing any of the selected sheets, select all fields from (J8) to (K32) and press "Delete." This same change should be reflected on all sheets, deleting any pre-filled "INITIALS" and "DATE" entries.
- 2) Note the Part Number on a box of filters, following "P/N." The filter diameter, 25 mm, should not change.
- 3) Note the Lot Number on a box of filters, following "Membrane B#" and the number-letter combination written vertically on the right. Example: B2382156-12 (74736D). The lot number is typically the same for every box in the shipment.
- 4) Note the day these filters were received.
- 5) Again, with all "SHEET" sheets selected, type the Part Number into field B8, the Lot Number in field E8, and the Date Received in I8. This same change should fill the entire columns and be reflected on all sheets.
- 6) Confirm on the box that the "REMOVAL" is 3.0µm and the "Size" is 25mm.

The "Box #" is determined by the set of labels created for each shipment. One label is affixed to each box. The numbers on the labels become IMPROVE's internal pack (or box) numbers. Detailed instructions on creating labels are further below. List the box numbers consecutively in the "Box #" column of the spreadsheet, 25 to a page. The next column to the

left, "Quantity," lists the number of filters in a box. This number is typically 50 for Teflon® filters. However, some filters are removed from a few boxes for acceptance testing or other tests, so modify the numbers in those cells to reflect the actual number of filters in each box. Note this by inserting a comment (right-click, "Insert Comment") for that field. The Teflon® spreadsheet has a "SHIPMENT" column, which is usually "1" unless the order is split and delivered in separate shipments.

A set of labels to be affixed to each box of filters must be created. Go to the "LABELS" sheet to do this. There may be multiple "LABELS" sheets to accommodate the size of the shipment, especially for Teflon® filters. In most cases, only cell B2 (lot number) needs to be modified. Modify B3 and E3 as well if it is not shipment #1. All of the other cells in the sheet are linked to these upper-left cells and will populate themselves automatically. Print the label sheets onto label stock and affix a label to each box of filters.

A few filters selected from each new lot will need to undergo acceptance testing. Work with the laboratory manager to select these filters and to arrange for laboratory analysis.

The Teflon® Excel file contains a "RATE LOG" sheet. This sheet keeps track of the filter usage versus the inventory available and, based on the average rate of usage, predicts when the current lot will run out. Edit the "RATE LOG" sheet as needed to contain the same number of rows as the number of spreadsheets in the shipment. Note that columns C ("PACKAGES") through G ("COMPLETED") are populated by links to the individual spreadsheets. When a new "RATE LOG" sheet is created, review it carefully to make sure the links are pointing to the proper sheets based on "SHIPMENT" and "SET" listed in columns A and B. Referring to the summary formulas at the bottom of the spreadsheet, the "TOTAL" summation should include all the rows of the table, as it shows the total beginning inventory. The "FIL USED" and "AVG" formulas include only the rows associated with the filters used to date, as will be explained further below. Ignore columns to the right of column H.

The laboratory staff will complete an entry on the printed log sheet each time a box of filters is used. When each sheet is completed, enter these data into the spreadsheets in the Excel files.

Enter the "INITIALS" and "DATE" into each cell on the appropriate sheet.

Proceed to the "RATE LOG" sheet. In cell H3, enter the date on which the log sheet was completed. Check the last completed row in the "RATE LOG" sheet to verify that it corresponds to the log sheet being entered (that row will have been completed by its links to the log sheet). Then go to the formulas at the bottom of the spreadsheet. In both "FIL USED" and "AVG," change the second cell within the formula parentheses to indicate the row of the log sheet being added. If a single log sheet is being added, this will involve augmenting the formula by one row (for example, changing (D6:D17) to (D6:D18)).

Now that all of the data are entered, check the depletion date shown in yellow at the bottom of column H. This date is the estimate of when the inventory will run out based on average usage.

6.1.3 Teflon® Filter Acceptance Testing

Consistency in pressure drop and composition (i.e., no contamination) are primary requirements for Teflon® filters being used in the IMPROVE network.

Pall Corporation Teflon® filters are purchased by UC Davis in boxes of 50 filters. Historically, two boxes are received for acceptance testing. Ten filters from each box are analyzed by XRF for composition, and another ten filters from each box are tested for pressure/flow changes. When certified, the entire lot is authorized for use in network operations. Acceptance testing is performed again when the filter lot is delivered before they are cleared to go out into the field. The following sections apply to the preparation and analysis of both new test lots of filters and filters that have been pre-approved. Items that apply specifically to only one or the other are noted.

6.1.3.1 Preparation for Filter Analysis

1. For Teflon® filter analysis, the following supplies are needed:
 - Forceps with ceramic tips
 - Clean sheet of white paper
 - Several randomly selected Teflon® filters
2. Take the necessary equipment, listed above, to the microscope in the mechanical shop. Make sure to wear safety goggles in the mechanical shop at all times.
3. Place the clean sheet of paper on the microscope stage. Turn on the microscope light.
4. Take one of the randomly selected filters using ceramic-tipped forceps and place it on the clean paper under the microscope stage.
5. Focus the microscope. About 1/8th of the filter should be in view. The magnification adjustment knob is on top of the microscope and the focus knobs are on either side of the microscope.
6. Examine the entire filter by moving the paper slowly up and down and then left and right across the plane of vision. Check for abnormalities and contamination. Occasionally there will be black specks, shiny specks, white fuzz, black threads, or white threads.
7. Look at several more filters to get an idea of the average contamination level. Write down any observations and forward them to the laboratory manager.

6.1.3.2 Teflon® Analysis

Twenty filters (ten from each pre-delivery box for preliminary testing) are analyzed by XRF to verify that there are no abnormal artifacts. Once the filters have been analyzed, the average net intensities (cps/mA) and standard deviations are determined for each species. The results of these filters are compared with both the results from the testing of the lot currently in use. If the measured net intensities (cps/mA) for the two lots are within the set acceptance limit, which is the average +3 standard deviations of measured net intensities, then the filters are accepted for full delivery. If, in any case, an outlier or irregularity is observed from visual inspection of the filters and/or the results of the XRF, the laboratory manager is informed.

Once the shipment of the new lot has been received, forty filters (randomly chosen from various boxes), are analyzed by XRF for final check. The results of these filters should meet the same acceptance limits set for the pre-delivery box. All results and comparisons

should then be forwarded to the laboratory manager for a final decision about acceptance or rejection of the specific lot of filters.

6.1.3.3 Special Tests for New Teflon® Test Lots

Once a test lot is shown to have no significant contamination, a test to examine flow change must be performed.

6.1.3.4 Flow Change Test

A flow change test is done to simulate the change in flow rate that should be expected when the new filter lot is installed in samplers that were calibrated using filters from the current filter lot. A change in the flow rate must be avoided as it may result in invalid data.

- 1) Supplies needed:
 - Three IMPROVE PM_{2.5} cartridges
 - Twenty-two Teflon® filters from the test lot (11 per box for preliminary testing)
 - Twelve Teflon® filters from the current lot
 - Forceps with ceramic tips
 - DryCal® device
 - Worksheet and pen
 - Arbor press
 - Tygon® tubing with DryCal® fitting on one end and temperature probe on other
 - Top plug from audit kit
 - One sampling unit, complete with one controller and one PM_{2.5} module in the AQG shop.
- 2) Carefully load a filter into each cassette in all three cartridges, being sure all parts are assembled properly.
- 3) Open up a copy of the last set's filter acceptance worksheet. It should be located in J:\User\Annex Rear\Kawamoto\Filters\Filter Acceptance\Teflon. Rename the file to indicate the current year (and set, if applicable). Delete the entries and save the file. Print out the now blank worksheet.
- 4) Bring the Tygon® tubing with fittings and probe attached, plug from an audit kit, worksheet, and cartridges to the AQG shop.
- 5) Confirm that the controller in the AQG shop delivers stable data.
- 6) Attach the Tygon® tubing to the DryCal® using the DryCal® fitting. Tighten the fitting by hand first, and then use a wrench for ¼ of a turn to make sure the fitting is tight. Use the plug from an audit kit to block the top of the T-plug in the module. Insert the temperature probe (attached to the Tygon® tubing) into the bottom of the T-plug in the module.
- 7) Put the first cartridge into the module. Plug in the controller and enter calibration mode. Go to position 1 of the module being used.
- 8) Turn the DryCal® on. Write down the pressure value displayed on the DryCal® onto the worksheet. Select "Measure" and then press "Enter."

- 9) Calibrate using the first position cassette of the first cartridge. Do this by selecting the "Continuous" mode on the DryCal[®] and press "Enter." The DryCal[®] will take continuous measurements and will display a running average for the measurements up until the 10th consecutive measurement. Then, the running average resets.
- 10) While the continuous measurements are being taken by the DryCal[®], turn the black knob on the valve behind the cyclone until the values on the DryCal[®] read around 23 lpm. Once it reads about 23 lpm, press "Enter" to pause. Then, select "Burst." The DryCal[®] will take 10 measurements. If the average value is within +/- 0.1 from 23 lpm, write down the value. Make sure to also record the temperature. If the average value is outside the acceptable range, repeat this step.
- 11) Run through the rest of the positions in the cartridge using the "Burst" option. Record the readings for each filter, making sure to also note the time and temperature for each reading.
- 12) After all filters have been measured, choose the filter with the median reading. This filter will be used in position 1 of cartridge 1 when testing the new lot filters.
- 13) Unload the current lot filters. Place the median filter into position 1 of the first cartridge, and then fill the rest of the positions in the three cartridges with new lot filters. Repeat step six for the new lot filters.
- 14) Unload the cassettes (except for the median filter in position 1 of cartridge 1) and reload the cassettes with another 11 new lot filters. Repeat step six again.

For preliminary testing, if the Teflon[®] filters are within the acceptable range for the flow change test, then the test lot is approved. After being approved, a purchase order for the approved lot should be submitted to Pall Corporation by the appropriate employee.

6.1.4 Switching Teflon[®] Filter Lots

The exact date on which the new Teflon[®] lot will begin to be used can be predicted using the "RATE LOG" tab described earlier in section 6.1.2. The date that the new Teflon[®] lot begins to be used should be the first sample day of the blue box. The first sample day is listed on the Week 1 log sheet of any given bin. The lot must also change at the beginning of a new cycle (2-3-2 or 3-2-2). The 2-3-2 cycle is preferable, but the lot may change at the start of the 3-2-2 cycle if necessary. Since 2-3-2 and 3-2-2 boxes are installed on different days, the date they change Teflon[®] lots will also be different. When planning for the transition, keep in mind that it is ideal to have between 5-10 Teflon[®] filter boxes from the old lot remaining at the end of a transition, so that there are enough for testing but not too many that go unused.

Once the date for the lot change is chosen, the lab can begin preparation. The new Teflon[®] lot needs to be swapped with the old Teflon[®] lot in the weight lab when the correct bins are ready for upload with the new lot. Also, remove the problem filters (specks, holes) from the lab that are from the old lot. Make new empty boxes for the problem filters. Update the Teflon[®] lot number in the PRE program. Once the new lot is all that remains in the weight lab, the new cycle of bins can be uploaded.

6.1.5 Reimbursement for Rejected Filters

Filters that should be rejected by the lab include those with visible holes, specks, or threads. Student lab assistants examine the filters at the PRE station and determine whether they are rejects or not. Rejects are placed into labeled boxes; once the boxes become full, they are counted by the students. When the transition between lots occurs, all the reject filters from the old lot need to be counted. Record the total number of rejected filters for a given year in the Excel spreadsheet found at V:\AQG\Ops\IMPROVE\Lab_Information\Filters\YYYY\YYYY_MM_DD_TEFLON FIL LOG.xls, under the "RATE LOG" tab. Report the final tally of reject filters to a principal investigator, who will work with Pall Corporation to obtain financial reimbursement.

6.2 Nylon Filters

6.2.1 Receiving a Nylon Filter Lot

Nylon filters are sent directly from Pall Corporation to Crocker Nuclear Laboratory. Shipments of nylon filters are sent with an invoice and a packing slip. Shipments can range from two boxes of filters to as many as 300 boxes; each box contains 100 nylon filters. Test lot shipments will usually contain around two boxes, while approved lot shipments will usually contain the full number of boxes used for the year (~ 300). Sometimes lot shipments are split and sent within a day or two of each other. When filters are received, count the number of boxes present in the order to verify the packing slip. Sign and date the packing slip and give it to the CNL employee in charge of accounting. Keep the invoice and file it away in the gravimetric laboratory.

After nylon boxes are stickered, they are sorted into re-closable bags in groups of four boxes. Use a Sharpie to number the bags, starting at 1. Make sure boxes are sorted in such a way that their box numbers remain sequential. Nylon filters are then stored in the refrigerator in the chemistry lab on the mezzanine floor (CNL Room 201).

6.2.2 Nylon Filter Inventory

The nylon inventory files are located at V:\AQG_Ops\IMPROVE\Lab_Information\Filters. There is a separate folder for each year. Within each yearly folder are separate Excel files for nylon, quartz, and Teflon® filters.

Each Excel file contains numerous spreadsheets for logging in sets of boxes of filters. These sheets are created when a shipment of filters arrives and are completed as filters are used. A printed copy of each log sheet is supplied to the lab staff so they can add entries as filters are used.

There is also a "RATE LOG" sheet that keeps track of filter usage and provides an estimated depletion date for the filters on hand. The nylon files also include "LABELS" sheets that are used to create and print labels to be affixed to each box of filters.

Nylon filters come in large shipments, typically around a year's supply. A new set of log sheets and a new set of labels to affix to each box of filters are created for each shipment.

Open the most recent Excel file for nylons and rename it with the date of receipt of the shipment. Some cutting and pasting is required to create the new file, and enough sheets must be created within the file to accommodate the size of the new shipment.

Working from right to left in each sheet, delete the entries in the "DATE" and "INITIALS" columns, as these are completed as the filters are used. Enter the date of receipt of the shipment in the "INPUT" tab and it should update all the log and label sheets.

For the "Box #" column, list pack numbers consecutively starting at "1." There will be 20 pack numbers per page for nylon filters. Boxes are assigned pack numbers after labels are generated and affixed to each box, as described below. If a lot is split into two shipments, the pack number resets and the first box of shipment 2 is "1."

The next column to the left, "Quantity," lists the number of filters in a box. This number is typically 100 for nylons. However, several filters are removed from a few boxes for acceptance testing or other tests, so modify the numbers in the appropriate cells as necessary to reflect the actual number of filters in that box.

The spreadsheet has a "SHIPMENT" column, which is usually "1" unless the order is split and delivered in separate shipments. Find the lot number on a sticker on the filter boxes and enter it into the "Lot #" cell in the "INPUT" tab and all sheets should be updated. The entries in the "REMOVAL," "SIZE," and "PART #" column do not typically change and can usually be left untouched; however, if the "PART #" changes, enter the new number into the "PART #" cell in the "INPUT" tab.

A set of labels to be affixed to each box of filters is created for each shipment. Go to the "LABELS" sheet to do this. There may be multiple "LABELS" sheets to accommodate the size of the shipment. In most cases, the label sheets will already be updated with the date received and the new lot number. B3 and E3 may need to be modified if it is not shipment #1. All of the other cells in the sheet are linked to these upper-left cells and populate themselves automatically. Print the label sheets onto label stock and affix a label to each box of filters.

A few selected filters from each new lot of nylon filters will need to undergo acceptance testing. Work with the laboratory manager to select these filters and to arrange for laboratory analysis.

Each Excel file contains a "RATE LOG" sheet. This sheet keeps track of the filter usage versus the inventory available and, based on the average rate of usage, predicts when the current lot will run out. Edit the "RATE LOG" sheet, as needed, to contain the same number of rows as the number of spreadsheets in the shipment. For multiple shipments within a spreadsheet, set the appropriate number of rows for each shipment as it comes in. Note that columns C ("PACKAGES") through G ("COMPLETED") are populated by links to individual spreadsheets. When a new "RATE LOG" sheet is created, review it carefully to make sure the links are pointing to the proper sheets based on the "SHIPMENT" and "SET" listed in columns A and B. Referring to the summary formulas at the bottom of the spreadsheet, the "TOTAL" summation should include all the rows of the table, as it shows the total beginning inventory. The "FIL USED" and "AVG" formulas include only the rows associated with the filters used to date, as will be explained further below. Ignore columns to the right of column H.

The weight lab staff will complete an entry on the printed log sheet each time a box of filters is checked out for use. When each sheet is complete, enter these data into the spreadsheets in the Excel files.

Enter the "INITIALS" and "DATE" into each cell on the appropriate sheet.

Proceed to the "RATE LOG" sheet. In cell H3, enter the date on which the log sheet was completed. Check the last completed row in the "RATE LOG" sheet to verify that it corresponds to the log sheet being entered (that row should have been completed by its links to the log sheet).

Then go to the formulas at the bottom of the spreadsheet. In both "FIL USED" and "AVG," change the second cell within the formula parentheses to indicate the row of the log sheet that is being added. If just one log sheet is added, this will involve augmenting the formula by one row (for example, changing (D6:D17) to (D6:D18)).

Now that all of the data are entered, check the depletion date shown in yellow at the bottom of column H. This date is the estimate of when the inventory will run out based on average usage.

6.2.3 Nylon Filter Preliminary/Acceptance Testing

Consistency in pressure drop and composition are the primary requirements for nylon filters being used in the IMPROVE network.

Precut nylon filters from Pall Corporation are purchased by UC Davis in boxes of 100 filters. Approximately two boxes are sent for preliminary testing. Ten filters from each box (or a total of twenty filters) are tested for pressure/flow changes, and around five from each box (or totaling ten filters) are sent to the ion contractors for analysis to verify that there are no abnormal artifacts. When certified, the entire lot is authorized for purchase. Acceptance testing is performed again when the filter lot is delivered before they are cleared to go out into the field. The following sections apply to the preparation and analysis of both new test lots of filters and filters that have been pre-approved. Items that apply specifically to only one or the other are noted.

6.2.3.1 Nylon Analysis

Ten nylon filters from each nylon shipment (including test lot filters for preliminary testing) are sent for analysis by the ion contractor to verify that there are no abnormal artifacts.

- 1) Randomly select ten or more filters apart from the ones used for the pressure tests described below.
- 2) Place each selected filter in a petri dish and label the dishes "TEST0"-"TEST9."
- 3) Package the filters in a petri dish box and ship them overnight to the ion contractor.
- 4) Receive the data and determine the average concentrations and standard deviations for each species.
- 5) Compare the results for the lot being tested with the results from the testing of the lot currently in use. There are ten lab blanks sent each month for comparison.
- 6) Compare the results for the lot being tested with the results from current field blank analysis (if that information is available).
- 7) Forward the results and comparisons to the laboratory manager. If the measured concentrations for the two lots are within 5%, the tested blanks are lower than the

analyzed lab blanks, and the standard deviation is low, then the filters are accepted for use.

- 8) Set aside one or two boxes from the new lot (after final acceptance testing) for archiving and for maintenance technicians' future audits.

6.2.3.2 Flow Change Test

The flow change test for nylon filters is essentially the same as the flow change test for Teflon® filters, which is described in section E.1.3.5. The only difference is that the audit cartridge is a B cartridge.

Calculate the average flow rate for the lot being tested. If flow rate shows great variability within the same lot and it is not due to a "leaky" cassette, the filter counts may be increased to see if the trend continues.

The information collected from this test must be sent to the laboratory manager.

If the test lot passes the flow change test and all the prior tests, then it is approved and a purchase order can be placed for next year. If the new lot passes the flow change test and all prior tests, it is cleared for use in field operations.

6.2.4 Switching Nylon Lots

The monitoring of remaining filters from a given lot and the transition between filters is very similar to the procedures for the Teflon® filters. Differences and distinctions are outlined below.

6.2.4.1 Monitoring the Depletion of Nylon Filters

Nylon filters do not have the same manufacturing problems as Teflon® filters; therefore, there is no need to keep track of the percentage of rejects. Check the "RATE LOG" about once a month (more often when approaching the lot change date) to see what the estimated end date is for the current lot. The "RATE LOG" can be found in V:\AQG_Ops\IMPROVE\Lab_Information\Filters\YYYY\YYYY_MM_DD_NYLON FIL Log.xls.

6.2.4.2 Transitioning Between Lots

The procedure for the transition between nylon lots is the same as the transition between Teflon® lots, as described in section 6.1.4.

6.3 Quartz Filters

Quartz filters are sent from Pall Corporation to the carbon contractor, where they are pre-fired and labeled. Quartz shipments are much smaller than nylon and Teflon® shipments, typically around a month's supply of filters. Any paperwork should be signed and dated and filed away in the laboratory. The packet(s) of filters should be stored in the freezer in the chemistry lab on the mezzanine floor (CNL Room 201).

6.3.1 Quartz Filter Inventory

The quartz filter inventory files are located at V:\AQG_Ops\IMPROVE\Lab_Information\Filters. There is a separate folder for each year. Within each yearly folder are separate Excel files for nylon, quartz, and Teflon®. Quartz Excel files contain spreadsheets for logging in sets of boxes of filters as well as a "RATE LOG" sheet that keeps track of filter usage.

Because of smaller shipment sizes, a single Excel file can accommodate multiple quartz shipments, with the "SHIP" number designated in each spreadsheet tab. The carbon contractor ships the boxes in vacuum-sealed packets, with around a half-dozen boxes in each packet. It is most convenient to list one or two packets on a sheet, so the number of records in each sheet will vary depending on how the carbon contractor filled the packets. If fewer than the maximum 12 rows in a sheet are used, delete the formulas in column N for the unused rows, as they will not calculate correctly if left in.

Open the most recent Excel file for quartz and rename it with the date of receipt of this shipment. Again working from right to left in each sheet, delete the entries in the "DATE" and "INITIALS" columns, as these are completed as the filters are used. Enter the date of the receipt of the shipment in the "RECEIVED" column. Information for the next six columns ("QUANTITY" through "PRE-FIRED") is provided on a data sheet that the carbon contractor ships with the filters. Enter this information into the spreadsheets. The entries in the "SIZE" and "FIL TYPE" columns typically do not change, so they can be left untouched.

Each Excel file contains a "RATE LOG" sheet. This sheet keeps track of the filter usage versus the inventory available and based on the average rate of usage, predicts when the current shipment will run out. Edit the "RATE LOG" sheet, as needed, to contain the same number of rows as the number of spreadsheets (common for quartz), set the appropriate number of rows for each shipment as it comes in. Note that columns C ("PACKAGES") through G ("COMPLETED") are populated by links to individual spreadsheets. When a new "RATE LOG" sheet is created, review it carefully to make sure the links are pointing to the proper sheets based on the "SHIPMENT" and "SET" listed in columns A and B. Referring to the summary formulas at the bottom of the spreadsheet, the "TOTAL" summation should include all the rows of the table, as it shows the total beginning inventory. The "FIL USED" and "AVG" formulas include only the rows associated with the filters used to date, as will be explained further below. Ignore columns to the right of column H.

The weight lab staff will complete an entry on the printed log sheet each time a box of filters is checked out for use. When each sheet is complete, enter these data into the spreadsheets in the Excel files.

Enter the "INITIALS" and "DATE" into each cell on the appropriate sheet.

Proceed to the "RATE LOG" sheet. In cell H3, enter the date on which the log sheet was completed. Check the last completed row in the "RATE LOG" sheet to verify that it corresponds to the log sheet being entered (that row should have been completed by its links to the log sheet).

Then go to the formulas at the bottom of the spreadsheet. In both "FIL USED" and "AVG," change the second cell within the formula parentheses to indicate the row of the log sheet that is being added. If just one log sheet is added, this will involve augmenting the formula by one row (for example, changing (D6:D17) to (D6:D18)).

Now that all of the data are entered, check the depletion date shown in yellow at the bottom of column H. This date is the estimate of when the inventory will run out based on average usage.

6.3.2 Switching Quartz Lots

Each box of quartz filters has a different lot number written on the top of the box. Student lab assistants are responsible for changing the lot number in the Pre-weigh balance application when they open a new box of quartz filters. Students must use sequential box numbers. Sometimes the carbon contractor will skip several box numbers in their numbering scheme. To verify that this has occurred, check the filing cabinet for past inventory sheets. In this case, the student lab assistant must use the lot number closest to the one that just ran out.

TI 251D Incoming and Outgoing Blue Boxes

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1. PURPOSE AND APPLICABILITY

This SOP describes the proper procedures for opening IMPROVE blue boxes and transferring the contents to bins, as well as for shipping blue boxes back out into the field. The purpose of this SOP is to establish uniform guidelines for how to perform these tasks.

2. SUMMARY OF THE METHOD

IMPROVE blue boxes are not permitted in the sample handling laboratory to reduce the chance of contamination. Thus, contents of these boxes must be removed and placed into matching site bins in the shipping/receiving area for the sample handling lab before getting transferred to the lab. Bins are brought back into the shipping/receiving area after new filters have been uploaded. The contents are put back into the blue boxes and shipped out into the field.

3. CAUTIONS

Some site codes are very similar. Because of this, it is very important to make sure that filters are placed into the correct bins and that clean filters are shipped out in the proper box.

4. EQUIPMENT AND SUPPLIES

Opening Boxes

- Blue boxes containing sampled filters
- Bins labeled with site names
- Colored pens (other than red)
- Box Cutter

Shipping Boxes

- Blue boxes (empty)
- Bins with loaded clean filters
- Box stickers with site and installation dates
- Large blank stickers for box sides
- Black Sharpie
- Shipping tape

5. PROCEDURES

5.1. Proper Way to Open a Box

5.1.1 Removing Labels/Tape

When boxes arrive at Jungerman Hall, they are stacked on the floor in the main bay, right outside of the IMPROVE shop. Bring the boxes into the shipping/receiving area for the sample handling lab and place them on the counter to the right of the door. IMPROVE bins for all sites are on the shelf above the counter.

When opening a box, please tear off the UPS label found on top of the box. If it is a USPS box, remove the mail card at the front of the box and flip it so that the outgoing address

shows, and then place it back into the plastic holder. Then, please remove any tape that the operator may have put on the box to secure it for shipping. A box cutter may be used to cut the tape, but do not damage the box in the process. After cutting it, remove as much of the tape as possible. Finally, also remove the box label located on top of the box in the far left corner. It should have the site name and three installation dates.

5.1.2. Locating the Flashcard

Every box should contain one flashcard, which is labeled with a seven-digit number on one side and the site code on the other. Typically, the flashcard is found in the Week 3 bag because the operator removes the flashcard at the end of the week. However, if a flashcard is not there, please thoroughly check the other two bags as well as inside the box itself. Sometimes it is best to empty the contents of each week to find a flashcard, as it can get stuck in the log sheet or hidden under cartridges. If a flashcard is not found in the box, make a note on the Week 1 log sheet indicating that no flashcard was returned.

Sometimes a flashcard will have a label that reads "IMPROVE Replacement" instead of a site name. In this case, it is important to label the flashcard with a Post-it identifying which box it was taken out of.

After pulling out the flashcard, please remove the log sheets from each week bag. Check the flashcard number on the card and make sure that it matches the number printed on the log sheets in the upper right hand corner. After confirming this, please place the flashcards to the side. If a number doesn't match, write the number of the flashcard that was returned on the first week log sheet.

5.1.3. Reading the Log Sheets

There are several things to check on the log sheets in order to determine whether a box is considered "normal" or a "problem."

