National Human Exposure Assessment Survey (NHEXAS)

Arizona Study

Quality Systems and Implementation Plan for Human Exposure Assessment

The University of Arizona
Tucson, Arizona 85721

Cooperative Agreement CR 821560

Standard Operating Procedure **SOP-UA-L-9.1**

Title: Filter Weighing

Source: The University of Arizona

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
Human Exposure Research Branch

Filter Weighing

1.0 Purpose and Applicability

The purpose of this SOP is to describe the procedures to be followed in determining the pre- and post-weighing of 37mm and 25mm teflon filters, teflon sentinel filters and teflon vacuum dust filters. This procedure applies to the pre- and post-weighing of the filters and samples for the EPA NHEXAS and EPA Border projects of the University of Arizona/Battelle/Illinois Institute of Technology consortia, as well as future "Health in the Environment" investigations.

2.0 Definitions

2.1 Control weight= A metallic object of determined and constant weight that is periodically re-weighed during filter weighing operations to monitor the precision of the balance.

2.2 Deionizing unit= Radioactive Polonium-210 alpha particle source used to generate air ions for neutralizing static charges on a filter or other object prior to weighing.

2.3 Field blank = Filter placed in impactor in the field that has no air drawn through it by a sampling pump.

2.4 Lab blank = Randomly selected filter of a batch that is weighed and then retained in the weighing room, to be re-weighed when the complete batch of filters returns from the field.

2.5 M^3 = cubic meter

2.6 µg = microgram

2.7 µm = micrometer

2.8 mg = milligram

2.9 mm = millimeter

2.10 PM = Particulate matter

2.11 SOP = Standard Operating Procedure

3.0 References

3.1 Turner, William. Manual for the Indoor Sampler (Draft dated 10/7/85). Section 3.4.4. Harvard School of Public Health, Boston, MA 1985.

3.2 Appendix F in Quality Assurance Manual for Air Quality Assessment. Harvard University Six-City Air Pollution Health Effects Study. 1986. Volume II, Sections 3.2 and 3.3.

3.3 Mettler Toledo BalanceLink (V2.0) Software. Operating Instructions, Mettler Instrument Corporation, Hightstown NJ, 1994.

4.0 Discussion

Net sample weight determinations are made by weighing conditioned filters prior to sampling, and then conditioning and re-weighing the filters after they are returned from the sampling site. The difference between pre-weight and post-weight represents the weight of the material collected during the sampling procedure.

5.0 Responsibilities

5.1 The Project Director will be responsible for:

5.1.1 Final review and approval of this procedure.

5.2 The Project Lab Supervisor will be responsible for:

5.2.1 Insuring SOP procedures are followed by the Project Lab Staff.

5.2.2 Notifying the appropriate technicians with needed repairs. In cases when the item can not be fixed in-house, Project Field Coordinator will generate the appropriate paperwork, notify the appropriate vendor or company, and ship the disfunctional item.

5.3 The Project Lab Staff will be responsible for:

5.3.1 Knowing and following the procedures described in this SOP.

5.3.2 Recording the information as directed in this SOP.

5.3.3 Notifying the Project Lab Supervisor with down equipment and repair supplies needed (where applicable).

5.3.4 Providing the Project Lab Supervisor with down equipment label and isolating the down equipment into the down equipment area.

5.3.5 Insuring proper labeling techniques of down equipment.

5.3.6 Repairing the item (where applicable) in a timely manner.

6.0 Equipment and Materials

6.1 Equipment

6.1.1 Class "S" calibration weight, 20 mg (#9800008)

6.1.2 Class "S" calibration weight, 100 mg (#9800007)

6.1.3 Deionizing units with Po_{210} to dissipate static electricity

6.1.4 Hydrothermograph

6.1.5 Filter trays (12" x 18")

6.1.6 Mettler AE 163 (UA ID# A195535) Balance

6.1.7 Mettler AE 166 (UA ID# A201335) Balance

6.1.8 Millipore plastic petrislide filter dish with cover, 47 mm

6.1.9 Plastic cable tie

6.1.10 Plastic 30 dram vial

6.1.11 Teflon coated forceps

6.1.12 Teflo filters, 25mm and 37mm, with 2.0 µm pore size
6.1.13 Teflon sentinel filter sheets, with 2.0 µm pore size
6.1.14 Teflon vacuum dust filter sheets, with 2.0 µm pore size

6.2 Materials
6.2.1. Deionized distilled water (DDW)

7.0 Procedure

7.1 Preparation

7.1.1. Weighing Area

A. Clean the weighing area with paper towels and deionized distilled water.
B. Locate teflon coated forceps and standard weights.
C. Prepare the balance as outlined in "Calibration and Operation of the Mettler Balance" (UA-L-1.1).
D. Turn on the computer and type "**cd\balance**" to go to the "balance" sub-directory.
E. Once in the Balance subdirectory, type "**Balink Numeric Stable Right**" to start the program and setup the balance (UA-L-1.1; 7.2.3.A-C).