- 1) ET: ET stands for "elapsed time," which indicates how long a filter was sampled. This value is found on the far right side of the log sheet. Since filters should run for 24 hours (from midnight to midnight), the ET should be 1440 for all filters that are NOT in the 3rd position. If a number reads below this, please circle it with a pen that is not red.
- 2) Filters in the 3rd position (excluding field blanks) can vary in ETs because this position is the movable position. When an operator gets to the site on the sample change day, the movable position is actively being sampled. The operator stops the samples, records the ET for previous filters as well as for the movable position up to that point, and then moves the cassette to the next week's cartridge. Then, when the operator returns the following week, he records the total ET for the movable cassette. Because of the sample change that occurs during the run day, the ET is typically less than 1440. The movable position will have two ET values instead of one. The first value is the time elapsed prior to the Tuesday sample change, denoted by () around the value. The second value is the final/total elapsed time and can be up to thirty minutes short of 1440. Anything above 1410 is acceptable. If the ET for the movable position is less than 1410 for the final value, circle it.

NOTE: Sometimes an operator will do the sample change a day earlier or later, when the movable cassette is not running. When this happens, the ET value on one of the log sheets will be 1440 and the other ET value will be 0000. Do not flag this as a problem, as the filter has run a full 24 hours. Ask a lab tech for any necessary clarification.

- 3) MxORI: Max orifice values are found on the left side of the log sheet, next to the date and day for each week. There are four max orifice values, one for each type of module (A, B, C, & D). These values will read 40 for most sites. However, some sites run at slightly lower values due to elevation. Check with a lab tech if the max orifice reads below 36 so that the lab tech can confirm whether or not the site is at a high elevation. If it not a high elevation site, please circle it. If the max orifice reads below 30 for any module at any site, please circle it.
- 4) ORI: Orifice values are found next to the max orifice. There are 6 (or 4, depending on the week) ORI values per module per log sheet, 3 (or 2) under initial readings and 3 (or 2) under final readings. These values will vary from site to site, so what is important is to note whether or not the values follow a typical pattern. The "A" module ORI values are going to be the lowest (usually 11-12). "B" module ORI values will be slightly higher than "A," and "C" module ORI values will be slightly higher than "B" values. "D" module ORI values should always be 11. If one of the "D" ORI values is 10, do not flag it. If there is more than one 10 value, circle them with a colored pen. Also, ORI values should be consistent ACROSS weeks. Please make sure that all ORI values are within ± 1 of each other for each module type.
- 5) CYC: Cyclone values are found next to ORI values. There are six (or four) per module per log sheet; 3 (or 2) for initial readings and 3 (or 2) for final readings. The CYC is going to vary for each site. The important things to look for are outliers. The A, B, and C modules should all be roughly the same, within ± 2 of the median value, for all three weeks. The D module should always have a CYC value of 5, ± 1 . If any values are different from the parameters listed above, circle them with a colored pen.
- 6) Comments: At the bottom of the log sheet, there is a section for operators to write comments. The comments will vary in terms of importance. If a comment is about the weather or a forest fire nearby, please disregard. If the comment is about a mechanical problem or a strange occurrence at the site, please circle it with a colored pen. Ask a lab tech if help is needed to determine whether or not a certain comment denotes a problem.

When all of the values have been checked, please initial the area of the "Check" sticker (located on the back of the Week 3 log sheet) that says "Opened by."

5.1.4. Transferring the Bags

When log sheet examinations are complete, please remove all three bags (or 6, if it has an X-module) and place them in the corresponding bin. Be very careful to put the bags into the correct bin. Site bins are labeled with their name and are also color-coded. Yellow bins are for the dot (2-3-2) boxes, and blue bins are for the non-dot (3-2-2) boxes. After placing the bags in the bin, please place the empty box on one of the shelves. If it is a replacement box, please place it on the highest shelf so that it is not accidentally re-used.

If there is no labeled bin for a site, use one of the extra bins located underneath the counter. Be sure to use a bin of the appropriate color.

5.1.5. Flagging a Problem

If none of the log sheets for a box have any problems circled, please put them in a pile. Stack all “normal” log sheets together. When finished opening boxes, give the pile of log sheets to a lab tech along with the flashcards.

If a log sheet had a problem, please stack all three log sheets for that site and place them in a separate pile. These log sheets will be reviewed before the “normal” log sheets to ensure a quick response to any problems that may be causing sample losses at a site. Note that, if the site has an X-module, both the main box log sheets and the X-box log sheets need to be kept together and put in the same pile, even if only one of them has a problem log sheet.

If any questions arise while opening boxes or something is unclear, please ask a lab tech.

5.1.6. Delivering Bins to the Sample Handling Lab

Loaded bins are placed onto a cart located directly outside of the IMPROVE shop. Once all boxes have been opened, take the cart into the sample handling lab and transfer the bins onto the large silver rack on the left wall. Then return the cart to the area outside of the shop.

5.2. Proper Way to Ship a Box

5.2.1. Transferring Bins to the Shipping/Receiving Area

Once bins have been loaded with clean filters and have gone through the final check station, load the bins onto the cart and bring them back to the cart area, which is located outside of the shop on the right-hand wall. It is easiest to take bins into the shipping/receiving area 1-2 at a time due to the limited space. Bring a bin or two into the lab’s shipping area, which is on the right through the shop doors, and place the bins on the counter. Locate the matching blue boxes that are on the shelf.

5.2.2. Packing the Box

Transfer the bin contents into the blue boxes. If there are any letters for the operator, place them on top of the week bags before closing the box.

After closing the box, secure it with a piece of shipping tape. Place the tape on the right-hand side of the box flap. Only one strip is necessary. Then, locate the box stickers in the mesh desk trays. They are separated into two piles—one for dot stickers and one for non-dot stickers. Each pile is alphabetized by site. Locate the site sticker with the appropriate installation dates and place it on the upper left hand corner on top of the box. If a site is out of stickers or is missing the correct label, notify a lab tech for further direction.

If the site is a UPS site, take the UPS label from the bin and place it on top of the box. If the box is a USPS box, make sure that the mail card shows the outgoing address before sealing the pouch on the front flap.

For most boxes, this is all that is necessary. There are two exceptions:

- International Shipping: IMPROVE has four international sites: BYIS1, BALA1, EGBE1, and VIIS1. These sites will have a pouch with forms in it and two UPS labels instead of one in their bins. Place the pouch on top of the box. Then, flip the box over and place the UPS stickers on the bottom of the box.
- Replacement boxes: If there is no labeled blue box for a site, use one of the replacement boxes located on the top shelves of the bookcases. These boxes must be labeled, so find yellow or green blank stickers (depending on the site cycle) located in one of the desk trays and write the site name on three of them with a black Sharpie. Place the stickers on the sides and back of the box.

5.2.3. Blue Box Check Out

After boxes have been prepared for shipping, they need to undergo a check out process to ensure that all uploaded boxes have been shipped.

- 1) Open the "Box In Box Out" application located on the desktop of the thin client in the shipping/receiving area.
- 2) Enter user initials. Press "Enter" or click on the "Launch the App" button. The application will take a minute or two to run a macro.
- 3) Note the site code and first install date (which is the first date listed on the box top label) of the first blue box that is ready to be checked out for shipping.
- 4) The application will open a window that will ask for an install date and site code. In the "Choose Install Date" section, either type the first install date (in MM/DD/YYYY format) or choose it from the calendar.
- 5) Then, type in the site name or choose it from the drop-down menu.
- 6) To add the box to the checked-out list, press "Enter" or click "Add to List." The box will be added to a list on the right side of the window.
- 7) Repeat this process for all remaining boxes ready to be shipped out. As boxes are entered, a running box count is taken at the bottom of the site list.
- 8) To delete an entry, click on the site name in the entry list and then press "Delete from List."
- 9) When all boxes needing to be shipped have been added to the list, press "Yes, I've shipped these boxes." A small window will appear with a summary including the initials of the user who processed the boxes and the number of boxes that were shipped out. Press "Enter" or click on "OK" to close the program.
- 10) If anything unusual occurs during shipping, either notify a lab technician directly or click on the "Notify Us" box. A window will appear. Write down the unusual event or any bugs with the program. Then press "Contact Us." The note will be sent to an Excel file for a lab technician's review.
- 11) NOTE: A warning will appear if the date selected is not the first install date of the box, and the entry will not be added to the list.
- 12) **Duplicate Boxes and Install Date Check.** The default settings for the application will not allow two boxes with the same site code to be entered during the same session. The program will also not allow any invalid install dates that are not found in LOGS. If for some reason two boxes with the same site code need to be shipped or if a special study has a box with an unusual install date, disable the program from preventing duplicated

sites by checking the **Disable Duplicated Sites Checkbox** or disable the install date check by checking the **Disable Install Date Check** box. The program will display a warning prompting the user to check with the lab before continuing. Then, click on the "Password" field and type "IMPROV3." Check one or both of the boxes again if the program unchecks them and then press "Enter." The program will display a confirmation that the password has been authenticated.

- 13) The application has an expandable menu for staff use that provides more information on which boxes have been sent and which boxes still need to be sent out. Lab technicians should click on the "For Staff Use Only" checkbox. A warning will appear with a reminder that it is only to be used by staff members. Enter the password (IMPROV3) and press "Enter." A "+" sign will show up on the right hand side of the window. Click on it. An extended menu will appear with several sorting options and two empty list boxes. The three sorting options for the first list box are "Specific Site," "Install Date," and "Sent Out Date." Clicking on the "Specific Site" and choosing a specific site will show all the boxes for the open quarter that have been shipped out for that site, along with the install date and sent out date for each. Clicking on "Install Date" and choosing a date will show how many and which boxes were shipped that have that install date and the day on which they were sent out. Selecting "Sent Out Date" and choosing a date will show you all of the boxes that were sent out on that day. The second list box will ask for an install date. Enter the install date and press "Refresh." The box will then show a list of all site boxes that have been uploaded for that install date but have not yet been shipped out. To exit the program from this menu, the lab technicians have the option of choosing "Close the Application," which will prevent the application from submitting any shipping information that may have previously been entered in the session.

Once the boxes have been checked out, place the UPS boxes in front of the main bay door, behind the yellow line. Take the USPS boxes into the lobby and put them under the counter by the receptionist.

TI 251E Entering Log Sheets and Simple Problem Diagnosis

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to download flashcard information, diagnose simple sampling problems, and enter log sheet data. These procedures are applicable to all routine IMPROVE sites.

2. SUMMARY OF METHOD

Flashcard information is downloaded (if available) and log sheets are examined for potential issues. Any significant problems are directed towards the field maintenance team. Log sheet data are then entered into an application called Logsin, which writes the information to a .dbf file.

3. CAUTIONS

If a main box has an X-box also, make sure to enter X-box log sheets immediately after entering the main box log sheets.

Examine log sheet values and flow data carefully. Missing a substantial problem could lead to losing a site for the year. If unsure about whether or not something is a problem, err on the side of caution and contact the field maintenance supervisor.

Report equipment problems to the field maintenance team immediately. Not doing so could result in further sample loss.

Pay careful attention to the name of the site when entering log sheets. Some site names are very similar, and the correct site name must be typed in when entering the log sheets. Typing in the wrong site name could result in significant confusion later in the process.

4. PERSONNEL QUALIFICATIONS

Only trained laboratory technicians and members of the field maintenance team can perform the operations described in this SOP.

5. EQUIPMENT AND SUPPLIES

- Flashcard reader
- Laptop (for reading flashcards)
- Computer with network access

6. PROCEDURE

6.1 Reading Flashcards

To read flashcards, use the designated laptop in the sample handling lab. Plug in the flashcard reader if it is not already prepared. Sign in to the laptop using the appropriate Kerberos login information.

Insert a flashcard into the reader. Click on the Windows icon in the lower left-hand corner, and then choose "Computer." To prepare to download the card, open the U:\ drive and go to U:\IMPROVE\FlashTXT and choose the site file that corresponds to the flashcard.

Go back to the Windows icon and click on “Computer” again. In this window, choose either “Transcend (D:)” or “Removable disk (D:)” to view the flashcard files. Transcend® flashcards will have the former title and Kodak® flashcards will have the latter.

The number of files will vary depending on the program version running the controller at the site. There are three different program versions currently out in the field; the network is moving over towards 7.0N and should be completely transferred over by the end of 2013.

6.1.1 Version 6.02

Flashcards used in controllers running version 6.02 will have only one file, and it will be named TEMPFLSH.TXT. Rename the file using the site’s four digit UCID and the date of the first Tuesday install (or Thursday in rare cases). The format is UCIDMMDDYY. Then, either drag the file from the current window to the one with the site folder open or copy and paste the file directly. Do not cut and paste just in case something goes wrong with the file transfer. Once the file is moved, open it again in its new location to make sure it opens properly. After confirming that it does, delete the original file from the flashcard window to clear the card and prepare it for re-use.

6.1.2 Version 7.0M

There will typically be four files for sites running on 7.0M. There will be a file already labeled with UCID and the month and day of the first install date. After checking to make sure the file opens properly, add the year (YY) to the end of the file name. Note that initials taken for week 1 of the next box will be in a separate, smaller .TXT file labeled with the month and date of the first install date for the next box. Open this file and copy the rows with data (not the column headers). Open the primary .TXT file and scroll to the bottom. Paste the rows below the finals readings for week 3. Then, save this .TXT file. The smaller .TXT file can now be deleted. There should also be two log files. The log files will be named “logMMDD.TXT,” with MMDD being the month and date of first install for the current box cycle under review. Click on it to confirm that it opens properly. Then, add the year to the log file title (YY). Now, open the smaller log file, which should be named with the month and date of first install for the next box cycle. Copy the lines of data (without column headers) and paste them at the end of the primary log file. Save the file. It is now safe to delete the smaller log file. Transfer the modified data file and log file to the appropriate site folder. Note that there will be an additional folder for log files within the site folder. Check both the log and data files to make sure they open properly. Then, delete the original files from the flashcard.

6.1.3 Version 7.0N

There should be only one data file and one log file for this version. Add the year to each file (YY) and transfer them as described above. Sometimes, there will be an additional data file and log file (if the operator performs the flashcard swap at an incorrect time during the sample change); modify these following the steps described above for 7.0M.

NOTE: If a flashcard is blank, give it to IT. If nothing can be recovered, write “QD” in red pen on the right hand side of each log sheet, with an arrow going down the whole sheet. Write “CFLSH blank” at the bottom of the first log sheet.

If there is no flashcard for a box, mark all of the log sheets as “QD” as described above. The lab assistant who opened the box should have written, “No CFLSH” at the bottom of the first log sheet. If the comment is not there, add it in red pen.

If a flashcard has files on it but they will not open, give the files to IT. If the files are not recoverable, follow the steps described above.

If the flashcard is a replacement card, please open J:\User\AnnexRear\ Kawamoto/Lab Instructions/Replacement Log.xls. Click on the “Replacement Card” tab and find the entry for the replacement card. Enter the date the card was returned, save the file, and close it. Return the replacement card to the stack of cards on the file tray.

If it is a regular site card, stack it with other cleared site cards. When all cards have been read, put them in the flashcard box by the PRE station.

6.2 Ingesting the Flashcard

- 1) Go to <http://crocker.ucdavis.edu/improvedb>. Mouse over the Field Data tab and press “Upload Flow Data.”
- 2) Press “Select.” Go to U:\IMPROVE\FlashTXT. Find the correct site folder and choose the file that was most recently transferred off of the flashcard. Click “Open.”
- 3) Press “Upload.” Click “Files for Review” in the Field Data drop-down menu.
- 4) Press the “Review” tab next to the newly-uploaded file.
- 5) Click “Post” if the program allows. The button for this should be below the review tab at the top of the page. If the program does not allow this, read the error messages that appear. Typically a flashcard will not be ingested if there is corrupt data, if there has been a time or date change, or if there are multiple UCIDs in the file. Contact either the Field Operations supervisor or a lab technician who has been cleared to modify flashcard data.
- 6) If the file has been posted, the data are available for viewing through IMPROVE flow.xls.

6.3 Reviewing the Log Sheets

Log sheets are reviewed to spot issues that need to be examined more closely using flashcard data. There are several things in particular to look out for:

- 1) **Elapsed Time (ET).** A run day typically consists of 1440 minutes. The exception to this is the moveable position filter. This filter is running if the operator performs the sample change on the day designated on the log sheet. The operator must interrupt the sample to change out the cartridges and to transfer moveable position cassettes to the next week’s cartridge. Thus, the ET will typically be somewhat shorter on this day. A value of $ET \geq 1410$ is accepted; anything less than that should be reviewed for equipment swaps, power interrupts, or other problems.

NOTE: Sometimes one of the ETs for the moveable position may read 0. The ET for the moveable position is recorded twice; once before it is moved over to a new cartridge and again when that “new” cartridge is uninstalled the next week. If one ET reads zero, check the other. Typically when this occurs, the operator performed the sample change before or after the moveable position run day. In this case, the other ET listed should be 1440.

If ETs are scrambled, very high, or very low, it may be easier to confirm real ETs by examining flashcard data through IMPROVE flow.xls or through the flashcard .TXT file. ETs are usually not over 1440 unless the controller has scrambled ETs due to a lightning strike. However, a rare and special case with version 7.0N is if a sample change is missed for a moveable position day and the next sample change isn't performed until 3 weeks later on another moveable position day. In this case, the controller will log the full run time of the first sample and append the time for the later sample, thus possibly exceeding 1440 minutes.

- 2) **Sample Change Dates.** Sample changes should be performed on Tuesdays. There are only a few exceptions to this rule. If a sample change is not performed on a Tuesday, it is important to note when it was performed and if it affected any sample ETs. Each log sheet shows the sample days for its corresponding week. In order to have valid samples for the entire week, the sample change must not be performed later than 6.0 hours after the start of the sample day (with the exception of the moveable position). If any sample has an ET<1080 due to a late sample change, that sample needs to be assigned a status of NS (No service/no sample). This status can be confirmed by reviewing flashcard data. This will be discussed further in the "Simple Problems" section.

If a log sheet is blank, the filters may not have sampled. Check the install dates on the other log sheets and look for notes from the operator indicating a missed sample change. As described above, filters that do not sample due to a late sample change receive a status of NS. Confirm a missed sample change by using flashcard data.

- 3) **Max VAC/ORI Values.** There are four MxORI values on each log sheet, one for each module. The highest value is 40. Acceptable ranges are from 35-40. If one or more of these values is significantly below this, contact the field maintenance team. An exception to this is if the site is a high elevation site, which can cause MxORI values to run between 30-35. In this case, report anything that is under 30. If unsure about whether the site is high elevation or not, ask a maintenance team member.

If a MxORI value reads 10, this *usually* indicates that the pump is malfunctioning and/or is not turning on. Check the flashcard data to confirm whether the pump was running. See the below sections on flashcard data reviewing and simple problems for more information.

- 4) **ORI and CYC Values.** The ORI and CYC values listed on log sheets are a real-time snapshot of what the transducer values were when the operator was at the site for the sample change. These values are taken both when cartridges are installed and when they are uninstalled.

Check the ORI values for each module across weeks. These values should be fairly stable across the three weeks. Each type of filter medium has its own typical range of ORI values. Teflon® filters ("A" and "D" modules) are typically 11-12 (sometimes 10-13). Nylon filters are the most variable, but a typical range would be 12-14. Quartz filters are fairly stable and are likely to be around 15. The only exception to this is the double-C filter sites; these values can range from around 18-20.

CYC values should be similar for all modules except for the "D." When modules are calibrated, the "B" and "C" CYC values are adjusted to match the "A" CYC reading. The "D" mod does not have a CYC channel so it will read at zero values, which are typically between 4 and 5.

If any of the CYC readings seem significantly different from the rest, take note of it and review it more closely using flashcard data.

Something to pay particular attention to is the pattern of the "C" module ORI and CYC values. Quartz filters are the most likely to have double filters loaded instead of one, along with the possibility of one filter being loaded instead of two for double C sites. If a site should have single C's, ORI will increase and CYC will drop if double filters are loaded. If a site should have double C's and only has a single C, the ORI will drop and the CYC value will go up. If there is a significant pattern disruption among the "C" values along these lines, follow the instructions in "Simple Problems" for "C" module issues.

6.4 Reading Flashcard Files

The flashcard data file for version 6.02 contains the UCID, date, time, solenoid position, transducer values for all modules, temperature (in mV), operator initials, time interval, and EPROM version number. Readings are taken every 15 minutes, whether samplers are running or not.

Versions 7.0M and 7.0N flashcard data files look slightly different than version 6.02. Each reading for these versions shows UCID, start time of the interval, end time of the interval (interval is typically 15 minutes), GMT offset, whether the controller is sampling or not (OFF or ON), transducer values for all MODs, temperature (in mV), running ET of the sample if it is a sample day, operator initials, and version type. Readings are taken in intervals of 15 minutes.

Note that transducer values are listed in different orders depending on program type. For each module, version 6.02 displays the CYC value first (called MAG in 6.02) followed by the ORI value (or VAC in 6.02). 7.0M and 7.0N display the values in the order that the log sheet and controller do, which is ORI first and then CYC.

Versions 7.0M and 7.0N also contain a log file. 7.0M takes readings every minute on the log file, while 7.0N takes readings every 15 minutes. Log files show the UCID, controller ID, and details of time/date/GMT offset changes, sample changes, etc. The log files are used for advanced troubleshooting.

Flashcard files can be helpful in determining what may have happened to a piece of equipment and when, if an operator was late or early doing the sample change, if the date and time on the controller was changed, etc. Looking at the finals and initials values can also be helpful when trying to determine if cartridges were swapped or placed in the module upside down.

6.5 Using IMPROVE Flow

IMPROVE Flow.xls is a data connection to CNL's SQL server through Excel used to graph flashcard data in order to make it easier to spot transducer value trends and sampling issues. This application can be found in J:\User\AnnexRear\Mojica\ Contractor Files\Improve flow 3_10.xls.

To use, open the file and click "Enable Editing" if prompted. Type in the desired start and end dates; these usually encompass the three weeks of the box cycle plus a week or two previous to the box installation. Then enter the site name. The data in the cells below will update. If the site has an X-module, check the box below the calibration date cell. If it does not have one, leave the box empty. Then, press the nominal values button. The calibration date box should update to show the last calibration date for the site, and the module values (colored red, yellow, green, blue, and orange if applicable) should change.

To view a module individually, click on the corresponding tab. Note that the X-MOD tab is labeled as "E Flow." There is also a tab to view temperature data and a tab that will display transducer values for all modules in the same graph, entitled "All Flows."

Each graph shows the transducer values recorded on the flashcard in the form of a graph. The graphs provide a guide for appropriate values by placing range lines showing $\pm 5\%$ of the flow rate, which should be 23.0lpm for modules A-C and 16.9lpm for the D. Use these indicator lines to help determine transducer value shifts due to equipment replacement or problems, swapped cartridges, double/single filters loaded for the C MOD, etc. Absence of transducer values indicates that there is no flashcard data for that time period.

6.6 Logsin

If all values appear to be in range and appropriate for the site, it is time to enter the log sheets. If a shortcut is not on the thin client desktop already, go to U:\IMPROVE\ Programs\logsin.app. Click on it to open the application. Enter user initials to start the program. Type in the full site code for the log sheets being entered. The program will display week 1 of the box. User initials, start and end dates, ETs, sample dates, and some other columns are all already filled in. Sample dates are set, but the other pre-filled fields can be modified if necessary. Use the Tab key to move forward to the next field, and Shift + Tab to move back to the previous field. Enter the initials of the operator who performed finals for week 1. If the field on the log sheet is blank, look it up in the flow table of IMPROVE flow or the flashcard .TXT file. Enter in the times that initials and finals were taken. Make sure to use military (24-hour) time, as "am" and "pm" options are not available. Make sure the sample change dates are correct; the logsin.app automatically fills in the Tuesday installation date (or Thursday in rare cases). If the operator performed the sample change on an alternate date, modify the date.

The rest of the fields are entered by going down the columns, instead of going across rows. Fill in the MxORI values for all of the modules, from A through D. If two or more values in a row are the same, type in the first value to start with and then press the "+" key on the number pad. The next field will be filled in with the same value. This is the preferred method for entering repeating values, as it reduces the chance of typing errors.

Next, enter in the initial ORI values for each sample date and module, followed by the initial CYC values. Then, enter the final ORI and CYC values. For non-dot boxes (3-2-2), there will be 3 entries for week 1 initials and only 2 for finals. The final value for the third position, or moveable, will be added in the second week. Dot boxes (2-3-2) will have this set-up in weeks 2 and 3.

The next column is for ETs. It is already populated with 1440 ETs; if this is correct, go ahead and Tab through to the status column. If any of the ETs are not 1440, modify them as necessary.

Next, enter in the status code for each sample. If the samples are normal, the code to use is "NM." Other codes are described in section 6.7. Fill in the status boxes.

The next column is called "UseL." If flashcard information is available for the dates being entered, leave this column as default, which is prefilled with "F." If there is no flashcard data, change the "F"s to "T"s. More on this can be found in section 6.7.5.

The next column is temperature. Temperature is listed on the log sheet above the "Finals" values. If the site has a version 6.02 EPROM, the temperature will be displayed in millivolts (mV). There is a chart posted in the sample handling laboratory that shows the conversions from mV to °C and °F. Convert the temperature from mV to °C and type it in the first box. Press "+" to add the values to the addition cell(s).

The final column should be left as default (F) unless there are no flashcard data. In that case, change the value to "T."

If a comment needs to be entered, press F12. A box in the upper left corner will pop up. Note that a date will be at the top of the box; this is the sample date for the first position of the week. Pressing "Enter" will change the sample date. If an issue applies to only one sample, make sure to note it only in the box with the appropriate date. If an issue applies to the whole week, leave a comment for each sample date. The comments database can be found in U:\IMPROVE\LogStatusFlags\2011 Comment Database.xls.

When finished with the week, press F3 to save or F4 to quit without saving. Repeat these steps for the remaining weeks. If the site has an X-module, enter the log sheets for the X-mod immediately after the main site. Note that the operator initials, sample change dates and time will not be modifiable for X-mod boxes; they will be filled in with data from the main box.

6.7 Simple Problems

6.7.1 Power Interrupt/Power Outage

Some IMPROVE sites are in remote locations or have frequent severe weather, leading to power interrupts or outages. When the power is off, all equipment shuts down including the controller unless the controller has back-up power. However, if a site has a backup UPS, only the controller will remain functional and the sampling will halt if it is a sample day.

If there is a short ET on the log sheet and flashcard data indicate a data gap (complete absence of any data lines on the chart, several hours or days between readings in the .TXT file), then it is likely a power issue. Look for comments from the operator on the log sheets regarding loss of power at the site.

If loss of power causes a sample to have an ET of less than 1440 but more than 1080, it is considered to be a "power interrupt." There is a comment for this in the comment database that should be entered for the appropriate sample date(s) while entering the log sheet. As long as there are no other issues with the sample(s), the status(es) should remain NM.

If loss of power causes a sample ET to be less than 1080, the sample is terminal and is considered a "power outage." Copy and paste the appropriate comment found in the comments database for the appropriate day(s), and status the sample(s) as PO (for Power Outage).

6.7.2 Simple Pump Malfunctions

There are several things on the log sheets and in the flashcard data that can indicate a pump issue. MxORI is listed for each module on every log sheet. The typical acceptable range is from 35-40. Sometimes these values are lower depending on elevation. However, if any pump's MxORI is below 30, contact the field maintenance team and let them know, as they may want to replace the pump.

A dead pump will not turn on at all, and the MxORI will read 10, which is the resting value when the pump is not functioning. Initial and/or Final ORI readings for that module may also be at resting transducer values (typically 10 for ORI, 5 for CYC). Use flashcard data to determine when the pump failed and how many samples were affected. If the pump failed for less than six hours in a run day, use the appropriate comment but keep the status as NM. If the pump failed for more than six hours on a run day (valid ET<1080), the sample will receive a status of EP (Equipment Problem) and the appropriate pump failure comment should be used. Make sure for either situation to indicate in the comment which module had the failure.

Note that as long as the controller is on and functioning, the controller will think that the pump is on and provide an ET for a full run day as long as there are no other issues. To calculate the real ET, examine the flashcard and find the length in time that the pump was down, and then subtract it from the 1440 ET.

Notify the field maintenance team immediately so that they can troubleshoot the issue with the operators, especially if two or more pumps fail simultaneously. While this situation is likely merely a dead pump, other factors could be at play to cause similar symptoms and must be evaluated as soon as possible.

6.7.3 Late Sample Change

As mentioned previously, operators install filters every week on a designated day (usually Tuesday). If an operator is late performing this change, sample loss is possible. The log sheet should have the dates of sample changes written on them. Any samples that occurred between the appropriate installation date and the date the operator did the sample change will likely have an ET of zero unless it was a late sample change on a sample day. Confirm this by examining flashcard data through the .TXT file or through IMPROVE flow; the controller should have locked out after the designated day and the transducer readings for sample days after that day should read 10 and 5. The final readings should also read "0." These samples should be designated with a status of "NS." If a late sample change occurs during a sample day (not the 3rd position), the sample is only valid if the final ET is above 1080 minutes. Anything less is an "NS." If a week is missed completely (usually indicated by a blank log sheet), all of the samples for that week are "NS." Make sure to use the appropriate comment for each scenario using the comments database.

Sometimes a late sample change is due to a blue box being shipped late. In this case, missed samples are still considered an "NS," but receive the comment that indicates the late sample change was due to the blue box and not the operator.

6.7.4 C MOD Filter Issues

IMPROVE has around a dozen double-C FIL sites. This means that two C filters are loaded instead of one for each sampling position. Double-C FIL modules have higher ORI values than single C FIL modules due to the increase in resistance because of the two filters.

Sometimes a mistake occurs during the filter upload process and only one filter is loaded for a double-C cassette. When this happens, the ORI value drops to single-C levels (14-15) and the CYC value jumps by several points due to the decreased resistance. If such a change is noticed on the log sheet and in the flashcard data, confirm that a single C filter was loaded by checking the physical cassette to see how many filters were loaded. If a single C filter was loaded for a double-C site, give that sample a status of "QD" and use the appropriate comment when entering.

Note that when this occurs, a lab blank must be sent in place of the missing secondary quartz filter. Add a comment for the sample through SWAP or logsin.app after the lab blank has been prepared.

Sometimes the opposite happens and a single C cassette is loaded as a double-C (quartz filters sometimes stick together and it can be difficult to tell that two are sandwiched together). When double-C filters are loaded instead of a single C, the ORI value increases and the CYC value drops several points due to the increase in resistance. If a double-C filter is suspected, physically check the cassette to determine for sure that two filters were loaded. If so, assign the sample a status of "QD" and enter the appropriate comment in logsin.app. Discard the additional filter.

6.7.5 Flashcard Issues

Sometimes operators forget to return flashcards. The student assistant who opened the box should have already written that the flashcard is missing. Do a quick check of the week bags to be sure that there is no CFLSH. If the flashcard is indeed missing, assign a status of "QD" to all of the filters and change the "UseL" and "UseTL" flags from "F" to "T." Also add the appropriate comment from the database.

Make a call to the operator to track down the flashcard and have it sent back. When it arrives, check the data. If the data are complete, change the "UseL" and "UseTL" flags back to "F" and assign statuses as needed.

Sometimes flashcards fail during a box. If there is only partial flashcard data (not the full three weeks), follow the steps above for any samples that do not have corresponding flashcard data.

6.7.6 "D" Cartridge Upside Down

The "D" cartridge is the only cartridge that is installed with the cassettes pointing towards the bottom of the module. Because of this, operators sometimes install it the same way as the A-C cartridges, which for the "D" cartridge is incorrect. If the "D" cartridge samples in the wrong orientation, the first position ORI values (and possibly the second if it is a 2-filter cartridge) will be very high (35-40) and the CYC will be very low (around 5)

because the first (and second if applicable) will run on a dummy position. The filters also may be blown out. Any deposit on the filters will be on the incorrect side. When this occurs, the filters in that cartridge should be assigned a status of BI (for Bad Install) and the appropriate comment should be used.

Sometimes an operator will catch the mistake during filter readings. If the initial readings look abnormal (40 and 5 for the first position) but the final readings are correct, the operator may have fixed the issue. Inspect the cartridges to confirm that the filters are intact and the sample is on the correct side. Also check flashcard data to confirm good run day values. Rule out any other equipment issue (like a "sticky" solenoid) by talking to the field maintenance supervisor. If everything checks out, assign the filters a status of "NM" and note in the comments field that the D MOD ran fine, as the initial values will look incorrect.

6.7.7 Missing Screens

The "A," "C," and "D" cartridges are loaded with loose screens. While extremely rare, a cartridge may be sent out without loaded loose screens. The danger in this is that the filters will tear and the loose material may cause the valve to clog. If there are cassettes with missing loose screens but no filter tears, the ORI values should be low and the CYC values should be high due to reduced resistance. Examine the physical cartridges to confirm that a missing loose screen is the cause for the reduced resistance. Samples that do not have loose screens but are not torn are given a status of "QD" until all further analyses have been completed. If both ORI and CYC values for samples of a module are lower than normal (which would occur if flow is reduced due to a clogged valve), check the physical cartridges to see if loose screens were loaded for all samples and that all filters are intact. If there is a filter that is torn and a screen that is missing in any cassette, contact the field maintenance team immediately. Samples that are torn due to missing loose screens are given the status "XX" (which implies that the lab was at fault for the terminal issue). If a clog in the valve exists due to a torn filter, discuss the situation with the field maintenance supervisor to determine whether or not the reduced flow is low enough for subsequent samples to be given terminal statuses.

6.7.8 Bad Temperature

A temperature probe is located in the "C" module and its values are recorded on the same interval as transducer values. When temperature probes malfunction, the values typically read around "4095." If a trend like this is noticed, notify field maintenance. Also, if temperatures seem abnormally low or high for a site, talk to the field maintenance team to determine whether the temperature offset may have been set incorrectly (version 6.02 controllers) or whether some other issue is occurring.

6.7.9 Other Issues

Many other problems may occur with IMPROVE equipment; this SOP is only meant to discuss the simpler problems that may occur. If values do not look correct and the problems listed above are not applicable, please contact the field maintenance supervisor

or an experienced lab or development technician to help determine the source of the problem.

7. DATA AND RECORDS MANAGEMENT

Log sheet data are entered through the use of a FoxPro® application called Logsin. The corresponding flashcard data are uploaded to a SQL database through the use of a web application called IMPROVE Database Manager. A data connection to the SQL database through Excel is used to graph the flow data in order to help the diagnosis of log sheets. Finally, an Excel file called the Comments Database is used to store standardized comments for use in entering log sheets.

7.1 Logsin

The Logsin program is a FoxPro® application used to record data from the field log sheets for exposed filters into the LOGS database. Through this program, temperature, pump vacuum readings, orifice and cyclone values, elapsed sampling time, and filter status are recorded for each filter. This program is located in U:\IMPROVE\Programs\logsin.app.

7.2 IMPROVE DBM

IMPROVE Database Manager is a web application (located at <http://improve.crocker.ucdavis.edu>). For the purposes of this SOP, its primary function is to review flashcard data and then upload it to the SQL database. The system will alert the user to any irregularities in the data, such as multiple UCIDs, time changes, or extended power outages.

7.3 IMPROVE Flow

IMPROVE Flow is an Excel file (J:\User\AnnexRear\Mojica\ContractorFiles\Improve flow 3_10.xls) and is used by the lab and other IMPROVE personnel to graph flow data for any site in the network. Users have the ability to view each module separately with the acceptable range of values displayed on the screen, providing users with a quick and easy way to determine if flow values are too high or too low. Users may also view all modules' flow data in the same graph. Finally, temperature values are also graphed for the user's convenience.

7.4 Comment Database

The Comment Database is an Excel file located in U:\IMPROVE\Logs>StatusFlags\2011 Comment Database.xls. It contains standardized comments to use in Logsin and SWAP. The comments are grouped according to common issues/problems. Each comment also indicates what status code to use for the samples the comment applies to.

8. QUALITY ASSURANCE/QUALITY CONTROL

Because diagnosing of problems can be difficult and somewhat up to interpretation based on available data, all log sheets that have significant problems or those that required a differential diagnosis are given to the field maintenance supervisor to "double" after they have been entered. "Doubling" in this case refers to the field supervisor re-diagnosing the log sheets and making any

changes as necessary. The supervisor will also check to make sure comments and values were typed in correctly.

All simple problem and normal log sheets are “doubled” in the sample handling lab. Simple problem log sheets are “doubled” by lab technicians other than the person who entered the log sheets to confirm the problem and to check that comments and values were entered correctly. Student lab assistants may “double” normal log sheets, as entered values only need to be checked for typos.

Also, student lab assistants are trained to alert lab technicians anywhere down the line during filter processing if anything unusual occurs or is found with a sample (ex. anodizing dust present on the filter, large hole, low filter weight difference, etc.) that may affect the filter status.

TI 251F BC Download

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1. PURPOSE AND APPLICABILITY

The purpose of this standard operating procedure is to describe in detail the procedures used at the B/C download station. It is applicable to all routine filters in the IMPROVE network.

2. SUMMARY OF THE METHOD

Once all log sheets have been entered for a bin, the bin is ready for the first station of the download process. At the B/C download station, sampled nylon and quartz filters are placed into petri dishes and put away in a specific order generated by a macro. Any "problem" status filters of any filter type are removed at this station as well. 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 downloaded.

Be very 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, so it is important to use the appropriate forceps when processing these filters.

Be cautious when separating double-C filters. The filters are fragile and can tear easily. Also make sure to put the primary and secondary filters in the correct Petri dishes. A good guideline to follow is that primary quartz filters are typically much more sampled than secondary filters, but this does not allow apply.

Do not clean nylon cassette bottoms with a Kimwipe™ that has been used to clean quartz cassette bottoms. The simplest way to prevent this from happening is to discard Kimwipes™ after cleaning all quartz cassette bottoms and getting new Kimwipes™ for the next bin.

4. EQUIPMENT AND SUPPLIES

- Forceps for nylon filters
- Forceps for quartz filters
- Computer with "Download" macro
- Five empty Petri trays (one for nylons, one for quartz, one for problem filters, one for FB problem filters, and one for inactive C's)
- Brush for quartz
- Ethanol in appropriate container
- Kimwipes™
- Container for loose C screens
- Arbor press
- Clean Petri dishes
- Status adjustment sheets

5. PROCEDURE

5.1 Petri Dish and Tray Setup

On the counter to the right of the B/C download station are trays full of Petri dishes with already downloaded B and C filters. The tops 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 given in the download list. Within each site, the oldest dates go in first. Problem filters should be placed in a separate tray labeled "Problems" with the oldest date first as well. If problem filters share a date, place them in the order of their cartridge letters, with A (first) to D (last). Field blank problems and inactive quartz field blanks also have their own trays.

All trays are labeled with the name of the type of filter that belongs in them. Trays labeled "Ions" are for the nylon filters, and the trays labeled "Carbon" are for the C filters. Problem trays are labeled as "Problems." Note that there are two different problems trays. One is for problems that are regular A-D filters. The other problems tray is only for field blanks that have a problem status. Finally, inactive C field blanks go in their own tray, which is labeled, "Inactives." It is important to make sure that the downloaded filters are placed into their proper tray.

Prior to beginning work, review the download list with the information for the filters that will be downloaded. Do not begin download without a download list. The download list is on a computer by the B/C download station. On the desktop, there is a file named "Download.xls." Click this to open the file. Then, look at the top row of the Excel file and press the "↓load" button with the mouse. The program will ask for a date. Enter the current date in the following format: MM/DD/YYYY. A download list will be generated (Figure 1). If there are site bins ready to be downloaded that do not come up on the download list, ask a lab tech for help.

On the download list, the first column is the site ID name and the second column is the date the filter was sampled (SAMDAT). Following this are four columns with a variety of abbreviations. The four columns correspond with A-D cartridges from left to right on the given date. The following statuses are problems and will be highlighted in red: PO, EP, NS, BI, OL, and XX (Chart 1). Normal statuses include NM and QD. The highlighted data in red signifies problem cassettes which will be handled in a different manner.

Also, the column labeled FB CHAN indicates whether or not a bin has a field blank and what channel the field blank is in. Make sure to confirm that there is a field blank where the column indicates that there is one and that the type of filter is correct.

Chart 1. Filter Statuses

NM	Normal
QD	Questionable Data, process as Normal
CG	Clogged, process as Normal
PO	Power Outage
EP	Equipment Problem
NS	Not Serviced
BI	Bad Install
OL	Offline
XX	Invalid Sample

	A	B	C	D	E	F	G	H	I	J
1	SITE	SAMDAT	A Status	B Status	C Status	D Status	DBLC	FBCHAN		
2	AGT11	2/21/2013	NM	NM	NM	NM	FALSE			
3	AGT11	2/24/2013	NM	NM	NM	NM	FALSE			
4	AGT11	2/27/2013	NS	NS	NS	NS	FALSE		Click when Done	
5	AGT11	3/2/2013	NM	NM	NM	NM	FALSE			
6	AGT11	3/5/2013	NM	NM	NM	NM	FALSE			
7	AGT11	3/8/2013	NM	NM	NM	NM	FALSE			
8	AGT11	3/11/2013	NM	NM	NM	NM	FALSE			
9	MOZ11	2/21/2013	NM	NM	NM	NM	FALSE			
10	MOZ11	2/24/2013	NM	NM	NM	NM	FALSE			
11	MOZ11	2/27/2013	NM	NM	NM	NM	FALSE			
12	MOZ11	3/2/2013	NM	NM	NM	NM	FALSE		Click when Done	
13	MOZ11	3/5/2013	NM	NM	NM	NM	FALSE			
14	MOZ11	3/8/2013	NM	NM	NM	NM	FALSE			
15	MOZ11	3/11/2013	NM	NM	NM	NM	FALSE			

Figure 1. Example Entry

5.2 Organization

- 1) Use the download list to see which site bin comes next. Always follow the download list in its order unless directed otherwise by a lab tech.
- 2) Confirm that the bags are in numerical order, 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 (A, B, C, D; or, red, yellow, green, blue). Make sure that the cartridges are oriented correctly so that 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.
- 3) Check the dates on the 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, please let a lab tech know. Please also confirm that the cartridge configurations are correct for the cycle that the bin is on.

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, A, B, C, and D. 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 (A to A, B to B, 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 A, B, C and D. 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 (A to A, B to B, etc.).

5.4 Downloading of Normal Nylon and Quartz Filters

- 1) If there are any red highlighted statuses, please refer to the instructions below on how to handle problem statuses. If the download list indicates that all filter statuses are normal, please set the A and D cartridges aside. Remove all the red caps from the B and C cassettes and place the caps in the week 1 bag.
- 2) From this point forward, handle only one cartridge at a time. Start with the B cartridges and then move on to the 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 downloaded, depending on the type of filter it is. NOTE: Field blanks should be placed in front of the first position filter when stacking petri dishes.
- 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 unlabeled forceps for the B filters. As the filters are downloaded, stack the Petri dishes from the earliest date (on the bottom) to the latest (on top). Proceed to download all of the B filters in this fashion for all three weeks. Then, place the Petri dishes into the tray marked for 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 the first position of that week. If the tray is filled, continue with the Nylon Inventory instructions below.
- 4) Clean all of the cassette bottoms and fixed screens using ethanol and Kimwipes™. Also make sure to clean the cartridge plate.
- 5) Download 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 B/C download station. NOTE: For double-C sites, make sure to put each label on a separate Petri; the C primary sticker will go on one petri and the C secondary sticker will go on another. When downloading double C filters, note that after inverting the cassette bottom, the primary C filter will be on the top and the secondary C will be on the bottom. Ensure that the filters end up in the correct Petri dish.
- 6) Clean the C cassette bottoms and cartridge plates with Kimwipes™ 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 Kimwipe™. As mentioned previously, discard Kimwipes™ after the C cartridges have been cleaned. Stack the Petri dishes with downloaded filters in the same fashion as the B filters and place them in the tray marked for quartz. If the tray is full, follow the instructions below for Quartz Inventory.
- 7) Stack cartridges from each of the three weeks in pairs: A +D and B+C. Place them back in their corresponding bags. B and C cartridges should be in the bottom of the bag and the A and D cartridges on the top. This makes it easier for the person at the A/D Download station.
- 8) If a filter is dropped or punctured in any way, fill out a status adjustment sheet. These sheets can be found on a shelf at the station. Make sure to list the site name, sample date, and medium of the filter and describe what happened. If it was dropped, make sure to

indicate whether it was dropped sample-side up or sample-side down. Turn any status adjustment sheets in to the file holders on the lab techs' desk after the site is complete. Make sure that each sheet only documents issues for one site.

5.5 Handling of Problem Cassettes

- 1) If the download list for a bin has statuses highlighted in red, take a red pen and write the problem status abbreviation (ex., PO) directly on the label(s) belonging to the problem cassette(s). Make sure the proper cassette is identified by double-checking the sample date and the cartridge letter with the download list. If there is a field blank that shares a date with a regular filter that has a problem status, the field blank is considered a problem as well and must be labeled as such.
- 2) Once all problem cassettes are labeled, proceed with downloading the problem filters. To begin download of problem 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 Bs, place the filter into the Petri dish and close. For As, Cs, and Ds, 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 B/C Download station, while loose screens for As and Ds go in a container at the A/D Download station.
- 5) Clean the cassette bottom with ethanol and a Kimwipe™. If it is a B cassette, make sure to clean the fixed screen as well. Remember not to use Kimwipes™ that were used on a quartz cassette on a cassette of any other filter type.
- 6) Repeat steps 3-5 for every problem cassette in the bin.
- 7) Once they have been downloaded, problem filters are placed in the Problems 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 A to D. Problem field blanks should go in the FB Problems tray.
- 8) If either tray is full, refer to the appropriate inventory instructions below.
- 9) Continue with the download procedure for normal B and C 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 in the cupboard to the right of the front entrance to the lab. Find six small round stickers to use to label the tray. For nylons, the stickers should be yellow. For quartz filters and inactive C's, they should be green. Problems and FB problems used to be color-coordinated by quarter (A=red, B=yellow, C=green, D=blue), but starting in 2013 problem trays are now labeled with pink stickers to avoid confusion with A and D Teflon® filters. Four stickers will be used on top of the tray and two will be placed on the side (Figure 2). 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 quarter number 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.

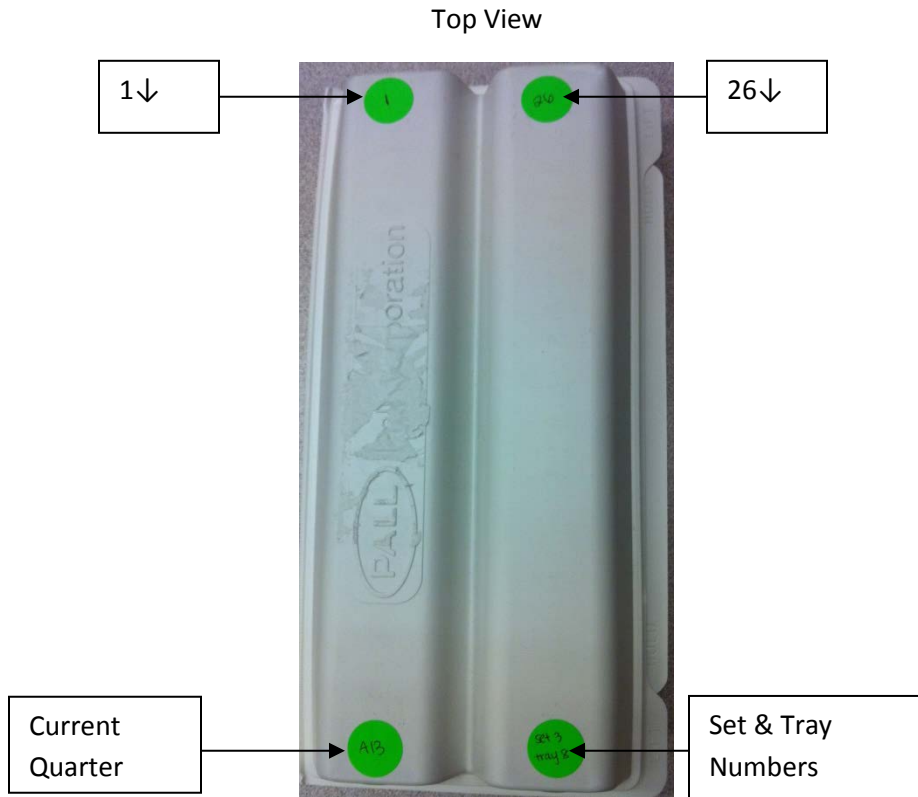
5.7 Identification Numbers for "B"s and "C"s

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 identification numbers on the last tray that was inventoried. 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.

5.8 Identification Numbers for Inactive "C"s, FB Problems, and Problems

The identification numbers for Inactive C's, FB Problems, and Problems are based on the quarter. Trays start at #1 and continue sequentially until a new quarter starts, when the tray number will start back at #1 again.

Figure 2. Properly Labeled Filter Trays



Side View



5.9 Tray Checking

Once labeled, all trays but the FB problems need to be tray checked. For FB problems, move the Petri dishes into the newly labeled carton and store them in the designated area. There is no specific order for the Petri dishes to be in.

To find the macros for the Bs, Cs, Problems, and Inactive C's, click on the "Download.xls" file located on the desktop on the B/C Download computer.

5.10 "B" Contractors

Once the Excel file is open, click on the yellow smiley face in the top row of the file to get a tray check list for the nylon filters. The program will display a prompt for the proper quarter (ex. D12) and the filter set number. Once this information is entered, a master sheet will be brought up as well as the tray lists for the set (labeled B_Sheet_1, etc.). Each sheet number corresponds to a tray number. Click on the appropriate sheet and begin tray checking. Move the Petri dishes in the nylon filter holder over to the newly labeled carton in the order given by the sheet. Completed trays are stored upstairs in the chemistry lab fridge.

5.11 "C" Contractors

For the quartz filters, click on the green ☺ icon in the "Download" Excel file. Enter the proper quarter and filter set number. Once this information is entered, a master sheet will be brought up as well as the tray list for the set (labeled C_Sheet_1, etc.). Each sheet number corresponds to a tray number. Click on the appropriate sheet and begin tray checking. Move the Petri dishes in the quartz filter holder over to the newly labeled carton in the order given by the sheet. NOTE: When tray checking double C sites, one week's field blank(s) and secondary (CS) filters will not be displayed on the tray check list. Move the filter(s) to the Inactive C's tray. Completed quartz trays should be placed in the freezer in the upstairs chemistry lab.

5.12 Inactive "C"s

Click on the ♠ symbol in the top row of the 'Download' Excel file. Enter the proper quarter and the tray sheets will be generated. Completed trays are placed in the freezer in the upstairs chemistry lab.

5.13 Problem Filters

Click the ☹ icon in the top row of the 'Download' Excel file. Enter the proper quarter and the tray sheets will be generated. Completed trays are placed on top of the shelves at the B/C Download station.

TI 251G AD Download Station

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to download sampled Teflon® filters and prepare them either for further analysis or for storage. Procedures listed are applicable to all routine filters.

2. SUMMARY OF THE METHOD

Once all nylon, quartz, and problem filters have been removed from a bin, it is ready to be A/D downloaded. Sampled Teflon® filters are weighed on a microbalance and their post-weights are recorded using a FoxPro "POST" program. "A" filters are prepared for further analysis, and "D" filters are prepared for permanent storage.

3. CAUTIONS

Many site names are similar. It is important to ensure that the site being uploaded in the "POST" program matches the site name on the bin.

Make sure to handle only one cassette at a time. Having two or more cassettes open while downloading filters increases the risk of filter swaps.

Sometimes the loose screens stick to the filters. Try gently holding the filter and screen with one pair of forceps while trying to separate them with another pair of forceps. Ask a lab tech to separate them if there is concern about tearing the filter.

Sometimes filters are accidentally loaded upside-down so the sample is on the wrong side of the filter. Make sure to weigh the filter sample side up, even if the sample is on the incorrect side. Also make sure to place the filter in the Petri sample-side up. If a filter has sample on the wrong side, note this on a status adjustment sheet and give the sheet to a lab tech.

Make sure when logging into the A/D Download computer to use the correct login information. It is posted on the computer.

4. EQUIPMENT AND SUPPLIES

- Microbalance
- Computer with "Post-weigh" balance application
- Antistatic unit
- Forceps with ceramic tips
- Polonium strips (small and large)
- Container for used loose A and D screens
- Clean Petri dishes
- Status Adjustment Forms
- Designated "A" and "D" Petri trays

5. PROCEDURE

- 1) There is one assigned "A/D Download" station, which is across from the "A/D Upload" station. The balance at this station is Mettler 1. Make sure to enter the correct username and password when logging on to the "A/D Download" computer. Login information is posted by the computer. In front of the balance are several polonium strips. They will be used as placeholders for the filters before weighing.

- 2) Enter user initials into the POST program. The program will then display the site code of the next bin in the queue. This queue must be followed unless directed otherwise by a lab tech. Remove the site bin indicated by the POST program from the shelf in the "A/D Download" cabinet and check the contents. There should be three re-closable bags labeled Week 1, Week 2, and Week 3. Each bag should contain four cartridges. "A" and "D" cartridges should be the only cartridges with labels. Ensure that the dates on the "A" and "D" labels fall within the week listed on the bags and that the site codes on the bag and cassette labels correspond. EXCEPTIONS: Main-X boxes and C-only sites will differ from this. Main-X boxes will have an additional three bags with one cartridge in each. If the X module is an "A" or a "D," check the dates and site code on the labels. Single-C sites (PITT1, ATLA1, and DETR1) will only have one cartridge in each bag and all filters should already be removed.
- 3) If the bin is not a single-C site, continue on to step 4. If the box is a single-C site, press "Enter" on the computer at the "A/D download" station to start the first week of the box, a necessary step in data processing even though there are no "A" or "D" filters at these sites. Because there are no filters to be weighed, all boxes next to each weight in the program should be blacked out. Press "enter" to continue on to week 2, and proceed in the same manner through week 3. Then place the bin on a shelf in the "Q/A" cabinet.
- 4) Visually check the bubble level on top of the Mettler balance and be certain that the inner bubble is centered within the outer black circle. If the bubble level is not centered, immediately inform a lab tech so that they can perform an adjustment.
- 5) Check that the reading on the balance display is 0.000mg. Unstable weights have blue numbers as well as the indicating circle on the terminal display. Stable weights are indicated by black numbers without any displayed indicating circle. If the reading is stable and is not 0.000mg, immediately inform a lab tech and do not proceed with any weighing until instructed to do so.
- 6) Make sure that the antistatic unit is turned on.
- 7) Remove the "A" and "D" cartridges from the Week 1 bag. Remove the red caps from the "A" cartridges and place them in the Week 1 bag. All red caps removed during the A/D Download process should go into the Week 1 bag to simplify the Q/A and A/D upload processes.
- 8) Press "Enter" on the keyboard to start the first week of the box.
- 9) Remove the label from the first sampled cassette in the "A" cartridge and place it on a clean Petri dish. Typically the first sampled position will be the first position in the cartridge, but sometimes cassettes will have labels and filters already removed from them at the "B/C Download" station due to problem statuses. The program will not ask for a weight from these filters.
- 10) Open the first sampled cassette with the arbor press. Overturn the cassette bottom over the polonium strips. There should be a loose screen and a filter in each cassette bottom. Remove the loose screen and place it in the labeled container for used screens. 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 a lab tech to separate them.
- 11) Make sure to orient the filter so that it rests on the polonium strip sample-side up. The filter will be sample-side up when it comes out of the cassette bottom. Note that typically the sample is on the "dull" side of the filter (looking at the outer support ring); or, in other words, the opposite side of the filter as the barcode. This is the proper orientation. Sometimes a filter is uploaded upside-down and the sample is on the same side of the filter as the barcode, or the

“shiny” side (looking at the outer support ring). It is important to note this on a status adjustment sheet and to weigh and store the filter sample-side up.