7.1.2. Computer File Set up

A. Computer files are created in the tracking system as they are received. A file consist of ten sample ID numbers with a field for the balance weights in a database file (UA-D-28.0).
B. The files are created and stored in the "**G:\Filters**" subdirectory with the following format "*mm/dd/yffc.dbf*", where; "mm" is the month, "dd" is the day, "y" is the last digit of the year (i.e. 6 for 1996), "ff" is the sample prefix, "c" is a alphanumeric counter (i.e. A,B,C,...) for multiple files created on the same day, and "dbf" is the dbase program suffix.
C. The tracking system (UA-D-28.0) prompts during the logging in procedure, pre-field and post-field, for the creation of the computer datafile. Type "y" for yes and follow the file naming convention listed above.
D. Seperate filters into groups of five and scan into the tracking system using the light pen. After each five filters enter one of the two class "S" calibration weight ID numbers (#9800007, #9800008) which is appropriate for the general weight of the filter class. For example, 27mm filters generally weigh ~20 mg thus #9800008, the 20 mg weight, ID number is entered.
E. After the tenth filter press escape to back out of the program which saves the file to "**G:\Filters**", a subdirectory restricted to input by lab personnel only. Mark the file name on the filter weighing backup forms (figure 1-5,7).

7.2. 25mm and 37mm Teflo Filters

7.2.1 Conditioning 25mm and 37mm Teflo Filters

A. Conditioning consists of acclimatizing filters to standard temperature, and humidity conditions prior to weighing.
B. Arrange clean (UA-L-5.1) 47mm plastic petrislide filter dishes with 25mm or 37mm filters on a tray in groups of ten. Loosen the top of each petrislide to expose the filter to ambient conditions.
C. Check to see that a sample ID label is placed upon each plastic filter dish. Record the date and time on the "25mm and 37mm Teflo Filter Pre-Weighing Form" (figure 1). Place the form with the filters during conditioning. Ensure that the computer file with the sample ID numbers has been created in the tracking system (7.1.2. A-E) and is marked on each form.
D. The weighing-room must remain at standard weighing conditions for temperature, 75°± 5°F, and humidity 50 ± 10% as outlined in the "Weighing Room Operation and Maintenance" SOP (UA-L-2.1).
E. Store the tray in the weigh-room conditioning locker for at least 48 hours prior to weighing.

7.2.2 Pre-Weighing 25mm and 37mm Teflo Filters

A. Take a batch of 10 pre-conditioned filters from the weigh-room conditioning locker. Check that the equilibration start date and time on the batch is at least 48 hours prior to the current date and time.
B. Set-up and calibrate the Mettler balance (UA-L-1.1).
C. Turn on the computer, log in, and follow the computer-balance set-up (UA-L-1.1; 7.2.3.A-C).
D. Record the pre-weigh date, room temperature, relative humidity and technicians initials on the filter weighing form (Figure 1).
E. Re-zero the balance for weighing by momentarily depressing the control bar.
F. Remove a filter from it's Petrislide dish using teflon coated forceps. Pass the filter over a deionizing unit.
G. Check balance to read "0.00000 g" with the doors closed (re-zero if necessary), then open a side door and place filter onto the filter support in the middle of the balance pan.
H. Close the door and observe the illuminated stability indicator dot.
I. Wait five to ten seconds after stability indicator dot goes out, and depress the hand switch transferring the weight to the computer screen. Follow the instructions on recording weights with the computer 7.5.1.A-I.
J. Record the weight onto the "filter weighing backup form". Slight changes in the scales environment may cause slight variations in the display. All recorded values are valid if they reflect the value at the time that the stability light went out and was recorded on the computer.
K. Return the filter to its petrislide dish.
L. Close the balance access doors and allow the display to return to zero. If the

display does not return to 0.00000, this may indicate zero-drift. Re-zero the display and weigh the filter again following steps G through L.

M Repeat steps G through L for each filter.

N. Return pre-weighed filters to the lab supervisor for QC and QA checks.

7.2.3. Post-Weigh 25mm and 37mm Teflo Filter

A Upon assignment to the lab after field sampling, open the petrislide dish tops and place onto a tray for post-conditioning. Record the sample ID#'s along with the date and time on the "25mm and 37mm Post Weighing Form" (figure 2.0). Create a computer file with the sample ID numbers is created within the tracking system (UA-D-28.0).