- 12) Closely inspect the filter. Filters can have a variety of problems, all of which must be reported to a lab tech. The standard procedure for reporting filter problems involves writing a comment on a status adjustment sheet. Comments should be brief descriptions and drawings of the filter problem encountered. Identify the filter in question by writing the site name, sample date, and filter type on the status adjustment form. Filter problems that need to be reported are listed below:
 - a. Rips or holes. Draw a picture demonstrating the size and location of the hole and give a brief explanation. Check the correct box depending on whether it was an existing hole or if it was punctured at the Download station.
 - b. Anodized Dust (D filters only). Anodized dust looks like wispy dark specks on the filter. Use the example picture at the “A/D Download” station to help determine whether anodizing dust is present. In addition to noting it on the status adjustment sheet, alert a lab tech immediately if anodizing dust is suspected.
 - c. Specks, un-sampled regions, or a patterned sample (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. Check the particle box for specks. For un-sampled regions, mark the non-homogenous sample/uneven sample box and indicate the un-sampled region in the drawing.
 - d. Bugs. The weight of the filter is to be taken with and without the bugs. Record both weights on the status adjustment sheet. Avoid damaging the filter when removing the bugs. Make sure the weight taken by the computer is the weight without the bug(s).
 - e. Filters can have problems with their weights that need to be noted. A status adjustment sheet should be filled out if the weight is a negative value, zero, or higher than 1.000mg. The only exception to this is field blanks; field blanks can be in a range of ± 0.002 . Anything greater than this should be reported. Also, if an “A” filter has a greater mass difference than a “D” filter, it should be noted. In addition to filling out a status adjustment, report any weight issues to a lab tech when they occur.
 - f. Peeling. Record the location and size of peeling and include a drawing. Peeling will typically occur at the edge of a filter.
 - g. Dropped filters. If a filter is dropped on the counter or on the floor, it should be reported on a status adjustment sheet. Indicate whether it fell sample side down (written as SS↓) or sample side up (written as SS↑).
 - h. Water spots. Draw a picture of the water spot.
 - i. Finally, if there is anything not listed above that is found on the filter and is abnormal, make sure to note it on the status adjustment sheet.
- 13) Open the draft shield of the balance by pressing the right arrow button on the balance terminal. Pass the filter through the ionizing zone of the antistatic unit and gently place the filter onto the balance pan. Close the balance door by pressing the same arrow key.
- 14) Once the filter is on the balance, follow the screen prompts given by the POST program and wait for a stable weight (black numbers without any displayed indicating circle will appear on the balance display). Once the program takes a weight, press “Enter” to keep it. If the weight is incorrect, press “D” on the keyboard to discard the value and the computer will pick up a new weight.

- 15) After the proper weight is recorded, remove the filter from the balance with forceps. Place the "A" filter sample-side up into the labeled Petri dish and put it into the "A" filter Petri tray. Re-attach the cassette bottom and top using the arbor press.
- 16) Repeat steps 9-15 for all "A" filters in the week.
- 17) For "D" filters, the process is identical except that the filters in Petri dishes are placed in the "D" filter Petri tray.
- 18) Review the weights at the end of the week. If any changes need to be made, press "Tab" to go from entry to entry and modify any weights as necessary. Then press "Enter" to complete the week. Place the empty "A" and "D" cartridges back into the week 1 bag.
- 19) The POST program will go back to the site code page after completing a week. Make sure that the site code remains the same and press "Enter" again to start week 2. Remove the "A" and "D" cartridges from week 2. Repeat steps listed above until all three weeks have been downloaded.
- 20) Occasionally, there will be a field blank in one of the cartridges. After measuring the routine "A" and "D" filter weights, the computer will display a prompt to weigh the field blank. If this value has a difference greater than ± 0.002 from its pre-weight, make a note of it on a status adjustment sheet.
- 21) Main-X boxes will be downloaded one right after the other. After the main box has been downloaded, the next site in the queue should be the associated X box. If the X box is an "A" or a "D," download the filters as described above. If the X box is a "B" or a "C," follow the program prompts. No weighing is necessary.
- 22) After A/D Download is completed, move the bin to the "Q/A" cabinet.
- 23) If any tray is filled, close the already-labeled tray and place it on a lab technician's desk. Then, find an empty Petri tray. Empty trays are typically found in the cupboard to the right of the front entrance to the lab. Begin inventory preparations for the next tray by finding six small round stickers to use to label the tray. For "A" filters, the stickers should be red. For "D" filters, they should be blue. Four stickers will be used on top of the tray and two will be placed on the side. 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 quarter number and the bottom right needs to be labeled with the tray and set number. These last sticker labels are repeated and placed on the side of the carton, directly under their corresponding stickers.

6. DATABASE MANAGEMENT

The POST program is a FoxPro® program that accesses the LOGS database to develop a list of exposed filters to be downloaded from cassettes. Next, it queues the exposed filters for weighing, and it records post weight values from the microbalance into the WEIGHTS database. Finally, after download is finished, it notes that the record is complete in the LOGS database.

TI 251H Quality Assurance Station

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1. PURPOSE AND APPLICABILITY

This SOP details the procedures used for the Q/A station in the sample handling laboratory and establishes uniform guidelines for how to perform these tasks. These instructions are applicable for any IMPROVE network site box.

2. SUMMARY OF THE METHOD

The "Q/A" station is the first in the process of uploading a bin to be sent back out into the field. Cartridges are checked for proper orientation. "A" and "D" cartridges are cleaned and all cartridges are labeled with fresh stickers for the new cycle. "B" and "C" filters are loaded and field blanks are designated if necessary.

3. DEFINITIONS

- Dummy: A placeholder used for cassette positions that are not sampling positions and do not contain filters.

4. CAUTIONS

When loading quartz filters, it is important to load a single screen in each cassette. Failure to load a screen at all or loading two screens instead of one can severely affect sampling out in the field.

Some sites have very similar names. It is important to use the correct stickers when labeling cartridges and week bags so that no confusion occurs at later stations or in the field.

Also, for future boxes starting in January 2013, double-C sites will have single C field blanks. Make sure to only load one C filter for the field blank in the fourth position every week.

5. EQUIPMENT AND SUPPLIES

- Ethanol
- Ethanol wash bottle
- Kimwipes™
- Bins with empty cartridges
- Week stickers (with site name and installation date)
- Cassette stickers (with site name and sample date)
- Sharpies (red, yellow, green, blue, black)
- Necktie stickers (A,B,C,D)
- Dot stickers (red, yellow, green, blue)
- Blank cassette stickers
- Black pen
- Clean 6 mil re-closable bags
- Pre-labeled 6 mil re-closable Week bags
- Container of clean quartz screens
- Designated quartz forceps
- Stainless steel forceps for nylons

6. QUALITY CHECK PROCEDURE

6.1 General Information

Bins ready to go through the “Q/A” station are placed in the open cabinets between the “A/D download” cabinet and the “A/D upload” cabinet. Work at this station is performed on the counters above the “Q/A” and “A/D upload” cabinets.

Bins go through the Q/A station according to priority. Bins with pink labels are the highest priority, followed by those with white stickers. Then, dot bins (yellow) are generally higher priority than non-dot (blue) bins. The only exceptions to this are if a dot box is late and its replacement has already been shipped, or if the dot box is one of two sites that install cartridges on Thursdays. These two sites are BALA1 and WHPE1, which are permitted to go out after the non-dots.

6.2 Cleaning the “A” and “D” Cartridges

The first step at the Q/A station is to remove the stickers from the week bags and then dispose of them. Remove all cartridges from the three week bags and line them up by week. Place the B and C cartridges to the side, keeping them paired up by week. These cartridges have already been cleaned at a previous station. The A and D cartridges have had their cassette stickers removed at A/D download, but the cartridges need to be cleaned. If the site has an X module that is either an A or a D, its cartridges will need to be cleaned as well.

- 1) Please remove the cassette bottoms from each sampling position and any other position that does not have a “dummy” in it (FB positions, if one was loaded).
- 2) Clean all cassette bottoms. The inner lip needs to be thoroughly cleaned to remove any sample peel and to prevent filters from sticking to the cassette bottoms.
- 3) Please remove all sticker residues from the cartridge plates. Use as much ethanol and as many Kimwipes™ as necessary.

Perform a quick inspection of the B and C cartridges to make sure that they have been cleaned thoroughly. Wipe down any cartridges that need it.

6.3 Quality Check of the Cartridges

Be able to recognize which cartridges (A-D) should be in which bag. Make any necessary corrections. Lists of how cartridges should be configured for each cycle type are below:

2-3-2 DOT Boxes

- Week 1: All 4 C-clip positions, with neckties on positions 1 and 2.
- Week 2: C-clip positions in positions 1 and 2, with an O-ring cassette in position 3. These 3 positions should have neckties. Position 4 should have a C-clip position with no necktie.
- Week 3: C-clip positions with neckties for positions 1 and 2. There should be an open hole in position 3 (no cassette). Position 4 should be a C-clip position without a necktie.

3-2-2 Non-DOT Boxes

- Week 1: C-clip positions for positions 1 and 2, with an O-ring cassette in position 3. These three positions should have neckties. Position 4 should have a C-clip and no necktie.
- Week 2: C-clip positions with neckties for positions 1 and 2. There should be an open hole in position 3 (no cassette). Position 4 should be a C-clip position without a necktie.
- Week 3: Week 1: All 4 C-clip positions, with neckties on positions 1 and 2.

6.4 Week Bag Check

- 1) Please check that week bags are presentable. They should be clean and without holes.
- 2) If unsure about a week bag, it is safer to replace it.
- 3) Pre-labeled week bags are located on a shelf at the Q/A station. If there are none, make more using fresh 6 mil re-closable bags and a black Sharpie.

6.5 Necktie Check

- 1) Please check that there are clean neckties on all sampling positions (not on field blanks). Replacements for all A, B, C, D, and X neckties can be found on a shelf at the Q/A station.
- 2) If any necktie is fading or falling off, replace it. Please clean the cassette "neck" with ethanol and a Kimwipe™ before applying the sticker.

6.6 Stickers and Cartridges

- 1) Bag and cassette stickers for all sites can be found in the filing cabinet below the counter that is next to the A/D download balance (Mettler 1). If any stickers are missing, ask a lab tech to print new ones.
- 2) Please place the appropriate bag label on each week bag. They are site and week specific.
- 3) Please sticker all cartridges. Sticker Wk 1 → Wk3, POS 1 → POS2, etc. for the appropriate filter type. Please only sticker cartridges one week at a time to avoid mix-ups and confusion at upload.
- 4) Determine whether or not a field blank needs to be loaded. There should be a Post-it with the number of field blanks needed for the current sampling month. If there is not, ask a lab tech.
 - a. If no field blanks need to be loaded, continue to 5).
 - b. If the site is a double-C site, then quartz field blanks are going to be uploaded. Starting in 2013, single C field blanks will be loaded for double-C sites.
 - c. Remaining sites can have an A, B, or D field blank. Determine which type to load and adjust the field blank tally. Place a post-it with the type of field blank being loaded on week 1 of the bin for the A/D uploader.
 - d. Please make the appropriate FB label. Blank FB stickers are located at the Q/A station. Label the sticker with the appropriate site, FB filter type, and sample date (the same sample date as the filter in position 1 of the appropriate week).
 - e. A, B, and D field blanks are always in position 3. Field blanks are located in week 1 for dot (2-3-2) boxes and should have the same sampling date as the first position

for that week. Non-dot (3-2-2) field blanks are located in week 3 and should match the sampling date of position 1 for that week.

- f. Single quartz field blanks for double-C sites are loaded in position 4 for all three weeks. Please sticker the FB label on the underside of the cartridge for these field blanks.
- 5) After bag and cassette stickers are used, please leave them in the appropriate desk tray on the shelf at the Q/A station. These will need to be returned to the filing cabinet at a later time.

6.7 "Dummy" Check

- 1) All positions without a necktie should have a correctly-colored "dummy" set. The "dummy" for the "A" cartridge is a thin, clear plastic disc and a circular red piece of construction paper. The clear plastic disc is placed in the cassette bottom, followed by the circular piece of construction paper. The "dummy" for the "D" cartridge follows the same procedure except that the construction paper circle is blue instead of red. The "B" "dummy" consists of two white circular papers with blue type spelling "PALL" written on one side. The papers are placed type-side down into the cassette bottom.
- 2) If an "A," "B," or "D" field blank was designated and a field blank sticker was placed on the cartridge, remove the "dummy" set from that position. Clean the cassette bottom to prepare it for upload.
- 3) If a field blank was loaded previously but is not being uploaded in the current box, please fill that position with the appropriate "dummy" set. If it is an "A," "B," or "D" cassette, please also make sure to put a correctly-oriented loose screen on top of the "dummy" set.

6.8 Final Check

Please re-check all neckties, stickers, "dummies," bags, and cassette organization before continuing on to the B/C upload process.

7. PROCEDURE FOR NYLON AND QUARTZ UPLOAD

The second part of the Q/A station is uploading B and C filters.

- 1) Find the two sets of forceps needed for B/C upload. One will be unmarked and is used for nylons. The other will be marked with a green sticker or tape at the bottom and is used exclusively for C filters.
- 2) There should be a box of nylon filters and a box of quartz filters at the station. If there aren't any, please notify a lab tech so that they can check out a new box. These filters are both stored in the Chem lab upstairs on the Mezzanine floor. The nylon filters are in a fridge and the quartz filters are in a freezer in this lab.
- 3) Remove all red caps from the Week 1 bag. Stack the A and D cartridges, keeping them together by week. These won't be uploaded until the next station. Line up the B and C cartridges according to week. Begin with week 1 B and C cartridges.
- 4) Uploading B filters: Open up the cassettes for all the sampling positions in the first week. Use a pair of unmarked forceps to remove the B filters from their container. The filters are white and there are pieces of paper with the PALL logo on them to separate the filters. Throw away the

papers. The B filters do not have any orientation. Simply place one in each cassette bottom. After loading a filter, close the cassette by putting the cassette bottom and top into the arbor press and then pushing up on the lever to close them together. When all filters for a cartridge have been loaded, put red caps on all cassette bottoms.

- 5) Uploading C filters: Open up the cassettes for all sampling positions. Use a pair of C forceps to remove the quartz filters from their container. These filters do not have any paper to separate them. Be sure to take only one at a time. The C filters have a proper orientation: the roughest side must be facing up in the cassette bottom. Once a filter has been loaded into a cassette bottom, use forceps to pick up a loose C screen from the container at the Q/A station and place it on top of the filter. Make sure the screen is oriented so that the side with the engraved "UP" is facing up out of the cassette. When the cassettes have been loaded with filters and screens, close them and put the red caps on. NOTE: When a new box of quartz filters is opened, make sure to report the new lot number to the A/D uploader, as it must be input into the PRE program to record the change in lots.
- 6) Repeat all uploading procedures for the second and third weeks. When all B and C cartridges have been uploaded, return them to their appropriate week bags, along with the A and D cartridges. Place all remaining red caps in the Week 1 bag and move the bin to the "A/D upload" cabinet.
- 7) Specialty Cases:
 - a. B Field Blanks: Make sure to load an extra B filter if a week has a designated B field blank in one of the weeks. B field blanks will always be in the third position and are found in week 1 for dot boxes and week 3 for non-dot boxes.
 - b. Double-C sites: Some sites will have two quartz filters to install in each cassette. Each cassette in a double-C site will have two stickers; one will say "CP" (for C primary) and the other will say "CS" (for C secondary). C primary filters are the ones seen by looking at the underside of a cassette bottom, and C secondary filters are the ones placed on top of the C primaries. Double-C sites are denoted by two green dot stickers on their bins, one on other side of the site label. When uploading double-Cs, remember that both filters need to be rough-side up. Also, double-C bins have field blanks in each week. Remember to load single C's for the field blanks (starting January 2013), as they were previously double-C field blanks.
 - c. 1-X sites: Some sites have an X module. This means that a site will have three bags with four cartridges in each, followed by another three bags with only a single cartridge per week. The X module can be any filter type. If it is an A or a D, no further work needs to be done. If it is a B or a C module, make sure to load the cassettes with the appropriate filter type. Note: Unfortunately, A, B, C, or D cartridges in X site bins are all labeled with an orange dot sticker and "X" neckties. To identify the appropriate filter type, refer to the X mod cassette labels.

TI 251I AD Upload Station

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to weigh and install clean “A” and “D” Teflon® filters to be sent back out into the field. These procedures are used for every site in the IMPROVE network, though many of them generally apply to special studies as well.

2. SUMMARY OF THE METHOD

Clean Teflon® filters are weighed on a microbalance. The weights are recorded using a FoxPro® program. Teflon® filters are uploaded into labeled cassettes. A flashcard is assigned to each bin and log sheets are generated, one for each week. Bins are then ready for the Quality Check station.

3. CAUTIONS

Many site names are similar. It is important to ensure that the site being uploaded in the “PRE” program matches the site name on the bin.

Make sure to handle only one cassette at a time. Having two or more cassettes open while uploading filters increases the risk of filter swaps.

Pay attention to Post-its in the week bags denoting field blanks. Force the field blanks before pressing “enter” to start the week. Remember that field blanks for double-C sites need to be forced each week.

When loading Teflon® filters, it is important to load a single screen in each cassette. Failure to load a screen at all or loading two screens instead of one can severely affect sampling out in the field.

Make sure to use the correct login information at the A/D Upload computer. The username and password are posted on the computer.

4. EQUIPMENT AND SUPPLIES

- Microbalance
- Computer with FoxPro® “PRE” program
- Antistatic unit
- Forceps with ceramic tips
- Container of clean 25mm loose screens
- Polonium strips (small and large)
- Clean Teflon® filters
- Compact flashcards (site specific and replacements)
- Printer
- Log sheet paper
- Extra red caps

5. PROCEDURE

- 1) There is one assigned “A/D upload” station, which is the Mettler 2 (A-182) balance. In front of the balances are four to six antistatic polonium strips. There should be one set of forceps to be used for the Teflon® filters. Make sure to use the correct login information at the station. The username and password are posted on the computer at the station.

- 2) Remove the Teflon® filters from the box and line up as many as possible on the polonium strips. Use the forceps, making sure to grab the filters by the plastic edge. Throw away the clear plastic circles that are on the top and bottom of each stack of filters.
- 3) Look at the computer monitor. The "PRE" program will ask for user initials to enter into the program. Enter the appropriate initials. The next screen will have a box for a site code. Typically there will be a site code already in the box. The bins that are ready to be A/D downloaded are found in the cabinet directly to the right of the upload station. Find the bin that corresponds to the site code in the queue. If the bin is not ready for upload, type in the site code of a bin that is ready to be uploaded. Otherwise, press "enter" to start the bin.
- 4) The next screen shows the first week's "A" and "D" sample dates. Before proceeding, check to see if a field blank needs to be forced. Field blanks will be indicated by a Post-it in the week the field blank is in. For yellow bins, the field blank will be in week 1. For blue bins, it will be in week 3. This must be done before pressing "enter" again to start the weights.
 - a. To force an "A" field blank, press Alt-F5.
 - b. To force a "B" field blank, press Alt-F6.
 - c. To force a "C" field blank (only for double-C sites), press Alt-F7.
 - d. To force a "D" field blank, press Alt-F8.
 - e. If the program has already assigned a field blank and it is not the type that needs to be loaded, force the correct one. If the program has assigned a field blank when no field blank has been loaded, enter the command to force that same type of field blank and the program will remove it.
- 5) The cartridges should have already been stickered by the time the bin gets to this station. Remove the "A" and "D" cartridges from week 1 and ensure that the cassette labels on the cartridges match the sample dates shown on the computer screen.
- 6) Make sure that the balance reads 0.000mg. If it does not weigh zero, please tare the balance by pressing the tare button (<0>) on the balance. Check the level bubble at the top of the balance. If the bubble is outside of the circle, please ask a lab tech to level it before continuing.
- 7) Take the forceps and pick up a Teflon® filter from the polonium strips. Look at the filter. Make sure that there are no holes. If a speck can be seen on the filter, try to flick it off by tapping the edge of the forceps. If the speck will not come off, place it in the box on the weight table that is labeled, "Specks." If a hole is found, place it in the box labeled, "Holes." If the filter is dropped or injured in any way due to handling, place it in the "Dropped" box.
- 8) Ensure that the filter is oriented correctly. There are two sides to a Teflon® filter. The ring on the outer rim of the filter is shiny on one side and has a barcode on it, while the other side is dull and has nothing written on it. Make sure to pick up the filter so that the dull side is facing up. Pass the filter through the antistatic unit on the right side of the balance. Open the balance by pressing the right arrow button. Gently place the filter on the pan shiny side down and press the same button to shut the door.
- 9) Press "Enter" to start the week. A box in the A channel column and in the first sample date row will appear and display "0.000mg." Therefore, the filter that is being weighed belongs to position 1 of the A channel. There will be a gray box in the upper right hand corner of the screen that will say "Waiting for balance to stabilize." While waiting for the balance to stabilize, open the first position of the physical "A" cartridge. Do so by putting the cassette in the arbor press and pulling down on the lever. Take the cup from the bottom of the press

- and set it next to the polonium strips. When the filter weight is stable, the program will pick up the weight and display it in the white box.
- 10) After the filter's weight stabilizes and a weight is displayed, the box at the top of the screen will offer several options: [Enter] to keep and continue; [D] to discard and retry. Check to make sure that the weight the balance reports matches the number on the computer monitor. If the two numbers differ, then press [D] to discard and retry. If the weights match, press [Enter]. The gray box will display a prompt to remove the filter and to press the spacebar. Open the balance door and gently grab the filter (again by its outer edge) with the forceps. Set the filter down into the cassette bottom that is in front of the polonium strips. Make sure that the filter is shiny side up in the cassette bottom—the barcode should be visible and read correctly by looking into the open cassette bottom. This means that the filter must be flipped over between removing it from the balance and placing it into the cassette bottom. The proper orientation is extremely important. Then, retrieve a clean loose screen from the container on the weight table and place it on top of the filter. Make sure the side with the engraved "UP" is facing up in the cassette cup. Make sure to load only one, as they can sometimes stick together.
 - 11) Press the spacebar. The program will wait for a stable zero weight from the balance. Manually press the tare button on the balance (<0>) to return the balance to its true zero if it fails to do so by itself. Then, the program will display a prompt in the gray box to place another filter on the balance and to press the spacebar. Now the space for the second position "A" filter will be highlighted and read "0.000mg." Pick up another filter and place it on the balance. Be sure to close the balance door. The computer will automatically start waiting for the balance to stabilize. Proceed with the rest of the filters in the week.
 - 12) Make sure while weighing that all weights in a week are $\pm 0.100\text{mg}$ apart from each other. The program will only display a prompt if the weights are too close within each column, but not across columns; thus, attention to detail is required.
 - 13) At the end of week 1, the program will request a flashcard number. Flashcard assignments only apply to week 1 and only to main boxes. When the last filter of week 1 has been weighed, the program will ask for a flashcard number. The flashcards are located in a box to the left of the balance, on top of the filing cabinet. Choose the flashcard with the site code that matches the bin being uploaded. If no matching flashcard can be found, ask a lab tech for a replacement flashcard. The number to enter into the computer is on the back of the flashcard. Once the number is typed in, press "enter" and the program will print out a log sheet for week 1. It will then continue on to week 2. Place the flashcard into a flashcard bag and place it in week 1 with the rest of the loaded cartridges. Repeat the weighing procedures listed above for the remaining weeks. Make sure to place the protective red caps over each cassette as the cartridges are uploaded. NOTE: Single module C sites (ATLA1, DETR1, and PITT1) will not prompt for a flashcard. Make sure to load a flashcard anyway and write the flashcard number on all three log sheets when they've printed out.
 - 14) When all three weeks are complete, please retrieve the log sheets for the bin from the printer. The site name is printed in the center at the top of each log sheet. Confirm that the log sheets match the site that was just uploaded. Fold the log sheets in half lengthwise and place them in the correct weeks. Place the uploaded bin in the cabinet at the "Final Check" station.

- 15) Special Case #1: X-boxes. Some bins will have an additional three bags with a single cartridge in each. These cartridges need to be uploaded directly after the main site. When SITEX appears in the site code box, press "Enter". If the X MOD is an A or a D, upload the filters as described above. If it is a B or C, the weight boxes on the screen will be blocked out in red. Press "enter." The gray box in the top right will display some options. Simply press "enter" again and a log sheet will print. Do the same for weeks 2 and 3. Remember that nothing is being weighed; this process updates the Logs database that a new box has been uploaded and also produces log sheets for the X mod.
- 16) Special Case #2: C-only sites. C-only sites (DETR1, ATLA1, and PITT1) will not need to have any filters weighed at the upload station. Simply press enter to get through each week and to print the log sheets. Remember to follow the note in step 13 regarding the flashcards for C-only sites.

6. DATABASE MANAGEMENT

The "PRE" program is a FoxPro® program used to upload filters that will be sent out into the field. It accesses the LOGS database to develop a list of sites requiring boxes of filters. The order of this list is determined by the date and time that the site's previous filters were downloaded. The PRE program then downloads the site's configuration information from the SITEFILE database and then checks the WEIGHTS database to determine the sample date of the last filter weighed for each site. PRE then determines the next seven sample dates required at each site. Next, it queues the filters for weighing and records pre-weight values from the microbalance to the WEIGHTS database. Finally, it records the site code, sample date, and start time to the LOGS database, thereby completing the initialization of the records for each filter being sent into the field.

TI 251J Quality Check Station

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe in detail the procedures used at the Quality Check station in the sample handling laboratory. It is applicable to all routine filters in the IMPROVE network.

2. SUMMARY OF THE METHOD

Once all cartridges of a bin have been uploaded with new filters, the bin goes through a final check to make sure that all filters and cartridges are suitable to be shipped out. Log sheets are examined for mistakes and the flashcard number is confirmed. Any issues are remedied. For United Parcel Service (UPS) sites, a label is printed out and placed in the bin. The bins are placed onto a rack and eventually transferred to the designated shipping/receiving area for the sample handling lab in the IMPROVE shop to be packed and shipped out.

3. CAUTIONS

Many site names look similar. It is important to make sure to print out the correct UPS label for each site so that they are sent to the correct place.

Remember that United States Postal Service (USPS) sites have a white site label on their bins. These sites do not need a UPS label printed out at the Quality Check station.

Remember to staple the return label to the Week 3 log sheet and place the outgoing label in the bin. Sometimes these labels are accidentally swapped and the box ultimately ends up back at the lab instead of its proper destination. This can cause loss of sample out in the field and is to be avoided.

Be careful to check that a flashcard has been uploaded for C-only sites (ATLA1, PITT1, and DETR1). The upload program does not prompt the user to enter these flashcards, so they are occasionally forgotten and not placed in the Week 1 bag.

Double-check each cassette in every A, B, and D cartridge to make sure that a single loose screen has been loaded in each cassette. Multiple screens or no screen can affect the flow rate of the sample out in the field.

4. EQUIPMENT AND SUPPLIES

- Computer with Internet access
- Thermal printer
- UPS label rolls
- Highlighters
- Pen (not red)
- Stapler
- Quality Check stickers

5. PROCEDURE

- 1) The Quality Check station is located to the left of the bin rack in the sample handling laboratory. Bins ready to be checked are located in the cabinet under the counter at this station. Before starting this station, please print out the UPS labels for the bin that is going to be checked. Please refer to the UPS SOP for this procedure. Highlight the site code present on the outgoing

label and make sure to place it in the bin. Set the return label aside. Note that bins with white labels are USPS sites and do not need a UPS label.

- 2) Check the week bag labels to make sure that they have the correct installation dates on them.
- 3) Starting with Week 1, remove the log sheet and all of the cartridges. Starting with the "A" cartridge, make sure that the dates and sequence numbers written on the labels are correct and in the right order. Then remove all of the red caps on the cassette bottoms. Make sure that there is a filter in all of the sampling positions and "dummy" sets in the non-sampling positions. Also check for any specks, holes, etc. on the filter. Continue this process with the B, C, and D cartridges. If any specks are found, try gently tapping the cartridge on the counter. If the speck comes off and it is an "A" or "D" filter, have the person at "A/D upload" reweigh it to make sure that the weight did not change. If it did change, cross out the weight of the filter on the log sheet and write in the new weight. Then give the log sheet to a lab tech so that they can make the change in weights.dbf and note it in the problems file.
- 4) Make sure all "A," "C," and "D" cartridges have loose screens in each cassette. Do this by looking through the hole in the cassette tops. Also, check carefully for double screens. Double screens will normally create a "honeycomb" pattern when viewed from the top of the cassette. If in doubt about whether a screen is a single or a double, it is best to check to make sure.
- 5) Pay special attention to the "C" filters. They have a smooth side and a rough side. The smooth side should be visible when the red cap is removed from the cassette bottom. Make sure all sides of the filter are completely inside the cup as well.
- 6) Now, look at the log sheet. This will be the only piece of paper in the bag and will be folded lengthwise. The site and installation date are typed in the top center of the page. Make sure that the site on the log sheet corresponds to the site label on the bin and that the installation date matches the week bag's sticker. Highlight this information so that it draws the operator's attention. To the right of this information is the seven-digit flashcard number. This number corresponds to the flashcard that can be found in the Week 1 bag in its own small, labeled bag. Retrieve the flashcard and pull it out of the small bag. Check to see that the number matches what is written on the log sheet. Make sure that the flashcard goes back into its small bag before going into the Week 1 bag. There is only one flashcard per bin; sites that also have an X Mod will only have one flashcard, found in Week 1 of its main box. Make sure that C-only sites (ATLA1, DETR1, and PITT1) have a flashcard. The PRE program does not prompt users to enter a flashcard for these sites, so it is important to make sure that a flashcard gets sent out with the bin.
- 7) Now look towards the bottom of the log sheet. There should be a long line of dashes. Directly above this line are one or two messages (depending on what week is being examined). Please highlight the following message, which will be found in the week that the moveable position is in: "After Finals Move Cassette to Hole in Next Cartridge Plate." It will be in week 1 for non-dots (blue bins) and week 2 for dots (yellow bins).
- 8) The "A" and "D" filters are weighed before being installed and the weights are recorded at the bottom left hand corner of each log sheet. From top to bottom, the numbers on the left are for the weights of the "A" filters and the numbers on the right are the weights of the "D" filters. Check to make sure that no weights are too similar. The minimum difference between two numbers should be at least 0.100mg. If two weights are too close together, please ask for a new

Teflon® filter at the upload station. After checking the weights, initial next to them to indicate that they were reviewed before being sent out.

- 9) Put the cartridges back in the bag, and then slide the log sheet and flashcard into the bag. Repeat this process for weeks 2 and 3. Make sure to highlight the site name and installation date for each log sheet.
- 10) For Week 3, highlight the following message at the bottom of the log sheet: "Remove Flash Card After Finals and Return Box ASAP." This will be in the same place for all bins, regardless of cycle. Once all of these steps are completed, please staple the UPS return label (if applicable) to the back of the log sheet. Flip the log sheet over and place a Quality Check sticker on the back. Note that Quality Check stickers are placed on the back of every Week 3 log sheet for every site, even if it is an X-module. Initial it and check all of the boxes; these boxes are to confirm that the flashcard is present (if it is an X-box, write N/A), that no weights were too close (for B/C X-boxes or C-only sites, write N/A), that the UPS/USPS labels were correctly affixed and present, that screens are present in all cartridges, and that a newsletter has been added to the bin (if applicable for that cycle). Replace the contents of the last week's bag. Place the bin into the rack; make sure the front of the bin faces the wall and not out into the room. This orientation signifies that the bin has been checked before being shipped out.
- 11) Occasionally, there will be an extra step at the Quality Check station. There will be notes or signs displayed next to the computer or on a specific bin with instructions. Some examples are putting a newsletter in the bin, changing an address label, or giving the bin to a supervisor before shipping out.

TI 251K Shipping Blue Boxes

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to print out UPS labels for the IMPROVE network sites. It is applicable to all IMPROVE sites except for a select few that are shipped by the U.S. Postal Service.

2. SUMMARY OF THE METHOD

Outgoing and return labels are created for all IMPROVE site boxes that are shipped via UPS. This includes the international sites: BYIS1, VIIS1, BALA1, and EGBE1. An effort is made to keep the cost as low as possible for outgoing boxes while ensuring that they arrive on time to be installed.

3. CAUTIONS

Many site names are similar. It is important to pay close attention to the site code of the bin and to ensure that the proper label is printed for it.

Make sure when comparing shipping options to account for any holidays or possible delays that could cause shipping to take longer. Getting the box there on time is more important than cheaper shipping costs.

Make sure to charge shipping charges as well as duties and taxes to "5FX769-Crocker Nuclear Laboratory" for all international sites. Not doing so creates difficulties in the shipping process.

Make sure to send all 3 signed copies of the commercial invoice with the four international sites. Not doing so will cause significant shipping delays.

4. EQUIPMENT AND SUPPLIES

- Computer with Internet access
- Thermal printer
- UPS label rolls
- UPS pouches for International shipping
- Printer
- Computer paper
- Pen
- Highlighter

5. PROCEDURE

5.1 Procedures for Regular UPS Shipping

- 1) Some sites cannot receive boxes via UPS for various reasons (remoteness, delivery issues, etc.). The bins for those sites have white site code labels. UPS labels will not be generated for those bins unless authorized by a lab tech. All other bins will need UPS labels.
- 2) Go to <http://www.ups.com> on the computer at the Final Check station.
- 3) Click the Log-in option at the top of the web page.
 - a. The user ID is: aqglab
 - b. The password is: Aqg 1123 (there is a space between the g and the 1).

- 4) When the shipping information page loads, choose a site code from the “Address Book” pull-down menu located at the top middle of the page (ex., CABI1). The page will refresh with the address information for that site. If the site is one of the international destinations (BYIS1, VIIS1, BALA1, EGBE1), continue to the International Shipping Procedures in Section F.
- 5) Leave the “Ship From” and “Return” addresses as default. They should be the Crocker/Jungerman Hall address.
- 6) For the question, “What are you shipping?”
 - a. Number of Packages: Leave as default (1)
 - b. Packaging Type: Leave as default (Other packaging)
 - c. Weight: 4 lbs for main blue boxes, 6 lbs. for main-X boxes, and 3 lbs. for small blue boxes (used for ATLA1, DETR1, PITT1, and MALO1-2).
 - d. Package Dimensions:
 - i. Main boxes: 9”x10”x6”
 - ii. Main-X boxes: 13”x10”x7”
 - iii. Small boxes (ATLA1, DETR1, PITT1, MALO1-2): 9”x8”x6”
- 7) For “How Would You Like to Ship?” Click the “Compare Time and Cost” link. Choose the cheapest service that will get the box there by the appropriate deadline (usually the Friday before the first week installation date for the box). Keep in mind any holidays or weather delays when choosing a shipping option. When in doubt, it is always safer to choose 2nd day air.
- 8) References: Fill in Reference #1 with the four letters of the site code (omit the # that follows the site code) and add the date of first install, which can be found on the week 1 bag sticker. Do not put any slashes, dashes, commas, etc. For example, SAPE1 with a start date of 11/03 would be SAPE1103. For Reference #2, enter user initials.
- 9) For “How Would You Like to Pay?” make sure that the default option is selected: 5FX769-Crocker Nuclear Laboratory.
- 10) Leave “Would You Like to Schedule a Pickup?” blank. Make sure to check “Review shipping detail, including price, before completing this shipment.” Then click the “Next” button. Review everything and click “Ship now.”
- 11) The UPS label will then print from the thermal printer near the supervisors’ desks. There will be a confirmation box when the web page refreshes. Scroll down the refreshed webpage and choose the “Create a Return Shipment” option.
- 12) The page should refresh and the site code should have already been chosen from the drop-down Address Book menu. Confirm that it is the correct site code. Leave the 2nd box as default—it should provide Crocker’s address.
- 13) For box #3, “What are you returning?” leave the Packaging type as default. The proper weight should already be filled in, along with the package dimensions. There will be a new field in the box that asks for a “Merchandise Description.” Please type in “Air Filters.”
- 14) For box #4, “How would you like to return?” leave the service and delivery method as default. The service should always be 2nd Day Air and the “Label Delivery Method” should be “Print Return Label.”
- 15) Box #5 should have fields already entered. Leave them as they are.
- 16) Box #6 should have “Bill Shipping Charges to 5FX769-Crocker Nuclear Laboratory.” Make sure this is selected.

- 17) Make sure that "Review Shipping Details, including price before completing shipment" is checked. Then click "Next."
- 18) Review the details. If all is correct, press "Ship Now."
- 19) Retrieve both labels from the thermal printer. Highlight and place the outgoing label in the bin. Put the return label aside as it will be used during the Final Check.
- 20) If the bin is not immediately going through the Final Check station, highlight the site code on the outgoing label and place both labels in the bin.

5.2 Outgoing International Shipments

- 1) If BYIS1, VIIS1, EGBE1, or BALA1 is selected from the "Address Book" drop-down menu, the international shipment page will come up. It is very similar to the normal page but with a few unique boxes.
- 2) Leave "Ship From" and "Return" addresses as default.
- 3) All four sites will ask for:
 - a. Description of Goods: Type in "Air Filters."
 - b. Packaging Type: Make sure "Other Packaging" is checked.
 - c. Weight: 3 lbs.
 - d. Package dimensions: 9"x10"x6"
 - e. BYIS1, EGBE1, and BALA1 will have an extra field at the top asking for Customs Value. Type in "100."
- 4) Select Service: Select UPS Worldwide Saver (Express).
- 5) Reference Section: Fill in as usual—four letters of site code and date of first install.
- 6) Bill shipping charges and bill duties and taxes: Make sure both of these are set to 5FX769—Crocker Nuclear Laboratory.
- 7) Make sure that the box saying "Review shipping details" is checked. Click "Next." Review shipping information and then click "Ship now."
- 8) A new page will come up with different form options available. Make sure to select "Complete Selected Export Forms Online"—it should be default checked. Also, make sure that Commercial Invoice is checked. This should also be set as default. At the bottom, make sure the box saying "Preview Shipment before completing shipment" is checked.
- 9) On the next page, click "Add Product." Add "Air Filters" from the Product List drop-down menu. The product description should automatically fill in. Type "1" for Number of units. Price per unit should be defaulted to 100.00 and the currency should be "USD US Dollars." For Unit of Measure, choose "Pieces." Then click "Submit," followed by "Next."
- 10) Leave everything as it is on the next page. Click "Next."
- 11) Leave the "Form Description" blank and click "Next."
- 12) On this page, choose "Print All Online Forms." Then click "Open" if the browser asks to open or save the forms.
- 13) Go to "File" in Adobe and choose "Print." Make sure the Main Bay Printer is selected and press "Print." Three copies of the invoice should print out from the printer in the bay.
- 14) Retrieve the commercial invoices from the printer. Sign and date each one in the appropriate fields at the bottom of the page.
- 15) Go back to the UPS webpage and click "Next."
- 16) Leave everything as default in the Select Export Forms and click "Next."

- 17) Review all details (paying special attention to the payment information in Box 4) and choose “Ship Now.” Two labels should print. One will look like a regular outgoing label and the other will have a paragraph printed on it and a section for a signature. Sign and date the label. Retrieve a UPS pouch by the sample handling lab door and place the commercial invoices in it. Make sure that the barcode on the first commercial invoice is visible through the pouch.

5.3 International Return Shipping

- 1) To create an International Return, choose “Create Import” from the list of options on the left-hand side of the screen.
- 2) Box 1: “Where is this shipment coming from?” Select site: BYIS1, EGBE1, VIIS1, or BALA1.
- 3) Leave Box #2 as default—it should be the Crocker address.
- 4) Box 3: What Are You Returning?
 - a. Description of Goods: “Used Air Filters for Testing”
 - b. Number of packages: Default should be 1
 - c. Weight: 3 lbs. for blue boxes
 - d. Package dimensions: 9”x10”x6”
 - e. Merchandise description: Type in “Used Air Filters for Testing.”
- 5) Box #4: “How Would You Like to Return?”
 - a. Service: Select UPS standard for Canadian sites, UPS Express Saver for VIIS1 and BYIS1.
 - b. Label Delivery Method: Choose electronic label.
 - c. Make sure “Send E-mail notifications” is checked.
- 6) Box #5: “Would you like to add reference numbers to this return shipment?”
 - a. Reference #1: SITEMMDD (4 letter side code plus month and date of first Tuesday install).
 - b. Reference #2: Enter user initials.
- 7) Box #6: “How Would You Like to Pay?”
 - a. Bill shipping charges to: 5FX769-Crocker Nuclear Laboratory.
 - b. Bill duties and taxes to: 5FX769-Crocker Nuclear Laboratory.
 - c. Make sure “Review shipping details, including price, before completing the shipment” is checked.
- 8) Box #1 in “Enter Additional Import Control Information”:
 - a. A. Make sure “Send Electronic Label to:” is filled in with supervisor’s email. (ex. kawamoto@crocker.ucdavis.edu)
- 9) Review your return details and press “Next.”
- 10) Leave everything as default. “Complete selected export forms online” and “Commercial invoice” should be checked. Press “Add product.”
- 11) “Enter Product Information”:
 - a. Choose Air Filter Return from the Product List drop-down menu. The Product Description will automatically fill in.
 - b. Make sure that the Product Country of Origin is set to the default, “United States-US.”
 - c. Number of units: 1
 - d. Price per unit: 100

e. Unit of Measurement: Pieces

- 12) Press "Next." Leave everything as default on the next page and click "Next" again.
- 13) Leave the "Forms Description" blank and press "Next."
- 14) Review Export forms—leave everything default and do not print. The click "Next."
- 15) Leave everything on this page as default.
- 16) Click "Ship now." The lab tech whose email address was entered previously will get an email that asks him or her to retrieve the labels. The lab tech will print out the labels and commercial invoices. Put all of them into a UPS pouch after signing and dating all forms and place it in the bin. It will be shipped out in the blue box with the filters.

TI 251L BC Shipping

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedures used to check and ship nylon and quartz IMPROVE filters. These instructions apply to all routine "B" and "C" IMPROVE filters.

2. SUMMARY OF METHOD

Final tray check lists are generated for "B," "C," and "Inactive-C" filters before they are prepared for shipping. Once a month, an additional 10 lab blanks are added to a nylon set. At the end of every quarter, inactive-C filters are sent out. Nylon filters are sent to the ion contractor, which as of January 2013 is RTI, and the quartz filters (both "C" and "inactive-C") are shipped to the carbon contractor, which as of January 2013 is DRI.

3. CAUTIONS

Be careful when tray checking to make sure that every Petri dish has a filter in it. Pay particular attention to the Petri dishes that are loaded with lab blanks.

Be aware that working with files in the U:\ drive is extremely risky. Any errors that may occur can cause problems for lab equipment or analysis. Be extra careful when deleting or moving files.

Pay close attention when entering information into any macro. The information has to be in a designated format for the macro to work.

4. PERSONNEL QUALIFICATIONS

Only trained lab technicians generate tray check lists and create .dbf files for shipping. Trained student lab assistants may double check the trays after a lab technician has tray checked them.

5. EQUIPMENT AND SUPPLIES

The following supplies are necessary for "B," "C," and "Inactive-C" shipments:

- 1ft. cubed cardboard boxes
- Re-sealable bags
- Packing tape
- Ice Packs (for "Cs" and "Inactive-Cs")
- ULINE Premium Laser Labels S-8039
- Envelopes

6. PROCEDURE

6.1 Preparing Contractor Lists for "B" Filters

6.1.1 Acquiring First Filter for New Shipment

In the refrigerator in the chemistry laboratory on the mezzanine floor, find the set number to be shipped by identifying the lowest set number for that quarter. Open the B-

Ions contractor's list for the previous shipment (the tray check list for the last shipment sent out). The file name is BContractors[#].xls and is located in J:\User\AnnexRear\Mojica\ContractorFiles\Ions. Go to the "Master" tab. The first filter from that list is the filter information that will be needed later. Write down the site name and date. Close this file and do not save any changes.

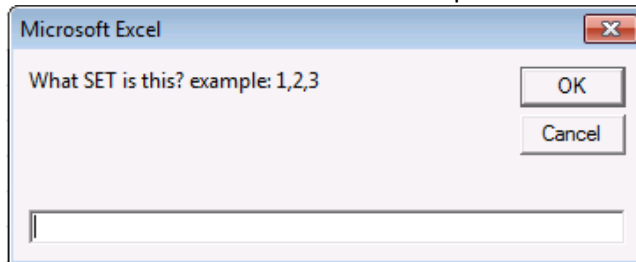
6.1.2 Running the Macro

Open JoseMACS_Version**.xls, where ** is the latest version number. As of January 2013, it is Version 2_06.xls. To access the macro, press "Alt+F8." Select the "Ion_Contractors" macro and click "Run."

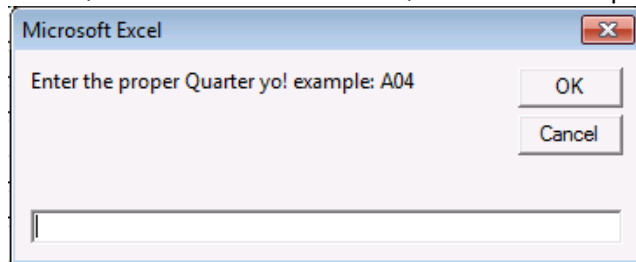
6.1.3 Entering Macro Information

The macro will ask for enough information to identify the first filter for the list being created. Follow the instructions in the input boxes. Be careful to enter the information in the exact format as the example. Following are the parameters and screenshots of the input boxes:

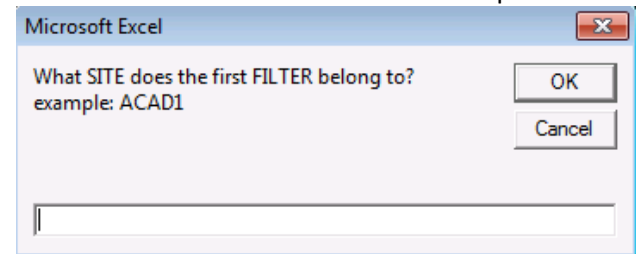
- 1) **Set.** Enter the desired set in number format. Example: 1.



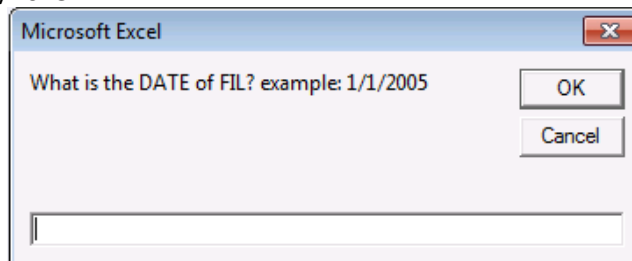
- 2) **Quarter.** Enter the Quarter desired in format 'QuarterYY.' Example: C12.



- 3) **Site Name.** Enter the site code for the first filter. Example: ACAD1.



- 4) **Sample Date.** Enter the sample date from the first filter in “*m/*d/yyyy” format.
Example: 1/1/2013.



6.1.4 Printing the Pages

Print a copy of each B_Sheet_[#] tab. The file will automatically be saved. If there was a previous version of the current set, that file will be overwritten by the new one.

6.2 Monthly Ion Lab Blanks

Near the end of every month, 10 clean lab blanks must be sent out. Add these lab blanks to an ion set being prepared for shipment.

6.2.1 Generating Labels

Open the “Lab BLNK stickers” file located in J:\User\AnnexRear\Mojica\ContractorFiles\Ion. Enter the date that the filters are being shipped into the yellow box in the upper left corner. This should update the cassette stickers near the middle of the page. On the bottom left of the page, update the ship date to record when each month’s lab blanks were shipped. Print out the cassette stickers to label 10 clean Petri dishes. Load one clean B filter (no paper dummies) into each of the 10 Petri dishes.

6.2.2 Appending the Tray Check List

Go back to the tray check list for the ion set being shipped. Go to “B_Sheet_8.” Copy the last 10 entries and append them to the beginning of the “Master List,” which is the following tab. Replace the last 10 entries of “B_Sheet_8” with the information from the lab blank stickers. These 10 entries should all be identical, with BLNK1 for the site, and shipment day as the filter date. Change the status to “LB” and leave the analysis as “Ion.”

Replace the last ten network filters in Tray 8 with the 10 lab blanks, so that the tray check list matches the filters in the tray.

6.3 Tray Checking

6.3.1 Tray Checking

Confirm that each tray check list matches the inventory of filters in each tray. Print one copy of each sheet in the tray check list. Start with Tray 1. Open the first tray, with the

filters on the right and the empty lid on the left. Note the site and sample date of the first filter on the tray check list. Select the first filter in the upper left, position 1. Confirm a filter is present in the correct sample-side-up orientation, and that the filter information noted previously matches the tray check list. If a filter is present and the information matches, place a check before the filter IDX. Perform the same checks for each filter on the tray check list/filter tray, correcting any discrepancies as necessary. Continue on to each subsequent tray until the set is done.

6.3.2 Doubling

Have another lab technician or trained student assistant double check the trays using the same tray check procedure.

6.4 "C" Contractors

6.4.1 Acquiring the Last Filter of Last Shipment

In the freezer in the chemistry lab on the mezzanine floor, find the set number to be shipped by identifying the lowest set number for that quarter. Open the C-Carbon contractor's list for the last shipment (the tray check list for the last shipment sent out). The file name is CContractors[#offset].xls and is located in J:\User\AnnexRear\Mojica\ContractorFiles\Carbon. Go to "C_Sheet_8" and find IDX 50, the last filter of the shipment. The last filter from that list is the filter information needed for the next set.

Write down the site name, date, and status (CP, CS, or FP, FS). Close this file and do not save any changes.

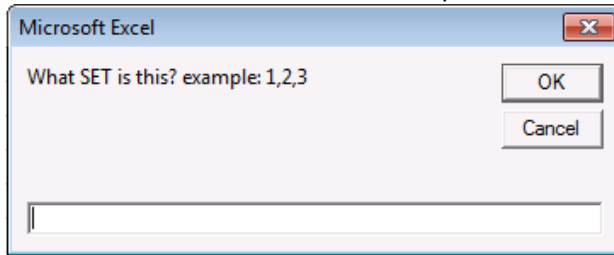
6.4.2 Running the Macro

Open JoseMACS Version **.xls, where ** is the latest version. It is located in J:\User\AnnexRear\Mojica\Contractor Files. To access the macro, press "Alt+F8." Select the "Carbon_Contractors" macro and click "Run."

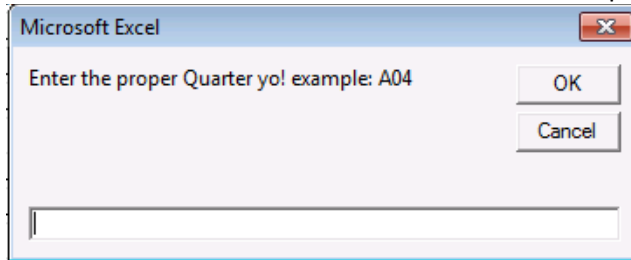
6.4.3 Entering Macro Information

The macro will ask for enough information to identify the last filter of the shipment. Follow the instructions in the input boxes. Be careful to enter the information in the exact format as the example. Following is the list of the parameters it will ask along with screenshots of the prompts:

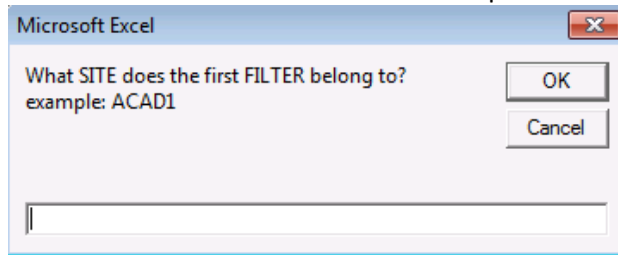
- 1) **Set.** Enter the desired set in number format. Example: 1.



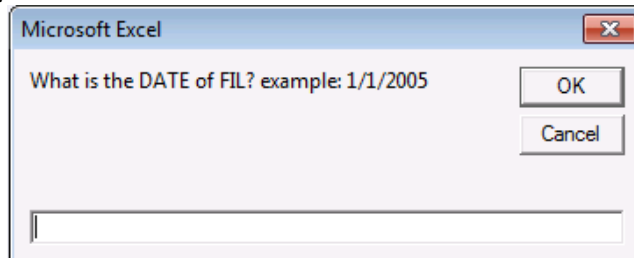
- 2) **Quarter.** Enter the Quarter desired in format 'QuarterYY.' Example: C12.



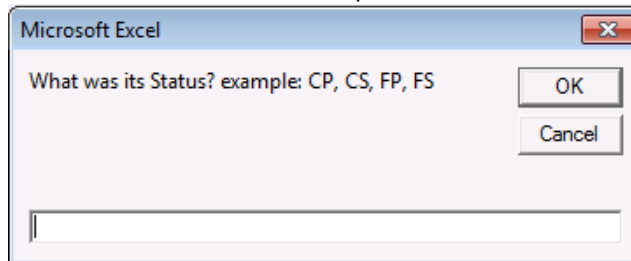
- 3) **Site Name.** Enter the site code for the first filter. Example: ACAD1.



- 4) **Sample Date.** Enter the sample date from the first filter in "*m/*d/yyyy" format. Example: 1/1/2013.