B. Place the "25mm and 37mm Post Weighing Form" (figure 2.0) with the filters and place into the weigh-room conditioning locker. Ensure that the weighing room conditions meet those defined in UA-L-2.1.

C. Condition the filters for at least 48 hours before post-weighing the filters.

D. Perform post-weighing by following the procedures outlined in 7.2.2(A) through 7.2.2(M).

E. Return the filters to their petrislide dishes and transfer to the lab supervisor QC/QA actions and to await further analysis and/or archival.

7.3 Sentinel Filters

7.3.1. Conditioning of Sentinel Filters

A. Conditioning consists of acclimatizing filters to standard temperature, and humidity conditions prior to weighing.

B. Arrange the sentinel filters on a tray in groups of ten. Open the top of each ziplock bag containing a single filter to allow expose to ambient conditions.

C. Check to see that a sample ID label is placed upon each ziplock bag. Record the date and time on the "Sentinel Filter Pre-Weighing Form" (figure 3). Place the form with the filters during conditioning. Ensure that the computer file with the sample ID numbers has been created in the tracking system (7.1.2. A-E) and is marked on each form.

D. The weighing-room must remain at standard weighing conditions for temperature, 75°± 5°F, and humidity 50 ± 10% as outlined in the "Weighing Room Operation and Maintenance" SOP (UA-L-2.1).

E. Store the tray in the weigh-room conditioning locker for at least 48 hours prior to weighing.

7.3.2. Pre-weighing Sentinel Filters

A. Take a batch of 10 conditioned filters from the weigh-room conditioning locker. Check that the equilibration start date and time on the batch is at least 48 hours prior to the current date and time.

B. Set-up and calibrate the Mettler balance (UA-L-1.1)

C. Turn on the computer, login, and follow the computer-balance set-up (UA-L-1.1; 7.2.3.A-C).
D. Record the pre-weigh date, room temperature, relative humidity and technicians initials on the filter weighing form (Figure 3).
E. Place a plastic 30 dram vial, cleaned to specifications outlined in UA-L-5.1, on the balance pan. Re-zero the balance for weighing by momentarily depressing the control bar.
F. Check that the balance reads "0.00000 g" with the doors closed (re-zero if necessary). Remove a Sentinel teflon filter sheet from its ziplock bag. Roll the filter sheet into a tube and then open a side door and place the filter into the 30 dram vial.
G. Close the door and observe the illuminated stability indicator dot.
H. Wait five to ten seconds after stability indicator dot goes out, and depress the hand switch transferring the weight to the computer screen. Follow the instructions on recording weights with the computer 7.5.1.A-I.
I. Record the weight onto the "Sentinel Filter Weighing Form" (figure 3). Slight changes in the scales environment may cause slight variations in the display. Recorded values are valid if they reflect the displayed value at the time of the first reading.
J. Return the filter to its ziploc bag.
K. Close the balance access doors and allow the display to return to zero. If the display does not return to 0.00000, this may indicate zero-drift. Re-zero the display and weigh the filter again following steps F through J.
L. Repeat steps F through K for each filter.
M. Return pre-weighed sentinel filters to the lab supervisor for QC and QA checks.

7.3.3. Post-weighing Sentinel Filters

A. Upon assignment to the lab after field sampling, open the ziplock bags and place onto a tray for post-conditioning. Record the sample ID#'s along with the date and time on the "Sentinel Teflon Filter Post Weighing Backup Form" (figure 4) A computer file with the sample ID numbers is created within the tracking system (UA-D-28.0).
B. Place the "Sentinel Teflon Filter Post Weighing Backup Form" (figure 4) with the filtwers and place into the weigh-room conditioning locker. Ensure that the weighing room conditions meet those specified in UA-L-2.1.
C. Condition the filters for at least 48 hours under set temperature and humidity conditions, before post-weighing the filters.
D. After exposure in the field each filter is folded into quarters (UA-F-10.1). The folded filter sheet is placed onto the balance rather then in the 30 dram vial during the weighing procedure.
E. Perform post-weighing by following the procedures outlined in 7.3.2 (A) through

(L).

F. Return the filters to their plastic ziplock bags and transfer to the lab supervisor for QC/QA actions and to await further analysis and/or archival.

7.4 Vacuum Dust Filters

7.4.1 Conditioning Vacuum Dust Filters

A. Conditioning consists of acclimatizing filters to standard temperature, and humidity conditions prior to weighing.
B. Arrange in groups of ten, bags with a vacuum dust filter and plastic cable tie in each, onto a tray. Open each bag's ziploc to allow the interior to equilibrate with exterior conditions.
C. Record the pre-assigned sample ID#'s onto the "Vacuum Dust Pre-weighing Form" (figure 5). Ensure that the computer file with the sample ID numbers has been created in the tracking system (7.1.2. A-E) and is marked on each form.
D. Ensure that the weighing-room is at standard weighing conditions for temperature, 75°± 5°F, and humidity 50 ± 10% as outlined in the "Weighing Room Operation and Maintenance" SOP (UA-L-1.1).
E. Store the tray in the weigh-room locker labeled "PRE" for at least 48 hours prior to weighing.

7.4.2 Pre-Weighing Vacuum Dust Filters

A. Take a batch of 10 pre-conditioned filters from the weigh room conditioning locker. Check that the equilibration start date and time on the batch is at least 48 hours prior to the current date and time. Each filter ziploc bag contains a teflon vacuum dust filter and a plastic cable tie.
B. Set-up and calibrate the Mettler balance (UA-L-1.1)
C. Turn on the computer, login, and follow the computer-balance set-up (UA-L-1.1; 7.2.3.A-C).
D. Record the pre-weigh date, room temperature, relative humidity and technicians initials on the "Vacuum Dust Pre-weight Form" (Figure 5).
E. Place a plastic 30 dram vial, cleaned to specifications outlined in UA-L-5.1, on the balance pan. Re-zero the balance.
F. Remove a vacuum dust teflon filter sheet from its plastic sample bag and roll into a tube which will fit into the 30 dram vial.
G. Wait five to ten seconds after stability indicator dot goes out, and depress the hand switch transferring the weight to the computer screen. Follow instructions on recording weights with the computer (see 7.5.1.A-I).
H. Record the weight onto the "Vacuum Dust Pre-weight Form" (figure 5) and "Vacuum Dust Chain of Custody" (figure 6). Slight changes in the scales environment may cause slight variations in the display. Recorded values are valid if they reflect the displayed value at the time of the first reading.

I. Return the filter to its respective container with its chain of custody record.
J. Close the balance access doors and allow the display to return to zero. If the display does not return to 0.00000, this may indicate zero-drift. Re-zero the display and weigh the filter again following steps F through I.
K. Remove a plastic cable tie and measure following step F through J substituting "plastic cable tie" for "filter". Record the weight on the "Vacuum Dust Pre-weight Form" (figure 5), and "Vacuum Dust Chain of Custody" record (figure 6). Place it in the filter bag with the weighed filter.
L. Repeat steps F through J for each filter and plastic cable tie.
M. Return pre-weighed sentinel filters to the lab supervisor for QC and QA checks.

7.4.3 Vacuum Dust Teflon Filter Post-weighing

A. Dust filters are consigned to the lab while in the freezer after field sampling (UA-F-7.1). Field sampling involves the pouching of the filter with the sample in the center and the top portion secured with the weighed cable tie making a pouch (UA-F-7.1).
B. Transfer filter pouches to be weighed to the freezer in the lab (room 130A) and allow to equilibrate (10 min.). Procedures for sample processing can be found in UA-L-12.1.
C. Take each filter one by one from the freezer, remove the sample pouch from its ziplock bag and weigh as quickly as possible. Weigh on the Mettler AE 166 balance in the laboratory (Room 130A) to facilitate the maintenance of the samples cold temperature.
D. Allow the balance to stabilize. Record the post-weight onto the "Vacuum Dust Characterization " form (figure 7), "Vacuum Dust Chain of Custody" form (figure 6) and the "Vacuum Dust Aliquot Chain of Custody" form (figure 8).

7.4.4 Vacuum Dust Post Sieving Filter Weighing

A. Characterization of the vacuum dust calls for each pouch to be opened and the material in the filter pouch removed and sieved (see UA-L-12.1 for instructions on further processing).
B. To determine the sieved sample weight, the cable tie and dirty filter are re-weighed.
C. Weigh the filter and cable tie together.
D. Wait five to ten seconds after stability indicator dot goes out.
E. Record the weight onto the "Vacuum Dust Characterization" form (figure 7), "Vacuum Dust Chain of Custody" record (figure 6) and "Vacuum Dust Aliquot Chain of Custody" record (figure 8). Slight changes in the scales environment may cause slight variations in the display. Recorded values are valid if they reflect the displayed value at the time of the first reading.
F. Return each filter and cable tie to its respective container to await archival.
G. Close the balance access doors and allow the display to return to zero. If the

display does not return to 0.00000, this may indicate zero-drift. If zero-drift is suspected re-zero the display and weigh the filter again following steps C through E.