5) **Status.** Enter the status of the filter. Example: QD



6.4.4 Printing the Pages

Print a copy of each C-Sheet_[#] tab and the new file will be automatically saved. Any previous version of the set's tray sheets will be overwritten with the new one. Close the file and collect the new tray checking lists from the printer.

6.4.5 Tray Checking

See Section 6.3 for instructions on tray checking. Note that there are some additional statuses for C filters. These are as follows:

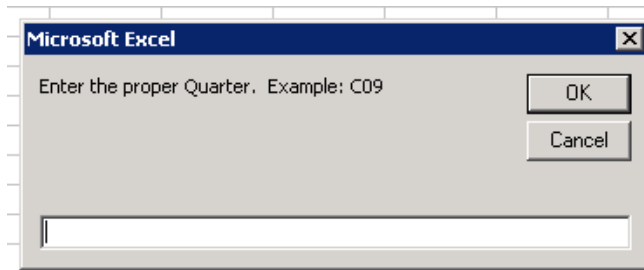
- CP: C-primary. Describes the quartz filter that air flow contacts first.
- CS: C-secondary. Describes the quartz filter that air flow contacts second.
- FP: FP-C, or field blank primary. Describes the quartz field blank that air flow contacts first.
- FS: FS-C, or field blank secondary. Describes the quartz field blank that air flow contacts second.

6.5 Preparing Contractor Files for Shipping Inactive C-Carbons

Inactive-C field blanks are sent out at the end of every quarter once all filters from the field for that quarter have been received, processed, and inventoried. For about ten select double-C sites, six double-C field blanks are loaded—a pair in the fourth position of each cartridge. Two pairs will be sent to DRI along with the sampled filters, but one pair will be set aside for archiving. These filters become inactive-C filters.

6.5.1 Running the Macro

Log into the "Contract" account on the old server. The password is "th9eWr!u." To generate the Inactive-C tray check list, open the "Download" Excel file on the desktop. Along the top-middle of the task bar, there is a green spade icon. Hovering over the icon with the mouse, the text box should read, "Inactive C's." Click that icon and enter the appropriate quarter.



6.5.2 Printing the Pages

Print a copy of each C_Sheet_[#] tab and the new file will be automatically saved. Any previous version of the quarter's tray check list will be overwritten by the new one. Close the file and collect the new tray check list at the printer.

6.5.3 Tray Checking

See Section 6.3 for tray check procedures. Note that the only statuses for inactive-Cs should be FP and FS.

6.6 Shipping Instructions for B-Ion or C-Carbon

6.6.1 Generating DBF Files

Because .dbf files can no longer be generated by the current Microsoft Office, all .dbf files must be generated on the old server, using the older version of Excel. Contact Crocker IT for further assistance logging onto the old servers. Open the appropriate Contractors file for the current shipment. Also open JoseMacs Version 2_06.xls, located in J:\User\AnnexRear\Mojica\ContractorFiles. With the contractor files open, access the macro by pressing "Alt+F8." Select the "'JOSEMACS Version 2_06.xls'!SaveDBF1.SaveDBF" macro and click on "Run." Do not confuse this with the "SaveDBFTest" macro. The macro will display a prompt for the correct set number, shipping date, and appropriate analysis option. For analysis option, choose either "B NM" or "C NM" depending on filter type. Please click "OK" to confirm options. For every complete set, the macro will generate eight separate DBF files, one for each tray. The 4-letter, 4-number file name will be the 4-letters of the site and its 4-number date, SITEMMDD. The generated DBF file will be located in U:\IMPROVE\LOGS\IONS or U:\IMPROVE\LOGS\Carbon. Place the DBF files into a new folder renamed with the quarter and set number, and file it under the correct shipment year and month. The macro will also update the Master List, located in U:\IMPROVE\LOGS\Ions\MasterList. The Master List records information for all shipped filters, their ship date, and their tray number.

6.6.2 Creating a Cover Letter

Open "RTI & DRI Cover Letter.xls" file which is located in J:\User\AnnexRear\Mojica\ContractorFiles. In the "SiteFetching" tab, confirm that the corresponding ion or carbon table information is correct. The data table with columns "SITE," "DATE," and Rows 1-8 for each tray should show the SITE name and sample date for the first filter in each tray check

sheet. All of this data will be pulled from “B Contractors” file under the “IONS” folder, or “C Contractors” file in the “Carbon” folder. These two files reflect the most recent tray check list for which .dbf files were generated. If anything is incorrect, make the appropriate changes. If there are any network link updates, the links may need to be updated. Any changes will automatically update relevant fields for the entire workbook.

For the B-ion cover letter, go to the “B Cover Letter” tab, and for C-carbon go to the “C Cover Letter” tab. The table in the upper left should reflect the same information as the “Site fetching” tab’s table checked previously. Below this table is a smaller table which contains the following:

Quarter	# of NPS
B06	400
# of ATT.	# of ARS
8	

Make sure that the Quarter is current. 400 represents the number of filters included the shipment, and 8 represents the number of trays. Make any relevant and necessary changes. Please leave “# of ARS” blank.

6.6.3 Generating Tray Labels

Go to the “Generate Tray Labels” tab and fill out the appropriate information in the upper left corner. Please note the warnings. Make sure that there is only one “Y” filled out for either “B” or “C” labels, or the sheet will error. The other entry should be “N.” Print the tray labels, and apply them to the shipment’s trays. The labels are generated Tray 1-7 on the left column, from top to bottom, with Tray 8 on the right column. Print the correct labels onto ULINE Premium Laser Labels S-8039. Apply the labels to the tops of the correct tray, on the left side over the “Pall Corporation” imprint, “facing” the right. Also make sure to remove the marked tray check list from each tray.

6.7 Preparing the Shipment

6.7.1 Printing the Hard Copy and File Copy

Prepare two sets of tray check lists with the attached cover letter. Print two copies of the appropriate cover letter and two clean copies of the previously-generated tray check lists. For each, staple the cover letter to the top of the tray check lists (stacked with Tray 1 at the top). Set one copy aside as the file copy, and fold the other copy into thirds as the hard copy. The hard copy will go into an envelope and will accompany the shipment. The file copy can be stored in the bottom drawer of the file cabinet in the upstairs Laser Room.

6.7.2 Boxing the Trays

Place all filter trays into a 1 ft. cube cardboard box, stacked Tray 1-4 from top to bottom on the left, Tray 5-8 from top to bottom on the right (if there are more than four trays). Include the enveloped hard copy in a watertight re-sealable bag, and use bubble

wrap to secure the trays. Quartz shipments must include an ice pack, covered in bubble wrap to prevent the cardboard from getting moist. Ice packs are located in the freezer in the chemistry lab on the Mezzanine floor. Securely seal the cardboard box with packing tape.

6.7.3 Printing Shipping Labels

Go to the UPS website and log into CampusShip. The username is: AqgLab and the password is: Aqg 1123. Make sure to include a space between the “g” and the “1.”

Ion shipment will go to Research Triangle Institute (RTI in the UPS address book).

Packaging: Other Packaging

Weight: 12 lbs.

Dimensions: 12 in. x 12 in. x 12 in.

Service: UPS 2nd Day Air

Declared Value: \$5000 (This package has “high value” requiring UPS to provide special handling)

Reference #1: SET[#][Quarter]BIONS

Reference #2: [user initials]

Carbon shipments will go to Desert Research Institute (DRI in the UPS address book).

Packaging: Other Packaging

Weight: 12 lbs.

Dimensions: 12 in. x 12 in. x 12 in.

Service: UPS Ground (this should arrive at the same time as the Next-Day Air service)

Declared Value: \$5000 (this package has “high value” requiring UPS to provide special handling)

Reference #1: SET[#][Quarter]CCARBON

Reference #2: [user initials]

When the shipping label is printed, two copies of the shipping receipt must be printed as well (sending one print job onto letter-sized paper should print two identical copies). Apply the shipping label to the outside of the box. One copy of the shipping receipt must be given to the UPS pickup driver. The other copy must be signed and dated by the same driver and stapled to the back of the file copy of the cover letter and tray check lists for record-keeping.

6.8 E-mailing

6.8.1 Sending the E-mail

For carbon shipments, open the “DRI email” tab in the “RTI & DRI cover letter” file, and for ion shipments, open the “RTI email” tab. Ion shipments will be addressed to Eva Hardison and all carbon shipments will be addressed to eaforcarbon@dri.edu. Copy and paste (values only) the e-mail template to a new e-mail sheet. The “To” and “Subject line” guidelines can be found above the template.

Confirm that the Quarter and Ship Date in the subject line, as well as in the e-mail template body, are correct. At the bottom, confirm each tray’s first filter site and date. Attach the correct previously-generated .dbf files.

Make sure Michelle Connor (MConnor@RTI.org) is copied in all Ion shipments.

6.9 Inactive-C Field Blanks

6.9.1 Generating DBF Files

For each sheet, manually highlight all fields with relevant information. Go to “Save as” and choose DBF (IV) as file type. Make a new folder and put it in the same archive directory as any other carbon shipment. Name the file by the quarter and year in the format: “[QYY] Inactive-Cs.” Also, manually add the filters to the carbon Master List below all routine C filters. Include tray number and ship date. Add “Inactive” to column H.

6.9.2 Creating a Cover Letter

Open “RTI & DRI Cover Letter.xls” file which is located in J:\User\AnnexRear\Mojica\ContractorFiles. If there are any network link updates, the links may need to be updated. Any changes will automatically update relevant fields for the entire workbook. Go to the “C Inactive Archiving” tab. Update data table in the upper left. The columns “SITE,” “DATE,” and Rows 1-8 for each tray should show the site name and sample date for the first filter in each tray check sheet.

Below this table is a smaller table which contains the following:

Quarter	# of NPS
B06	100
# of ATT.	# of ARS
3	

Make sure that the Quarter is current. “100” represents the number of filters included in the shipment, and “3” represents the number of trays.

6.9.3 Printing the Hard Copy and File Copy

Prepare two sets of tray check lists with the attached cover letter. Print two copies of the appropriate cover letter and have two copies of the tray check lists generated

previously. For each, staple the cover letter to the top of the tray check lists (stacked with Tray 1 at the top). Set one copy aside as the file copy, and fold the other copy into thirds as the hard copy. The file copy can be stored in the bottom drawer of the file cabinet in the upstairs Laser Room.

6.9.4 Generating Tray Labels

Go to the “C Inactive Tray Labels” tab. The labels are generated Tray 1-7 on the left column, from top to bottom. Confirm that the labels reflect the current quarter and the first filter information from each tray. Print the correct labels onto ULINE Premium Laser Labels S-8039. Apply the labels to the tops of the correct tray, on the left side over the “Pall Corporation” imprint, “facing” the right.

6.9.5 Boxing the Trays

Place all filter trays into a 1 ft. cube cardboard box, stacked Tray 1-4 from top to bottom on the left, Trays 5-8 from top to bottom on the right (if there are more than four trays). Smaller boxes will work as well. Include the enveloped hard copy in a watertight re-sealable bag, and use bubble wrap to secure the trays. Include an ice pack to keep the filters cold, but make sure to cover it with bubble wrap to prevent the cardboard from getting moist. Ice packs are located in the freezer in the chemistry laboratory on the Mezzanine floor. Securely seal the cardboard box with packing tape.

6.9.6 Printing Shipping Labels

Ship the Inactive C field blanks the same way as any other C Quartz filter shipment by following section 6.7.3, with the exception of changing Reference #1 to “[Quarter]InactiveCs.” If a smaller box is used, enter the correct dimensions and weight.

6.9.7 Sending the E-mail

Open the “C Inactive Email” tab in the “RTI & DRI cover letter” file. All carbon shipments will be addressed to eafcarbon@dri.edu. Copy and paste (values only) the e-mail template to a new-email sheet. The “To” and “Subject line” guidelines can be found above the template. Correct the quarter and ship date in the subject line, as well as in the e-mail template body. At the bottom, confirm each tray’s first filter site and date. Attach the correct previously-generated .dbf files.

TI 251M AD Tray Checking

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the procedure for preparing “A” filters for XRF and “D” filters for permanent storage. This procedure is applicable to “A” filters that sampled from January 2011 and on, and to “D” filters that sampled from December 2012 and on.

2. SUMMARY OF METHOD

After “A” and “D” filters have been post-weighed, they are placed in Petri dishes and labeled with a sticker designating the site name and sample date of the filters. Then, they are put into labeled Petri trays. When the trays are full, they are placed on a lab technician’s desk. A lab technician then runs the macro for the appropriate filter type and generates a tray check list. Filters are checked and arranged to match the order of the list. Trays are labeled with stickers to indicate set and tray number, and a hard copy of the tray list is printed and stored in the tray. “A” and “D” trays are stored in labeled boxes, which are placed in the chemistry laboratory on the mezzanine floor of Jungerman Hall.

3. CAUTIONS

Pay close attention when entering information into any macro. The information has to be in the exact format as the example shown in the input box. If an incorrect format is entered, the macro will not work correctly and an error will occur. If an error does occur, close the files and start over.

Be sure to enter the correct set number and the correct first filter information when generating tray check lists. A mistake in entering either one of these can cause significant confusion later on in processing.

4. PERSONNEL QUALIFICATIONS

Only trained laboratory technicians generate tray check lists for the “A” and “D” filters. Student laboratory assistants may perform the tray check process after training.

5. PROCEDURE

5.1 Acquiring First Filter for Updating Contractor Lists

- 1) Take note of which quarter and set need to be updated.
- 2) All Contractor lists are stored in J:\User\AnnexRear\Mojica\ContractorFiles. Open the contractor list file for the set previous to the one that needs to be updated. For “A” filters with completed sets, go into the “PM 2.5” folder. Then, click on the folder with the correct sampling year, and then the folder with the proper quarter. For “D” filters, click on the PM10 folder in the Contractor Files menu. For completed sets, click on the correct quarter folder. So, for example, if set 6 of quarter C12 for “A” filters needs to be updated, go to the C12 folder, which can be found by clicking on “PM 2.5,” “Teflons 2012” and “C12,” and open the “C12 A Contractor5” Excel sheet.
- 3) Once the file is open, go to the “Master” tab. The first filter in this list contains the filter information needed to update the next set.

- 4) Write down the site name, date, and status of the first filter. Close this file and do not save any changes.

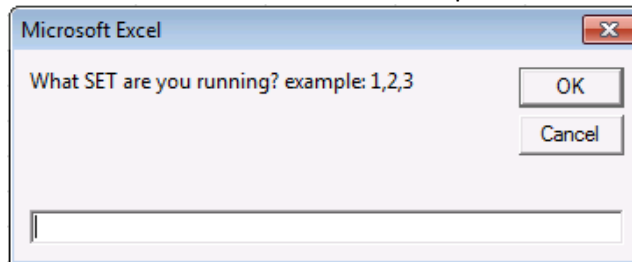
5.2 Running the Macros

- Located in J:\User\AnnexRear\Mojica\Contractor Files, open JOSEMACS Version 2_*.xls, where * is the highest version number. As of January 2013, it is version 2_06. To access the macros menu, press "ALT-F8." Select the "PM_25_Contractors" macro for "A" filters or the "PM_10_Contractors" macro for the "D" filters. Click "Run" after selecting the appropriate macro.

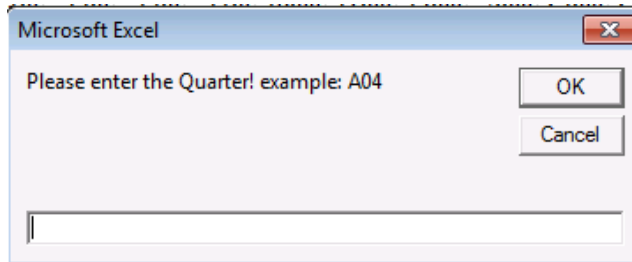
5.3 Entering the Macro Information

- The macro will ask a series of questions to generate the appropriate tray check list. Follow the instructions in the input boxes. Be careful to enter the information in the exact format as the example. Following is a list and screenshots of the parameters that both macros will ask.

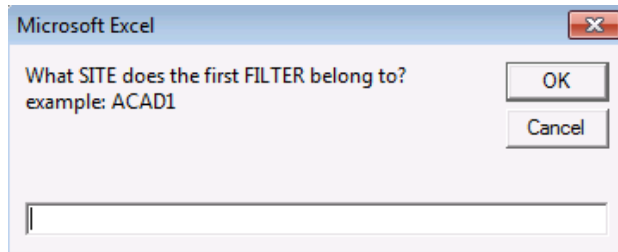
- 1) **Set.** Enter the desired set in number format. Example: 1.



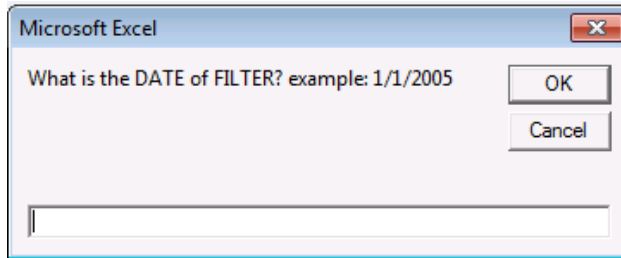
- 2) **Quarter.** Enter the Quarter desired in format 'QuarterYear.' Example: C12.



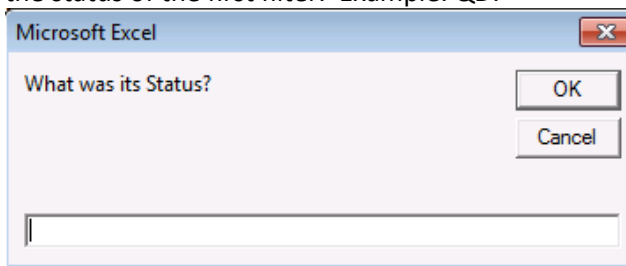
- 3) **Site Name.** Enter the site code for the first filter.



- 4) **Sample Date.** Enter the sample date from the first filter in “*m/*d/yyyy” format.
Example: 1/1/2013.



- 5) **Status.** Enter the status of the first filter. Example: QD.



5.4 Formatting the Pages

After the above information is generated, sheets labeled with tray numbers will generate. In Excel 2010, some formatting is required before the sheets can be printed, as the tray lists will not fit on one page. Click on the appropriate tray sheet and then double-click on the box in the top left corner to select all. Right click on a row cell and choose “Row height.” Change the row height from “15” to “12.75.” Then, go to the font menu and change the font to Arial and the size to 10. If desired, this formatting can be saved as default on user’s Excel accounts.

5.5 Printing the Pages

Go to the File tab and choose “Print.” Make sure the selected printer is Main Bay Copier. Print the page(s). The type of filter and the set and tray number should already be printed at the top of the page(s). If this information is missing, fill it in by hand with a black pen.

5.6 Tray Checking

After the lists have been printed, confirm that the contents of each tray match its corresponding list. Check that the site name and sample date is correct for each position in the tray. Initial the list and then fold it up and place it in the corresponding tray after the check is complete. Place the tray in a designated location in the sample handling laboratory. Once two sets are complete, place the trays in a box and take them upstairs to the chemistry lab on the mezzanine floor.

5.7 Managing Contractor Files

When a set of "A" filters is complete, go to the "J:\User\Annex Rear\Mojica\ Contractor Files\PM 2.5" directory. Move the corresponding Excel file for the set to the correct year folder (named "Teflons YYYY") and then to the correct quarter folder. If one or both of these folders do not exist, create them. Moving files into these folders eliminates the risk of them being overwritten. For a completed set of "D" filters, go to the "J:\User\Annex Rear\Mojica\ Contractor Files\PM10" directory and follow the directions above.

TI 251N Cleaning Loose Screens

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the equipment, supplies, and details needed to clean 25mm loose screens.

2. SUMMARY OF METHOD

25mm loose screens are cleaned using ethanol to remove any residue that may have accumulated during sampling. Loose screens used for quartz ("C") filters are kept separate from those used for Teflon® ("A" and "D") filters to avoid any cross contamination.

3. CAUTIONS

Make sure to use the appropriate forceps, cleaning jars, and containers for the screens being cleaned. Because the "C" screens are separated from the "A" and "D" screens, there are two sets of equipment to use so that no cross contamination can occur.

4. PERSONNEL QUALIFICATIONS

Only trained laboratory technicians may clean the loose screens. The Laboratory Safety course offered by EH&S is strongly advised and may become a requirement that must be completed before technicians can perform this procedure.

5. SAFETY

Ethyl alcohol can be absorbed through the skin and is irritating to the eyes. Nitrile gloves and safety glasses should be worn while performing this task. To reduce the dispersion of fumes, this procedure is completed in a fume hood located in the chemistry laboratory on the first floor of Jungerman Hall.

6. EQUIPMENT AND SUPPLIES

- Nitrile gloves
- Safety glasses
- Fume hood
- 2 Glass Jars with cover (1 for C screens, 1 for A+D screens)
- Drying rack with spill tray
- 2 forceps (1 for C screens, 1 for A+D screens)
- Ethanol (at least 97%)
- EH&S plastic container for ethanol waste
- 2 containers for cleaned screens (1 for Cs, one for A+D screens)

7. PROCEDURE

- 1) Put on gloves and safety glasses before beginning the procedure. Bring the used loose screens from the sample handling laboratory into the chemistry laboratory down the hall.

- 2) Pour the used screens into the appropriate glass jar; if cleaning quartz screens, use the designated quartz jar. If cleaning screens used with Teflon® filters, use the designated “A” and “D” jar. Fill the jar about $\frac{3}{4}$ full with screens.
- 3) Fill the glass jar with ethanol to approximately 1” above the level of the screens.
- 4) Cover the jar and swirl it in a clockwise manner for approximately one minute.
- 5) Dispose of used ethanol into the approved container marked for waste.
- 6) Pour out screens onto the drying rack, spacing them apart with the designated forceps appropriate for the screen type.
- 7) Leave the screens on the rack until they are dry.
- 8) Transfer the screens into the designated container for clean screens and then seal it. Bring the clean screens back into the sample handling laboratory.
- 9) Waste disposal: Leave one inch of head space in the ethanol waste container. Once this level has been reached, contact EH&S for pickup by filling out an online request at: <http://safetyapps.ucdavis.edu/EHS/wasterequest/index.cfm>

8. ADDITIONAL RESOURCES

For more information on waste disposal, visit the EH&S Hazardous Waste Management website. <http://safetyservices.ucdavis.edu/ps/hmhwm>

TI 2510: Closing the Quarter

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe how to “close” the current sampling quarter. This procedure is to prepare the information for the current quarter in logs.dbf to be uploaded to the SQL server.

2. SUMMARY OF METHOD

After all filters for the current quarter have been collected, all nylons and quartz are shipped and “A” filters are inventoried. All status adjustments are entered and weights for the “A” and “D” filters are reviewed and validated. The logs.dbf and weights.dbf files are packed and prepared for upload. The Database Manager is notified so that the information can be uploaded to the SQL server.

3. CAUTIONS

Be aware that working with files in the U:\ drive is extremely risky. Any errors that may occur can cause problems for lab equipment or analysis. Be extra careful when deleting or moving files. The actual process of packing and closing the quarter can take up to ½ an hour. Work with Logs and/or Weights is limited to one user, so caution must be taken not to hold up any group or balance.

4. PROCEDURE

4.1 Naming Conventions

Quarters are named as follows:

A[YY]: March[YY], April[YY], May[YY]

B[YY]: June[YY], July[YY], August[YY]

C[YY]: September[YY], October[YY], November[YY]

D[YY]: December[YY], January[YY+1], February[YY+1]

I.e. The D11 quarter includes December 2011, January 2012, and February 2012.

4.2 Confirming All Filters Have Been Received

Open up “JoseMACs Version 2_06.xls” or latest version located in J:\User\AnnexRear/Mojica/Contractor Files). Access the macro by pressing ALT+F8. Select the “Late_List” macro and click on “Run.” The list initially generated will show all filters with the “SO” (sent out) status assigned. These boxes have not been entered, and therefore not processed in the lab. Filter the “SamDat” (Sample Date) column to all filters in the Quarter about to be closed. To close the quarter, all associated filters must have been received and entered (not have an “SO” status). Contact anyone in charge of special studies to verify that all sites have been entered.

4.3 Running the Recent Problems Macro

Open up "JoseMACS Version 2_06.xls" or the latest version of JoseMACS located in J:\User\AnnexRear\Mojica\ Contractor Files. Access the macro by pressing ALT+F8. Select the "Recent_Problems" macro and click "run." Enter the "Start Date" using the example for formatting. The "Start Date" should be one or two days before the first sample of the quarter being closed. Enter the "End Date" using the example for formatting. The "End Date" should be one or two days after the last sample of the quarter being closed. Select to view by "Season Quarters." Select "no" to show all statuses. Using the two tables generated, review all QD statuses. When appropriate, change the status to "NM" or a terminal status (PO, EP, NS, XX, OL). In certain situations, such as with filter holes or dropped filters, the statuses may remain QD. Consult with the field maintenance supervisor for equipment-related QD statuses. To close the quarter, all associated QD statuses must be cleared.

4.4 Completing All Status Adjustments

Refer to the Status Adjustment section of the "General Laboratory Procedures" SOP located in K:\Lab Gravimetric\IMPROVE Sample Handling Laboratory SOPs for logging and changing statuses for status adjustment sheets. To close the quarter, all associated status adjustment sheets must be reviewed and cleared.

4.5 Shipping All B and C Filters

Refer to the "Shipping B and C Filters" SOP located in the K:\ drive to ship out all B, C, and Inactive-C filters. To close the quarter, all associated B and C filters must be shipped to their respective contractors.

Once every filter is shipped, rename the Master List, located in U:\IMPROVE\LOGS\ IONS\MasterList, to show the correct quarter, using the format "[QYY]Master List." File it under the appropriate folder.

4.6 Inventory All "A" Filters

Refer to the Tray Checking "A" Filters SOP located in the K:\ drive to tray check all "A" filters for the XRF group. To close the quarter, all "A" filters must be inventoried.

4.7 Inventory All Terminal Status Filters

To close the quarter, all terminal status (Problem) filters must be inventoried. These may be packed into boxes and stored elsewhere if the lab requires more space; there may be space in the Annex Lab or Cobalt. Though there is no inventory list for terminal status field blanks, store these in a separate tray and store them with other terminal status filters of the same quarter.

4.8 Relocating "D" Petri Trays

Once all "D" filters have been weighed and put into their respective Petri trays, they may be packed into boxes and stored elsewhere if the lab requires more space. There may be space in the Annex Lab to store them.

4.9 Check with the Field Maintenance Supervisor

To close the quarter, all equipment-related problem log sheets for the quarter must be double-checked. Contact the field maintenance supervisor.

4.10 Validating Weights

To close the quarter, all weights must be reviewed through SWAP and cleared. Perform the weight validation procedure listed in the SOP for General Laboratory Procedures in the K:\ drive.

4.11 Important Information for Closing the Quarter

4.11.1 Working with Logs.dbf and Weights.dbf

Be aware that working with files in the U:\ drive is extremely risky. Any errors that may occur can cause problems for lab equipment or analysis. Pay close attention to all work performed in the U:\ drive. Be extra careful when deleting or moving files. The actual process of packing and closing the quarter can take up to ½ of an hour. Work with Logs.dbf and Weights.dbf is limited to one user, so caution must be taken not to hold up any group or balance.

4.11.2 Backing Up Files

Before working with the current Logs.dbf and Weights.dbf files, create easily accessible backup copies (i.e., in J:\ drive). Logs.dbf is located in U:\IMPROVE\Log and Weights.dbf is located in U:\IMPROVE\Weights.

4.12 Closing the Quarter

4.12.1 Packing Weights.dbf

Enter the following lines, one at a time, into the FoxPro® command prompt, editing the fields highlighted in yellow. The date format is (YYYY-MM-DD). The filtered date range must start one or two days before the first sample of the quarter, and end date must be one or two days after the last sample of the quarter.

```
USE U:\IMPROVE\weights\weights.dbf EXCLUSIVE  
SET FILTER TO SAMDAT>={^2012-06-01} AND SAMDAT<={^2012-09-01}  
PACK  
SORT ON SITE, SAMDAT, STRTIM TO U:\IMPROVE\weights\temp.dbf  
DELETE ALL  
PACK
```

USE

Enter the following lines, one at a time, into the FoxPro® command prompt, editing the field highlighted in yellow. Refer to section 4.1 for correct naming conventions.

USE U:\IMPROVE\weights\temp.dbf EXCLUSIVE

COPY TO U:\IMPROVE\weights\B12wts.dbf TYPE fox2x

USE

4.12.2 Packing Logs.dbf

Enter the following lines, one at a time, into the FoxPro® command prompt, editing the field highlighted in yellow. Refer to section 4.1 for the correct naming conventions.

USE U:\IMPROVE\logs\logs.dbf EXCLUSIVE

SET FILTER TO SAMDAT>={^2012-06-01} AND SAMDAT<={^2012-09-01}

PACK

SORT ON SITE, SAMDAT, STRTIM TO U:\IMPROVE\logs\temp.dbf

DELETE ALL

PACK

USE

4.12.3 Locating the Packed Files

The newly packed log file is located in U:\IMPROVE\Logs and the newly packed weight file is located in U:\IMPROVE\weights. Both files can be distinguished by the file name assigned in the above 2 steps.

4.12.4 Notifying the Database Manager

Log on to <http://cl-ds.ou.ad3.ucdavis.edu/Analysis%20Data/Forms/AllItems.aspx> using Kerberos username and password (or passphrase). The Kerberos account must have permission to upload files. Upload the two new [QYY]Logs.dbf and [QYY]Weights.dbf files from section 4.12.3. Select "CNL" as the source. To access any closed-quarter data through the SWAP program, the database manager must be notified so that the two .dbf files are imported into SQL. There are a few days of turnaround time, so schedule the closing of a quarter appropriately.

TI 251P: General Laboratory Procedures

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to detail procedures used often in the sample handling lab that lab technicians must perform but do not fit in a specific category. They are general tasks that are performed on a regular basis to keep operations running smoothly in the lab.

2. SUMMARY OF METHOD

Many small tasks must be performed on a regular basis to ensure lab operations run smoothly. These include making new and replacement flashcards, destroying old ones, creating all types of stickers, creating purchase orders, "validating" and replacing weights, entering status adjustments, handling bad field blanks, and closing the quarter after all samples have been collected.

3. CAUTIONS

When making changes to weights in SWAP, pay very close attention to make sure the weight is entered correctly and in the appropriate cell.

When making new flashcards, be sure to choose numbers that have not been used before, especially when making replacement cards.

4. EQUIPMENT AND SUPPLIES

Due to the number of different tasks described in this SOP, supplies are described in each individual procedure.

5. PROCEDURE

5.1 Creating New Flashcards and Destroying Old Ones

Each IMPROVE site has designated flashcards that are only used for that site. The number of designated cards per site depends on the box cycle rotation for that site. Sites that have 2 blue boxes also have 2 designated flashcards, and 3-box cycle sites (mostly mail sites) have three designated flashcards. Sometimes a card is lost or damaged and a new card must be assigned. Other flashcards, called replacement cards, are sent out to sites when the designated cards are late returning to the lab. Flashcards that no longer function properly are noted and discarded.

5.1.1 Site Cards

When making a new flashcard, identify the next flashcard ID number to use. The simplest way to do this is to access SWAP (U:\IMPROVE\Programs\NewSwap.app), find the appropriate site name, and press "Log Status." Press F1 for full logs. Scroll to the left to the column called "FlashCode." Check to see what other flashcard numbers are in use for that site (excluding the one that is being retired). If it is the start of a quarter, press "Esc" and enter the previous quarter. This will provide a better picture of which flashcards have been used.

Some ID numbers will end in "0" and some will end in "1." IDs that end in "0" are used for Kodak® cards and those that end in "1" are used for Transcend® cards. Kodak® cards are no longer being introduced; only IDs ending in "1" should be used for new cards.

The first four digits of the flashcard ID will always remain the same, as that is the site's UCID. The 5th number is typically the one that changes. For example, if the flashcards in use are UCID401 and UCID501 and the -401 card needs to be retired, the next card should have an ID of UCID601. If the 5th number will exceed 9, change the 5th number to 1 and the 6th number from "0" to "1." Now this 6th number will change with ever new card instead of the 5th.

Once a new ID number has been decided upon, retrieve the label maker (usually stored by the Quality Control station). Two labels are needed for the flashcard.

Turn on the label maker. For the first sticker, type in IMPROVE, then press "enter" and type the site code. The display will not show two lines. After the label has printed, press the "cut" button on the top right side of the machine. Trim the edges of the sticker so that it will fit on the side of the flashcard. Erase the type on the display by pressing the "backspace" button. Then, enter the new flashcard ID and press "PRINT." Cut the sides of the sticker to fit to the card.

Retrieve a new Transcend® flashcard. Apply the site sticker to the side of the card that says "Transcend" and "128 MB." Apply the other sticker to the reverse side of the card.

5.1.2 Replacement Flashcards

Replacement cards do not have a designated pattern to their ID numbers, but there are several guidelines to follow. The number needs to be 7 digits long and should end in "1." The sixth number cannot be "0." Alternating numbers are preferred (ex. 7474741). It should not be identical to any other replacement card ID. The easiest way to determine if a flashcard ID is already in use is to sort the flashcard ID column in the "Replacement Flashcards" tab of the "Replacement Log" (J:\User\AnnexRear\Kawamoto\Lab Instructions\Replacement Log.xls).

Follow the steps described above to make new labels; however, for the first label, type "REPLACEMENT" instead of a site code.

5.1.3 Destroying a Flashcard

Flashcards that will not be used in the field anymore due to malfunction or damage are destroyed.

Go to IMPROVE Database Manager (<http://improve.crocker.ucdavis.edu>) and press "Network," and then "Problem." For the "Sampler" cell, type "FLASH" and press "Search." This will bring up a list of destroyed flashcards. Click "Edit" on the top entry and then highlight and copy the entry. Press "Save." Then press "Add New" and paste the entry. Delete the rows below the column header and fill in the flashcard information, including site, flashcard ID and the reason why it is being destroyed. Then note the new flashcard ID that is replacing the old one. Save the entry. The old flashcard can now be discarded.

5.2 Purchase Orders

Purchase orders for the sample handling lab are typically created by one designated lab technician. The current purchase order template is located in J:\User\AnnexRear\Kawamoto\Purchase Orders\PO TEMPLATE.xls. At least once a year, administrative staff sends a new template to keep CNL account numbers and other important information updated.

Fill in the information that has blank boxes. For the “To” box, put in the company name and information. If contact with a representative has been made, put their name and contact information in this box. The “Ship to” box should include information for the person making the purchase order. The invoice box should be filled in with the information for the administrative staff member in charge of invoices.

Leave the next few boxes as default. Name and phone number of the person creating the purchase order should be filled in the technical contact box.

The “Tax” column should always have “Y” entered. Fill in the item number and quantity. Also fill in the unit (this information can typically be found on the vendor website. Fill in the description box—this can usually be copied and pasted from the vendor website as well.

Finally, fill in the catalogue number and unit price. The total price will be calculated automatically. Print the form and have either the principal investigator or laboratory manager sign it. Then, turn it in to administrative staff at the front desk.

5.3 Replacement Boxes

Sometimes a box does not arrive in the lab in time to be downloaded and prepared for another cycle. When this happens, a replacement box is sent out.

To prepare a replacement box, start by pulling one of the replacement bins from the bottom of the bin rack in the sample handling lab. Replacement bins are not labeled and have 3 weeks’ worth of cartridges. Make sure the orientation is correct for the box cycle (dot or non-dot). Write the name of the site on a sticky note and place it on the front of the bin. Collect the cassette and week bag stickers for the site from the file cabinet by the POST station and place them in the bin. Place the bin at the Q/A station.

Then, go to J:\User\AnnexRear\Kawamoto\Lab Instructions\Replacement Log.xls. Click on the “Replacement Boxes” tab and scroll down to the first available row. Enter the site name and first installation date. Then, choose a replacement card from the stack on the file tray located on one of the lab technicians’ desks. Type in the ID for the replacement flashcard. Then, press the “Replacement Flashcards” tab. Enter the card number, site, and first installation date of the box.

Write the name of the site on a post-it and place it on the flashcard. Take the flashcard to the flashcard box at the PRE station so that it will be available for the uploader. After the box has been uploaded, open SWAP, select the site, and press “Log Status.” Press “F1” for full logs. Scroll over to the “Flags” field for the dates of the uploaded box. Type “Replacement Box—Remove from Circulation” and initial it. Press CNTRL+C to copy the comment and then paste it in the remaining six rows. This will remind the downloader after the box returns to remove it from circulation.

5.4 Weight Validation

Before closing the quarter, weights are reviewed. Go to J:\User\AnnexRear\Kawamoto\Filters\Weights Report.xls. This macro shows weight differences and ratios for the current quarter’s samples. Open the file and press “ALT+F8” to bring up the macro menu. “Weight Report” should be highlighted. Press “Run.”

The macro will take around a minute to run. When finished, it will display all the “A” filters for the current quarter, the differences between the POST- and PRE-weights, and the ratio

between the "A" and the "D" filters for that sample day. The "D" filter information has been sorted out so that the ratio function works properly, but it is possible to re-sort the data and show the "D" filters." Note that the ratios for the "D" filters will be incorrect, but the weight difference will be right.

The main things to look for are mass difference ratios between the "A" and the "D"s and the outlier mass differences.

For the mass difference ratios, check for values that are less than 0.5 ("A" mass difference is twice the "D" or more) or greater than 5 ("D" is 5 times the "A" mass difference), the values should be highlighted in red for review. Check to see if one of the modules had a sampling issue or if it is possible that a filter swap occurred. Review surrounding sample dates for that site and for past quarters through SWAP. If the ratio is similar across a long span of time, it is likely not an issue. Refer to a more experienced lab technician or talk to the field maintenance supervisor for help with further troubleshooting.

For the weight differences, start by filtering the "channels" column to include both the "A" and the "D" channels. Then, highlight the "Difference" column. Change the fill to yellow and the font to red. Go to "Conditional Formatting" and then to "Highlight Cells Rule." Click on "Between..." Enter "0.010" in the left cell and "3" in the right cell. For the font and fill, choose "Custom Format" from the drop-down menu. Choose "no color" for fill and black for the font. Then press "OK." Now, values that do not meet criteria will have a yellow background and red font. Go to the PSTBALWT column and de-select "0.00" to eliminate any filters that have not been POST-weighed.

When a weight is low (below 10 µg), examine surrounding weights to see if the pattern is typical. If it does not appear to be, re-examine the data for that filter to ensure that it is sampled properly. Sometimes a weight will have been repeated for several filters. In this case, weigh the filters in question and change the weights to their appropriate values. If a weight is very negative or very high, check surrounding weights to see if there was a possible filter swap. If it appears that a filter has an unknown pre-weight due to weight differences that cannot be explained by a filter swap or other issue, assign that filter a status of "UN" for missing weight analysis. For assistance with troubleshooting, please refer to an experienced lab technician or the field maintenance supervisor.

5.5 Replacing Weights

Sometimes during the Quality Control check, a filter is found with a hole in it or particles that will not come off. Sometimes two filters will be too close in weight. When things like this happen, the student assistant changes out the filter for a new one and notes the new weight. The log sheet with the new weight is given to a lab technician, as the new weight needs to be entered into the weights.dbf file.

Start by going to the Sample Comments document located in J:\User\AnnexRear\Mojica\Lab Projects\Sample Comments.doc. Copy the "FIL Weight Too Close" comment. Then, go to the Problems File (<http://improve.crocker.ucdavis.edu>). Go to the "Network" menu and choose "Problem." Enter the name of the site for the filter. Click the "Add New" option at the first entry. Paste the comment into the box. Make pertinent changes to the comment (name of person entering the adjustment, initials of person at Quality Control, problem with the filter, channel, sample date, old and new weight (if "A" or "D"), balance filter was weighed on (if applicable)). If

more than one filter is being adjusted, change the number in the upper left corner in the parentheses to match the number of filters being modified. Make sure each filter has its own row. Save the comment.

Open SWAP (U:\IMPROVE\PROGRAMS\NewestSwap Testing.app). Select the site for the filter and press the "Weights" button. Scroll down to the appropriate sample date and module. Carefully change the weight. Make sure to type the new weight correctly and in the appropriate cell. Make sure to "Tab" or click out of the cell so that the new weight will save, then press "Esc." The weight adjustment is now complete.

5.6 Invalid Field Blanks

Field blanks do not have their own status; instead, they share a status with the main filter they correspond with. When a field blank is damaged or significantly contaminated and the main filter is good, the best route is to remove the field blank completely. Go to the Sample Comments document (J:\User\AnnexRear\Mojica\Lab Projects\Sample Comments.doc) and go to the second page. Copy the "Remove Damaged FB" comment. Go to the Problems File (<http://improve.crocker.ucdavis.edu>) and choose "Problem" from the "Network" drop-down menu. Enter the site for the field blank and press "Enter." Click "Add New" and paste the comment. Make any relevant changes to the comment so that it matches the field blank. Make sure to include the reason why the field blank is being removed. Save the comment.

Go to SWAP (U:\IMPROVE\Programs\NewSwap.app). Select the site for the field blank and press "Log Status." Go to the "FBChan" column and find the field blank. It will be in the row for the main filter it corresponds to. Delete the information. Tab to the next cell and then press "Esc."

If it is an "A" or a "D" filter, the weight for the filter also needs to be deleted. Go to the "Weights" button in SWAP. Find the weight for the field blank. In the far left column, there are small white boxes next to each sample. Click on this box for the field blank and it should black out. Then press "Esc." The weight should be deleted.

5.7 Status Adjustments

Status adjustments are performed whenever the status of a filter changes after its information has been entered into logs.dbf. This is done by changing the status in Logs and adding a comment to explain they the status was changed. A comment detailing the change is also added to the Problems File in case any mistake is made making changes in Logs.

There are two important points to remember when making status adjustments:

- 1) When a change in LOGS is made using the SWAP program, make sure to exit the cell being worked on by either pressing "Tab" or clicking on another cell. Otherwise, the change made will not be saved. Also, be very careful to make changes to the correct site, date, and channel.
- 2) It is important to follow a standardized way of commenting in LOGS and creating a Problems File entry so searches for information can be done efficiently. Use templates whenever possible.

The following steps describe how to change the status in LOGS:

- 1) Open the file named "2011 Comment Database.xls." It is located in U:\IMPROVE\LOGS\Status Flags.
- 2) Go to U:\IMPROVE\Programs and open the program "NewSwap.app."
- 3) Select the name of the site for the filter in question.
- 4) Make sure the quarter is correct. If it is not, change it.
- 5) Now go to the Comment Database file opened in Step 1. Select the appropriate comment and copy it. Also make a note of the status that corresponds to the comment (NM, QD, XX, etc.).
- 6) Now go back to the SWAP program and press "Log Status." If multiple entries for the same site and date appear, press F12. This will hide all extra entries.
- 7) Locate the site and date for the filter. Go to the comments field and paste the comment. LOGS may truncate the field, so minor adjustments to the text may need to be made to consolidate. Make sure the channel for the filter is noted in the comment.
- 8) Go to the column "AF1NM" and overwrite the status with the new status that correlates to the comment.
- 9) Tab or click out of the cell. Press "Esc" to save and close LOGS.
- 10) NOTE: The SWAP program accesses the current LOGS file directly. While LOGS is open, the balances in the sample handling lab and other employees cannot access it. Do not stay in LOGS for long. After changes for a site have been made, press "Esc." If many status adjustments are needed for a site, make 1 or 2 changes and then close the program. Wait for a few seconds to allow the balance applications to write to LOGS, and then re-open LOGS and continue.

The following steps describe how to make a status adjustment entry in the Problems File:

- 1) Go to the IMPROVE website: <http://improve.crocker.ucdavis.edu>. Click the "Logon" button and sign on. It accepts Kerberos usernames and passphrases.
- 2) After logging in, choose "Problems" from the "Network" drop-down menu.
- 3) Enter the site name for the filter.
- 4) Go to the "Sample Comments" document located in J:\User\AnnexRear\Mojica\Lab Projects. Copy the correct comment. Close the document.
- 5) Go back to IMPROVE DB and paste the comment. Adjust information as needed to match the filter. For the reason why the status is being adjusted, use the same comment from "2011 Comment Database.xls" that was also used in LOGS.
- 6) Press "Save."

To print new status adjustment sheets, go to J:\User\AnnexRear\Kawamoto\Stickers.

5.8 Printing the Stickers

5.8.1 Cassette Stickers

For cassette stickers, go to J:\User\AnnexRear\Kawamoto\Stickers. Choose the correct cassette label file depending on cycle (2-3-2' or 3-2'-2). Press "Enable Content" if needed. Open up the correct tab (ABCD for normal sites, Double-C for double C sites, X-Site, C-only,

etc.). Type in the site name(s) that need stickers. Enter the position number for the quarter and sample date for the first filter. Make sure the number of samples in the quarter is correct (30 or 31).

Check the stickers to make sure everything looks OK. Then, click on "File" and press "Print." In the "Print" menu, make sure the IMPROVE lab printer is selected. The file will automatically attempt to print ten sheets, so modify the number of pages printed so only the active sheets will print. Click Printer Properties and change the source to "Manual Feed" in Tray 1. Press "Print" and feed the printer blank cassette sticker sheets. After printing, color the sticker sheets by drawing a line down the middle of the "A" column with a red Sharpie, down the middle of the "B" column with a yellow Sharpie, "C" column with a green Sharpie (both columns for double-Cs), and "D" column with a blue Sharpie.

For X mods, print the main site stickers first. Then, fill in the cassette sticker information for the X-mod using the correct tab. Then, when printing the stickers, feed the sheet with the main stickers printed on it into the printer. Put the sheet in sticker side up with the top of the sheet facing the printer. The X-mod information will be printed in the middle blank rows of the sheet. NOTE: If the main sheet has double-C stickers, there will be no empty rows in the sheet. In this case, print the X stickers on their own sheet.

File the colored stickers away into their respective folders in the file cabinet by the POST-station.

5.8.2 Week Bag Labels

To print labels that go on the week bags, go to J:\User\AnnexRear\Kawamoto \Stickers. Choose the "New Bag Labels" Excel file that corresponds to the correct cycle for the box in question (2-3-2' or 3-2'-2) . If more than one site needs week stickers, use the "Batch Site" tab. Enter in the sites and the first install date. Note that if one of the sites is BALA1 or WHPE1, this will require using the "Single Site" tab, as these sites have a Thursday installation date. If only one site needs printing, also use the "Single Site" printing. Use yellow stickers for 2-3-2' boxes and green stickers for 3-2'-2. The stickers are 2-5/8 in. X 1 in. Print following the same steps as the cassette stickers in section 5.8.1.

5.8.3 Box Top Stickers

For the box stickers that go on the top left of the box, go to J:\User\Annex Rear\Kawamoto\Stickers. Choose the "New Box Top Labels" file that is correct for the box cycle (2-3-2' or 3-2'-2). For labels for multiple sites, use the "Batch site" tab. If printing labels for only one site or for a Thursday install site, use the "Single Site" tab. Print following the same steps as the cassette stickers in section 5.8.1. Use the same labels as the Week Bag labels. Use yellow stickers for 2-3-2' boxes and green ones for 3-2'-2 boxes.

5.8.4 Box Stickers

For the large stickers that are placed on the sides of the blue boxes, go to J:\User\AnnexRear\Kawamoto\Stickers and choose either "Box Side Stickers 2-3-2'.doc" or "Box Side Stickers 3-2'-2" depending on the cycle. Find the page containing the needed site stickers, or create a new site label at the bottom of the document. Print the page, making sure

to use manual feed. In general, use yellow 4 in. X 2 in. yellow labels for dot boxes and green 4 in. X 2 in. labels for non-dot boxes. If the labels being replaced on a box are pink, make sure to print on pink stickers.

5.8.5 Slide Stickers

To create slide stickers for a quarter, go to J:\User\AnnexRear\Mojica\Contractor Files\JOSEMACS Version 2_06.xls. If there is a higher version of JOSEMACS, use that one. Once the Excel file is open, press ALT+F8 for the macro menu. Choose "Stickers." A warning may appear that the procedure will take seven minutes; note that the macro takes about a minute or two to work. Enter the first sample date for the quarter. Then, the macro will ask if the quarter has 31 samples. Choose the appropriate response depending on the quarter. Some tabs will appear. "1-20" has slide stickers for the first 20 samples for both "A" and "D." The "21-30" tab has the 21st-30th sample dates for both modules. If there are 31 samples in the quarter, there will be an additional tab for the 31st sample stickers. Print them using slide stickers, which are stored in the file cabinet in the Chemistry Laboratory on the Mezzanine floor. After they are printed, have student lab assistants separate the slide stickers according to site by using the paper cutter or scissors. For the 3rd position stickers, just separate the stickers after every 2nd cell across the row. For "A" slides, draw a line with a pink highlighter; for D's, use a blue highlighter. For "X" slides, use an orange highlighter. Staple "1-20" and "21-30" stickers for each site together. The "31" slides will be stickered separately and added to slide trays later.

5.8.6 Slide Box Stickers

For slide box stickers, go to J:\User\AnnexRear\Kawamoto\Stickers and choose "New Slide Box Labels.xls." Press "Enable Content" if necessary. Enter in the slide quarter and the channel. Print the stickers, making sure to use the "manual feed" option for the printer. The stickers are white 4" X 1" stickers. Make sure to put the sticker sheets in sticker-side up. Print out Field Blank stickers as well. These are not automatically generated and will need to be added to the electronic document manually before printing. As of 2013, only "D" slide tray stickers are printed.

After the stickers are printed, they will need a small sticker added to them between the quarter and channel. These small circular stickers can be found in the file cabinet by the PRE station. "D" slide boxes should have small blue stickers. The slide box stickers are then ready to be applied to the slide trays.

5.8.7 Quality Control/Shipping Stickers

The template for the stickers used at the Quality Control/Shipping station can be found in J:\User\AnnexRear\Kawamoto\Stickers\LeakCheckInitials.doc. Print the stickers, making sure to select manual feed. Place the sticker sheets in the printer sticker-side up.

5.8.8 Bin Labels

Labels for site bins can be found in J:\User\AnnexRear\Kawamoto\Stickers\ New Bin Labels Small.xls. Click on the "Batch Site" tab and enter the site names for sites that need

labels. Print using manual feed. Use the appropriate color sticker as designated in the box to the right in the file.

5.8.9 XRF Tray Stickers

After the filters have gone through XRF, they are placed in slides and are stored in trays. Unlike the “D” trays, the “A” laser trays are organized by month, with 4 sites per tray. These trays have front and side stickers that must be printed.

- 1) Go to U:\IMPROVE\LOGS. Create a copy of Logs.dbf and put the copy on the desktop. If the month needed is within a quarter that has been closed, go to U:\IMPROVE\ARCHIVE\LOGS and look for QYYLOGS.dbf (ex: A09Logs.dbf). Sometimes, if the quarter was very recently closed, the QYYLOGS.dbf will still be in U:\IMPROVE\LOGS.
- 2) Close the U:\IMPROVE\LOGS (or \ARCHIVE\LOGS) window. Change the name of the copy to COPYQYYLOGS.dbf (ex. COPYA09LOGS.dbf).
- 3) In Excel, open the file on the desktop. Since this is a copy, changing and saving the file is OK.
- 4) To make the spreadsheet easier to work with, go to the toolbar and click on “Data,” then “Filter.” This will create a drop-down menu for each column.
- 5) Next, click on the blank gray box above Row 1 and to the left of column A. This will select the entire document.
- 6) Now double-click on the line that separates column A and column B. This will enlarge all cells so that all of the text in the cells is displayed. Now, click on any cell to un-select the entire document.
- 7) Not all of the data in this file is needed. Delete the two columns between SITE and SAMDAT (WEEK and DAY). Then delete all the columns between SAMDAT and AF1NM.
- 8) Click on the arrow next to the cell labeled SITE in A1. A menu will appear. Scroll up and click on “Sort A to Z.”
- 9) Click on the arrow next to the cell labeled SAMDAT and select any date for the month that needs stickers. This will generate a list of every site that sampled during that month.
- 10) Click on the arrow next to the cell labeled “AF1NM” and select “TextFilters,” then “does not equal...”
- 11) In the Custom AutoFilter box, “does not equal” should be selected in the box to the left. In the box to the right, choose “NA.” Then, press “OK.” The term “NA” stands for “Not Applicable.” By doing this filter, any site that does not have an “A” channel (like C-only sites or X-mods that are not Teflon® 2.5pm).
- 12) In U:\IMPROVE\TRAYFILE\STICKERS\TEMPLATES, open the Excel workbook called, “Sticker Headquarters.xls.”
- 13) Notice all the tabs that point to different sheets at the bottom of the workbook. Begin with the “START” sheet.
- 14) As per the instructions on the sheet, type the desired month and year (MY) in B2. Then, type the name of the month in C2.

- 15) Now go back to the COPYQYYLOGS workbook. Copy the entire list of sites in column A and paste it in column A of Sticker Headquarters.
- 16) Every sheet in the Sticker Headquarters workbook will be updated to the desired quarter, month, and site list.
- 17) The side stickers for the trays are automatically made. Go to the "SIDE" sheet and print stickers from there. Only columns C-E will print. Remember to use manual feed. It is easiest to use the printer in the IMPROVE weight lab. If the month has 11 samples per site, the side stickers needed for the trays that hold the 11th position will be automatically generated as well. Go to the sheet "SIDE(11)" and print from there.
- 18) Creating stickers for the front of trays is more work-intensive. Save Sticker Headquarters.xls as MYYStickerHeadquarters.xls in the U:\IMPROVE\Tray File\Stickers\YYYY\QYYfolder. Create new directories as necessary. Then, open a new MS Word Document.
- 19) At the top menu bar, go to "Mailings," "Start Mail Merge," and then "Labels."
- 20) Make sure the LABEL PRODUCTS has the brand name of the stickers being used, "AVERY US Letter." Then select the product number (5262 Easy Peel Address Labels) and make sure the height and width match the stickers. Once the selections have been made, click OK.
- 21) Now click "Select Recipients," "Use Existing List" and navigate to MYYStickerHeadquarters.xls.
- 22) After the workbook has been selected, a "Select Table" box appears. Choose "FRONT\$," check the box next to "First Row of Data Contains Column Headers" and click OK.
- 23) Click "Insert Merge Field," "Month," then "Insert Merge Field," and "Qtr." Repeat this for "Tray," "SITE 1," "SITE 2," "SITE 3," and "SITE 4," in that order.
- 24) The very first box on the left is a representation of how every sticker will be formatted. Manipulate the items in the first box so that <<site 1>> through <<site 4>> are in a column on the left. Confirm that paragraph (right-click, Paragraph) spacing is single, with 0 pt. spacing before and after each line.
- 25) Place "Enter" before the first line.
- 26) Then, center the items <<month>> <<qtr>> <<tray>> and put 3 spaces between each item.
- 27) In front of <<site 1>> type TC. In front of <<site 2>> type Laser.
- 28) Now go to U:\IPROVE\TRAYFILE\STICKERS\TEMPLATES and select the file Front Templates.doc.
- 29) Copy the □ (the smaller box) and paste after TC and Laser.
- 30) Now press CTRL+A to select all. Then change the font to Times New Roman with 10 pt. sizing with the Tool Bar at the top of the document.
- 31) Manipulate the formatting so that the typed words are under <<month>> and the □'s are lined up.
- 32) Now manipulate the formatting so that <<site 1>> through <<site 4>> are under <<Tray.>>

- 33) Go back to FrontTemplates.doc. Copy the bigger box and paste it onto the first sicker box. Drag the box so it wraps around "TC," "Laser," and the small boxes. Do not include <<month>> or <<qtr>> in the bigger box.
- 34) Click on "update labels." If everything looks good, click on "Preview Results." If formatting is correct, click "Finish and Merge." Print the document.
- 35) Select "All" and press "Ok."
- 36) Print stickers using the IMPROVE weight lab printer. Make sure to use manual feed.
- 37) For trays that hold 11th position slides, go to the "Front(11)" tab. All that is needed is to print them.
- 38) Once all stickers are printed, save the Word document as MYYFrontStickers.doc in the U:\IMPROVE\TRAYFILE\STICKERS\YYYY\MYY folder.
- 39) Finally, take the stickers and highlight the month, quarter, and tray number in a different color than the previous months' stickers. The stickers are now ready to place on the front and side of the slide trays.

5.9 Adding New Sites

The sample handling laboratory has several responsibilities when a new site is created. After lab personnel have been informed of the new site code, associated UCID, and cycle, blue boxes and a bin are assigned to the site. In order to be able to upload the first box for the site, lab personnel must enter some information into two separate .dbf files.

- 1) Go to sitefile.dbf, which is located in U:\IMPROVE\SITECAL. Right click on the file and then choose to open the file with FoxPro.
- 2) Be very careful in this file. Changes to this file are not recorded, so any mistakes that occur may be difficult to locate and fix.
- 3) Go to the last entry in the file. Click on one of the boxes in the row to make the row active.
- 4) Click on the command box. Type in "Set Carry On." Then press "Enter." Press "CNTRL" and "Y" on the keyboard. The program will copy the selected row and paste it in the next available row.
- 5) In this new duplicate row, modify the cells so that they reflect the new site's information. Enter the new site code. The SAMDUR (sample duration) should remain 24 for standard sites. The protocol for a standard site with Tuesday installs should be 1/3. Sites with a Thursday install should be 1/3/Th. The configuration for a standard four module site is ABCD. Double C sites are ABCCD. C-only sites just have "C" listed in their configuration.
- 6) If the new site has an X module, repeat the procedure listed above to create another new row. Enter in the four letters of the site code and then add an X to the end instead of a number. The SAMDUR and protocol should match the main site. For site configuration, type in the letter that represents the type of filter that will be sampled in the X module. For example, if an X module will be sampling "B" filters, type "B" in for the site configuration.
- 7) The area should be 3.53 for all sites.
- 8) Next, go to idvsite.dbf, which is located in U:\IMROVE\Support. Right click on the file and choose to open it with FoxPro. Scroll down to the last entry and click on one

of the cells to make the row active. Then, go to the command box. Type in "Set Carry On" and the press "Enter." Then, press "CNTRL" and "Y" on the keyboard. The program will copy the active row and paste it in the next available row, so there will be two duplicate entries.

- 9) In this duplicate row, modify the information so that it matches the new site's information. Enter in the UCID of the new site, the site code, and the same site configuration used for the new site in sitefile.dbf.
- 10) After the new site's information has been entered into the previously mentioned .dbf files, upload the first box.
- 11) Enter the "PRE" program at the upload station and type in the site code. On the next page displayed, the program will prompt the user to press "Enter" to continue. BEFORE PRESSING "ENTER," start typing the first sample date for the new site in MMDDYYYY format. Then type 0000 for the start time. From there, the rest of the sample dates and position numbers should be filled in. Continue uploading the box as normal.

TI 251Q Box Cycles and Cartridge Orientation

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the different box cycles used for IMPROVE sites, proper cartridge orientation and configuration, and to explain the quarter naming system used to organize filters for analysis.

2. SUMMARY OF THE METHOD

IMPROVE sites run on one of two box cycles, which are referred to as “dot” (or 2-3-2’) and “non-dot” (or 3-2’-2). Cycles are differentiated by cartridge configuration, bin color, and box labels. Each cycle is three weeks long, with loaded cartridges for each week. Cartridges are configured according to the week and cycle to which they belong. After the filters have been sampled and returned to the sample handling laboratory, they are organized for analysis and separated into four different quarters based on the months in which they were sampled.

3. PROCEDURE

3.1 Types of Bins

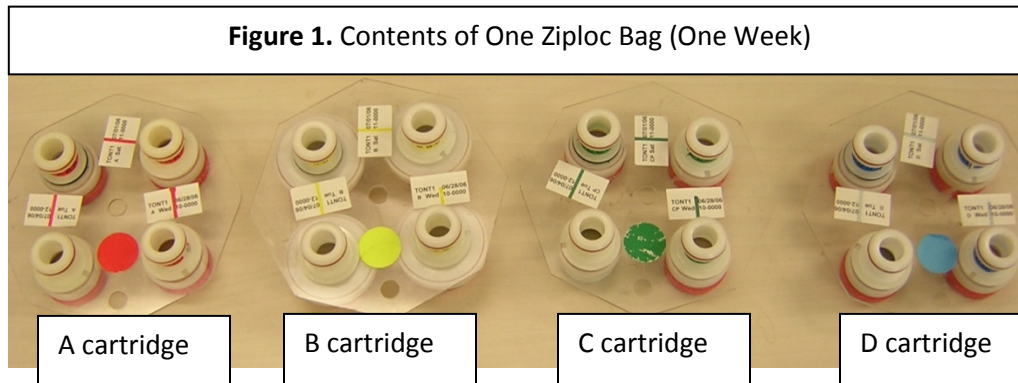
There should be two different color bins found below the “B/C Download” station, YELLOW and BLUE. YELLOW bins typically have yellow stickers with their site name listed, while BLUE bins have their site names on green stickers. Priority bins of either bin color have PINK site stickers. These receive priority at all stations. Bins of either color with WHITE site stickers are shipped through the United States Postal Service (USPS) instead of the United Parcel Service (UPS) (all bins designated with yellow, green, and pink site stickers are sent by UPS). White label bins receive the same priority as pink label bins because it takes longer for USPS sites to get delivered. Priority bins should be downloaded before normal boxes.

All yellow and blue bins have a site code that ends in a number (usually 1). In addition to the primary site code, some sites have an X module and are thus named SITE1-X. X filters are placed behind the main site filters in the bins and are to be downloaded/uploaded/quality checked immediately after their corresponding main site filters.

3.2 Bin Contents

3.2.1 Primary Filters

Each yellow and blue bin should contain three Ziploc bags labeled Week 1, Week 2, and Week 3. Each Ziploc bag should contain four cartridges. There are four types of cartridges: A (red), B (yellow), C (green), and D (blue) (Fig.1). Each bag should have one of each type of cartridge. Cartridges contain three to four cassettes. The cassettes in A and D cartridges contain Teflon[®] filters. The cassettes in B cartridges contain nylon filters, and the cassettes in C cartridges contain quartz filters.



3.2.2 X-Mod Filters

X-module bags contain only one type of cartridge. They can be any of the four types (A, B, C, or D). Each bin with an X-module contains three extra week bags for the X filters (Week 1, Week 2, and Week 3), with only one cartridge present in each bag.

3.3 Proper Cartridge Orientation

The proper orientation of the cartridge is with the labels facing up. There are two holes in each cartridge—one in the middle and one on the outer edge. If looking at the cartridge head-on, orient the cartridge so that the outer hole is facing 6 o'clock. Ensure that the color-coded circular sticker is above the outer hole, as this helps to orient the cartridge.

With the cartridge properly oriented, the sampling of the cassettes runs in a counter-clockwise manner. The bottom right cassette or the first position is always the first sampled followed by the top right (the second position) and then sometimes the top left (the third position) (Fig.2), depending on the week.

Two or three of the cassettes in each cartridge will have labels next to them. The label for each cassette can be found above in the picture. Printed labels contain the site name, the date of the sample, the sample day (Mon-Sun) and the cartridge type. Sometimes handwritten labels will appear in the third position. These are for field blanks, which are filters that are not sampled, but instead are used as controls. Handwritten labels will have the site name, sampling date, and cartridge type. Any unlabeled cassettes are considered "dummies" and do not contain any sample. Dummy cassettes contain a colored piece of paper and a clear circular sheet instead of a filter except for the B cassettes. For the "A" dummies, a red piece of paper and a clear sheet are used. The same protocol follows for "C" and "D" dummies, except that "C" dummies use a green piece of paper and "D" dummies use blue. The "B" dummies use two white circular sheets with the word "PALL" in blue writing. A dummy cassette can be identified by removing the red cap on the bottom of the cassette (Fig. 3).

All cassettes containing filters (except for the field blanks) should have a neck-tie around the center. Neck-ties are thin stickers that contain both the color and name of the type of cassette they are for. For example, neck-ties for "A" filters are red and have "AAAAAAA" typed on them; neck-ties for "B" filters are yellow and have "BBBBBBB" typed on them, etc. All of the neck-ties

should be facing upright except for the “D”. This sticker should be put on so that the typed Ds are upside down.

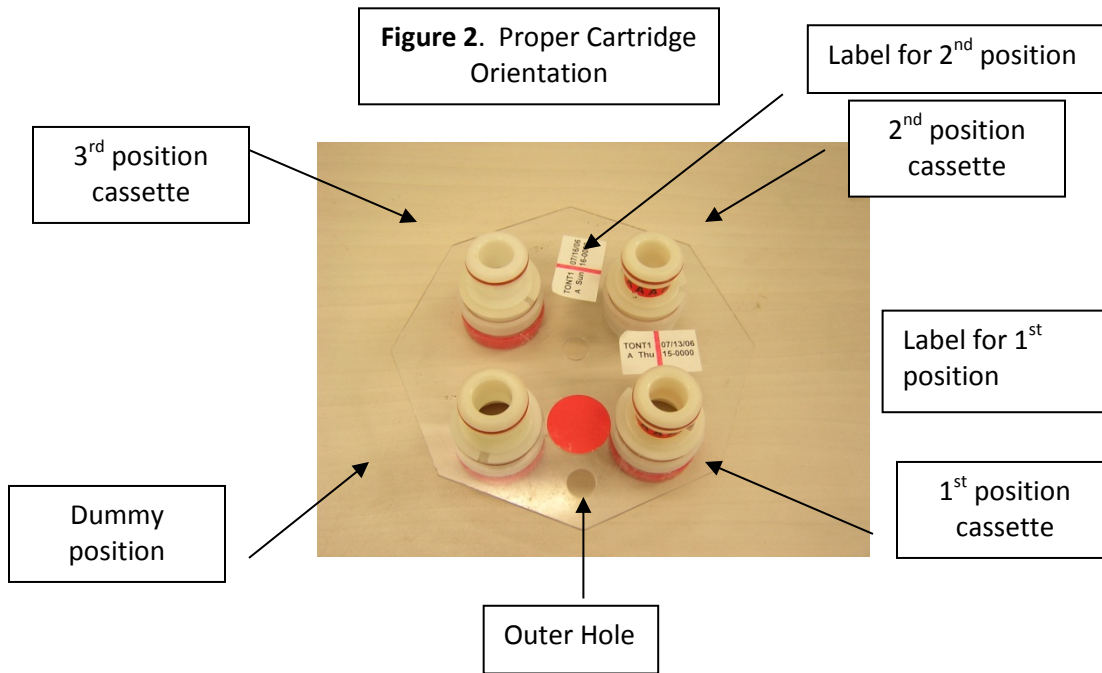
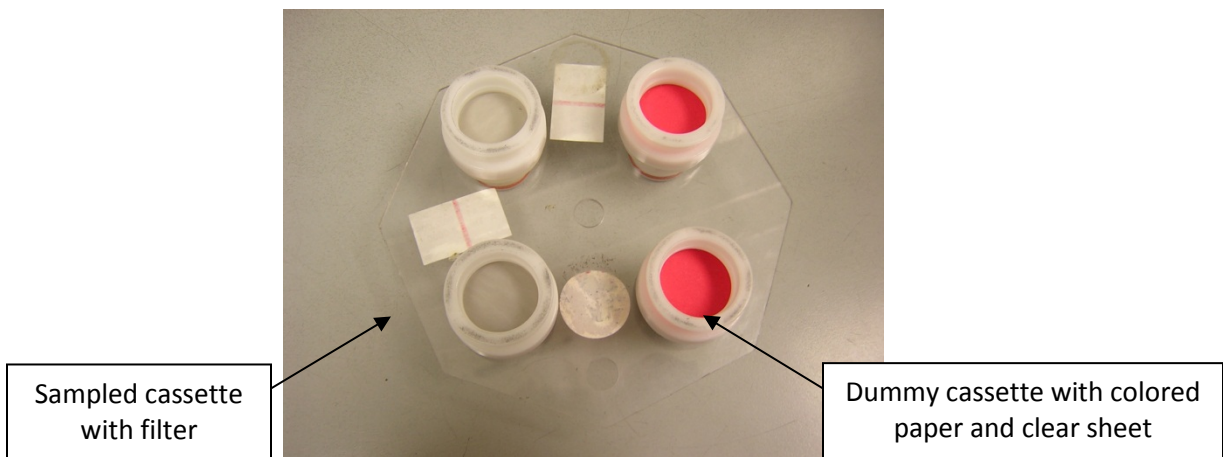


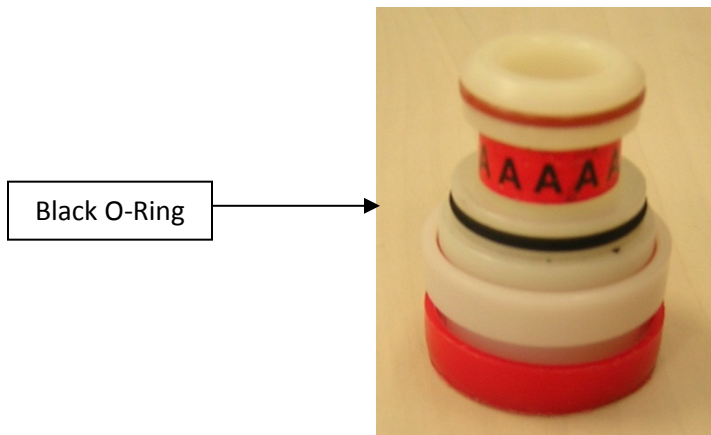
Figure 3. Identification of Dummy Cassettes



Some cartridges contain a cassette with a black rubber band, also called an ‘O-ring,’ around its center and label. The black rubber band allows this cassette to be manually moved between

cartridges when necessary. The location of this movable position is dependent upon the box cycle.

Figure 4. Movable Cassette (O-Ring)



3.4 Box Cycles

There are two different types of box cycles, which are referred to as the non-dots (3-2'-2) and the dots (2-3-2'). Cycles can be identified based on the stickers found on both the bins and the boxes they are shipped in. Non-dots have a green sticker with the site code printed on it on both the blue boxes and the blue bins. Dots have a yellow sticker with the site code printed on the bin and the box. The boxes have an orange circle sticker next to the yellow labels.

3.4.1 Non-Dots (3-2'-2)

Non-dot bins have three filters in the first week, two filters in the second week, and two filters in the third week. In the first week, the first two cassette positions contain a filter. The third position, which is the top left position, is a movable cassette (the one with the O-ring) containing a filter. A dummy is in the fourth position.

In the second week, there are filters in the first two positions. The third position is left empty. When the box is out in the field, operators remove the movable position found in the first week and insert it into this open space in the second week's cartridge. The empty space found in this cartridge is denoted by the apostrophe after the "2" in "3-2'-2." The fourth position is a dummy.

In the third week, there are two cassettes with filters and two dummies. This is the only week in which field blanks can be found for a non-dot. They will be in the third position (top-left) instead of a dummy.

3.4.2 Dots (2-3-2')

Dot bins have two filters in the first week, three filters in the second week, and two filters in the third week. In the first week, there are two cassettes with filters and two dummies. This is the only week in which field blanks can be found for a dot bin. They will be in the third position (top-left) instead of a dummy.

In the second week, the first two cassette positions contain a filter. The third position (top-left) is a movable cassette, which also contains a filter. Operators in the field will remove the movable position and place it into the third week during their sample change. The fourth position is a dummy.

In the third week, the first two positions contain cassettes with filters, and the 3rd position is left empty. The movable cassette will be inserted into this space when it is out in the field. The empty space found in this cartridge is denoted by the apostrophe after the "2" in "2-3-2'." The fourth position is a dummy.

3.5 The Quarter Naming System

When filters are organized for analysis, they are separated into four different quarters based on the months in which they were sampled. Every quarter is given a three digit code for identification purposes. The quarter is identified by the month and the year. March through May are identified as A months, June through August are B months, September through November are C months, and December through February are D months. Therefore, there are four quarters in a year each labeled A, B, C or D. The last two digits of the year in which the quarter began are found after the quarter letter. For example, December of 2012 through February of 2013 would be D12, while March through May of 2013 would be A13.

TI 251R Data and Records Management

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1. PURPOSE AND APPLICABILITY

The purpose of this SOP is to describe the different databases, programs, macros, and other data connections used on a daily basis in the sample handling laboratory to manage, view, and organize data.

2. DATA AND RECORDS MANAGEMENT

Multiple databases, programs, and macros are employed in the initialization, tracking, and organization of IMPROVE filters. These are listed and briefly described below:

2.1 Databases

The sample handling lab uses a variety of databases on a daily basis. All of them are FoxPro® databases, though three of them are primarily accessed by users through a FoxPro application called SWAP and the rest are accessed directly through FoxPro®. The databases accessed through SWAP are LOGS, WEIGHTS, and FB LEVEL and will be described first. Other databases are CALIB, Controls, idvsite, SITEFILE, and Lotnums.

- **LOGS:** The LOGS database is organized to include all non-analytical data for a single site/sample date in one record. Each record includes all of the information from each module at a site for one sample date. Site, sample date, start time, temperature, pump vacuum for each module, initial and final orifice readings for each module, initial and final cyclone values for each module, elapsed time for each module, status of each sample, person entering data, date of log sheet entry, area of the sample, position number, quarter, protocol, persons that pre weighed and post weighed filters, date of pre weight and post weight, field blank channel, comments and/or flags on status, and flashcard numbers are fields included in the LOGS database. Data is written to LOGS through the LOGSIN, PRE, and POST programs. At the end of every IMPROVE quarter, data from LOGS is packaged and uploaded to the SQL server. For more information on this, please see TI 251O.
- **WEIGHTS:** The WEIGHTS database, tied to the LOGS database through the PRE and POST programs, is organized to include the mass and identification data for each filter in a single record. Each record contains site, sample date, channel, status, pre weight, post weight, sample weight, pre weight time and date, post weight time and date, microbalance used for pre weight, post balance used for post weight, and persons entering the data.

LOGS and WEIGHTS contain all the records for the current quarter. Once data collection is complete for the quarter, the quarter is “closed” to any modifications and inaccessible through SWAP until it has been transferred to the SQL database. Once the data is in SQL, it is accessible in LOGS and WEIGHTS through SWAP again.

- **FB LEVEL:** The FB LEVEL database records the number of samples for any given month and calculates the number of field blanks needed for each module based on the total number of samples and the target percentages. Samples and field blanks count towards the month in

which they run in the field, not when they are uploaded. The database also records how many field blanks have been uploaded for each module in a given month. Finally, it also determines the ratio of field blanks to total samples generated for each module, displaying these values in percentage form.

Three other databases used on a daily basis by the sample handling laboratory are the CALIB database, and the Controls database.

- CALIB: The CALIB database is accessed through the POST program and is organized to include the name of the balance operator, the date and time of the “calibration check” of the balance, the zero weight value, the “calibration” weight value, the test weight value, the magnetic field reading, and name of the microbalance. These are recorded whenever a calibration check is performed. In order to comment on a calibration check, users must access this database through FoxPro®.
- Controls: The Controls database is accessed through the POST program and is organized to include the following information for each balance (Mettler 1 and Mettler 2); filter identification name; pre weight date; post weight date; number of days between the Pre and Post weighing of the filter; Pre, Post, re-Pre and re-Post weights; Post minus Pre weight; re-Post minus re-Pre weight; Post minus re-Post weight; Pre minus re-pre weight; differences between the Pre, Post, re-Pre, and re-Post weights measured on the Mettler 1 and Mettler 2, and initials of the balance operator responsible for each measurement. These are calculated and recorded when the control filters are weighed.

Three other databases that are used less frequently by the laboratory are idvsite, SITEFILE, and Lotnums.

- Idvsite: This database is where UCIDs are assigned and recorded when new sites are created. Once assigned, UCIDs are input into the controllers that will run at the sites. It is located in a shared drive. The database contains the site name, UCID, and types of modules at the site (under the column XTRA). Some sites in this database also have an IMPid, or IMPROVE ID. This was discontinued starting in 2008, so sites added to the network from that point on do not have an IMPid.
- SITEFILE: This database lists all of the site configuration information for every site in the network. It provides the site name, sample duration (which should be 24 hours for IMPROVE network sites), Protocol (1/3 for IMPROVE network sites, which means one sampling day per every three days), module configuration (ex., ABCD for regular sites and ABCCD for double C sites). X modules are listed as their own individual sites. Information is added to this database when new sites are created.
- Lotnums: This database is located in a shared drive, but it is primarily accessed through the PRE program. To change a lot number, a site must actively be in the process of being uploaded. The database records the start date and time of a new lot of nylon, quartz, or Teflon® filters. It also notes the SITE, SAMDAT, and sample start time of the filter currently being uploaded when the lot number for a filter type is changed.

2.2 Programs

There are three primary programs regularly used in the sample handling lab. They are listed and briefly described below.

- PRE: The PRE program accesses the LOGS database to develop a list of sites requiring boxes of filters. It then downloads the site configuration information from the SITEFILE database and then checks the WEIGHTS database to determine the sample date of the last filter weighed for each site. PRE then determines the next seven sample dates required at each site. Next, it queues the filters for weighing and records pre weight values from the microbalance to the WEIGHTS database. Finally, it records the site code, sample date, and start time to the LOGS database, thereby completing the initialization of the records for each filter being sent to the field.
- LOGSIN: The LOGSIN program records data from the field log sheets for exposed filters in the LOGS database. Through this program, temperature, pump vacuum readings, orifice and cyclone values, elapsed sampling time, and filter status are recorded in the LOGS database for each filter.
- POST: The POST program accesses the LOGS database to develop a list of exposed filters to be downloaded from cassettes. Next, it queues the exposed filters for weighing and records post weight values from the microbalance into the WEIGHTS database. It then notes that the record is complete in the LOGS database.

2.3 Macros and Other Data Connections

The sample handling lab uses a variety of macros, a web application, a web interface, and a data connection to perform vital tasks. These will be listed and described below.

- RH/TEMP macro: This Excel macro records live relative humidity and temperature data from a probe located between the Mettler balances every fifteen minutes.
- RH/Temp interface: This web interface allows users to see real-time temperature, pressure, and relative humidity values from the probe located between the Mettler balances.
- B/C Download: This macro generates a list of bins to be downloaded at the "B/C download" station.
- ION_Contractors: This macro organizes nylon filters into sets of 400 filters for organization and shipping purposes.
- Carbon_Contractors: This macro organizes quartz filters and is similar to ION_Contractors
- PM_25_Contractors: This macro is used to sort and organize "A" (PM_{2.5}) filters into sets. "A" filters are analyzed by XRF primarily in the order created by this macro.
- PM_10_Contractors: This macro is used to sort and organize "D" (PM₁₀) filters into sets. "D" filters are stored after gravimetric analysis.
- Problems_Contractors: This macro is used to sort terminal status filters by quarter.
- Inactive C's: This macro organizes the quartz field blanks that will not be analyzed by DRI. Inactive-C's are sent to DRI for archiving at the end of each quarter.

All of the Contractor macros store the set lists they create in folders labeled by analysis or filter type. All "B" filter set lists are placed in an "Ions" folder, all "C" filter set lists (including inactive-C's) in a "Carbon" folder, all "A" filter sets in a "PM 2.5" folder, and all "D" filter sets are located in a "PM10" folder. The "Problem" tray lists are generated in a folder called Contractor Files and are moved into a separate folder called "Past Quarter Problems" when the quarter is complete.

- **Save.DBF:** This macro is used for shipping nylon and quartz filters. It saves each sheet of a B, C, or Inactive-C Contractor file as its own DBF file. The macro also prompts the user to enter the date of each filter shipment so that it can append its Master List, which shows all filters that have been shipped out to DRI or RTI.
- **Late List:** This macro creates a list of all boxes that have not had their log sheets entered through Logsin and is commonly run 7-10 days after the last filters of a cycle should have been uninstalled. It is used to determine which boxes have not arrived from the field.
- **Outgoing Boxes:** This macro is used to ensure that all boxes have been sent out into the field during each cycle. It is used typically 3 business days before the next box cycle is due to be installed in the field. Lab personnel use this macro in conjunction with the Late Boxes macro to ensure that all late boxes in the field and all remaining bins in the lab get uploaded and sent out on time for the next cycle.
- **Recent Problems:** This macro is primarily used to track sites that have failed for the year or are close to failing and to see what kinds of problems are most common at each site.
- **Improve Flow:** Improve Flow is located in an Excel file and is used by lab and other IMPROVE personnel to graph flow data for any site in the network. Users have the ability to view each module separately with the acceptable range of values displayed on the screen, providing users a quick and easy way to determine if flow values are too high or too low. Users may also view all modules' flow data in the same chart. Finally, temperature values are also graphed for the users' convenience.
- **IMPROVE Data Manager:** This is a web application. It has two primary uses for the sample handling laboratory: the first is to review flashcard data and then upload it to the SQL database. The system will alert the user to any irregularities in the flashcard data, such as multiple UCIDS, time changes, or extended power outages. It is also used to record problems file notes for each site.
- **Weight Report:** This macro is used to examine the ratios between the "A" and "D" filters and to look at differences between PRE- and POST-weights for each type. It is used primarily to catch any swaps or mistakes that may have occurred in the sample handling laboratory before the "A" filters continue on to XRF analysis.
- **Sent Out Boxes:** This macro (located in J:\User\Annex Rear\Kawamoto\Filters\Sent Out Macro\Sent Out List.xls) interacts with a VB.NET application ("Box In Box Out") to check out uploaded boxes ready for shipping. A user enters the first install dates and site codes for boxes being shipped using the VB.NET application and then submits the list of boxes. The macro compares the list of entries to LOGS.DBF. The macro then creates a list of sites that have been uploaded in LOGS.DBF but have not yet been checked out for shipping. This list is generated in an Excel file called "Sent Out List TEMP.xls," which is located in the "Sent Out Boxes Macro" folder. This macro ensures that all uploaded boxes are shipped out into the field.