H. Repeat steps C through G for each filter-cable tie pair.

7.5 Computer Operation

7.5.1. AE163 (#195535) balance/computer interface and computer operation

A. The AE163 (#195535) balance in the weighing room is equipped with a computer interface allowing the electronic recording of data from the balance display into files containing the sample ID numbers. The programs used are validated under protocol UA-D-2.0.

B. Turn on the computer and type "**cd\balance**" to go to the "balance" sub-directory.

C. Once in the Balance subdirectory, type "**Balink Numeric Stable Right**" to start the program and setup the balance (UA-L-1.1; 7.2.3.A-C).

D. Go to the "**G:\Filters**" subdirectory and type "**DBASE**" to start the database program. The "**G:\Filters**" subdirectory is restricted to only lab personnel.

E. From the database program find and load the file with the filter ID's, from the "**G:\filters**" (UA-D-1.0) drive and subdirectory, into the database program (7.1.2.G). The file name appears on each backup weighing forms.

F. Follow each filter types weighing instructions (7.2.2.A-N; 7.2.3.A-G; 7.3.2.A-M; 7.3.3.A-G; 7.4.2.A-M).

G. Weigh each filter in the order that they occur in the database file. After each 5 filters weigh one of the Class "S" calibration weights and record it under the appropriate ID number.

H. After the stability light goes out on the balance wait 5 seconds and press the handswitch to transfer the weight to the computer. Upon transfer the computer will beep. Visually check that the weight transferred is the weight appearing on the balance display. Record the weight onto the appropriate weighing backup form (figure 1-4, 5).

I. The cursor will move to the next sample ID. Repeat step 5 and 6 for each sample.

J. After each group of filters is weighed and the cursor is at the end of the computer file, save the data and return the filters to the lab supervisor for QC/QA checks.

K. The lab supervisor QC checks each filter weight against the value recorded on the back-up form. Once completed the file is moved from "**G:\Filters**" to "**G:\Fil-Pre**" for pre-weights or "**G:\Fil-Pos**" for post-weights. The "**G:\Fil-Pre**" and "**G:\Fil-Pos**" subdirectories are restricted to lab personnel only. Each back-up form is checked by an additional lab person to ensure that each form is completely filled out for quality assurance.

7.6 Quality Control

7.6.1 Tolerance Limits

A. The "Standard Weight" must be within 0.02 mg of its previously determined weight.

B. Lab or field blank status will be assigned by the materials technician to one out of every 10 filters. The identification of blanks will be unknown to the lab staff during the pre and post weighing procedure.

C. The postweight of each batch blank must be within 0.02 mg of its initially determined pre-weight.

D. A visual check of individual weight values between the computer screen and the pre- and post-weight forms will be made during the weighing procedure.

E. To insure the accuracy of values recorded in computer files, 10% of pre- and post-weigh forms are scanned (UA-D-24.0) and compared to recorded values.

7.6.2 Detection Limits

A. Only the Mettler AE 163 (UA ID# A195535) and the AE 166 (UA ID# A201335) will be used to weigh filters (table 1).

B. The sensitivity of the Mettler AE 163 and AE 166 electrobalance is specified by the manufacturer as 0.02 mg. Set at 0 to 30 g. the balance can read to 0.01 mg, whereas set to read from 0 to 162 g it can be read to 0.1 mg.

C. Record all filter weight determinations to the nearest 0.01 mg.

D. Net filter sample weights are assumed to have a detection limit of 0.02 mg.

7.6.3 Corrective Actions

A. If the control weight (#9800007, #9800008) varies by more than $\pm$ 1% from its previous weight, recalibrate the electrobalance and re-weigh all filters in the previous 5 filter sequence.

8.0 RECORDS

8.1 Data Collected by this Procedure

8.1.2 Filter Pre-weight and Post-weight Data

A. The date, temperature, relative humidity, conditioning period information and technician's initials are recorded on all Pre- and Post- filter weighing backup forms (figures 1-5) at the beginning of all filter weighing sessions.

B. The sample ID #, weight in grams, and status if applicable are recorded on the filter weighing forms, and vacuum dust chain of custody forms (figures 1-6, 8).

C. Measured results for control weights are recorded in grams on all filter weighing forms (figures 1-8).

D. 10% of filter weighing backup forms are scanned and compared with computer files to insure computer accuracy.

8.2 Location/Placement of Forms

8.2.2 Sample Weighing Forms

A. Values recorded on weighing forms (figures 1-6) are checked against the electronic files by the lab supervisor to ensure quality control and signs and dates under "**Q/C**". An additional lab person checks that all appropriate fields are complete and signs and dates under "**Q/A**" Data forms are passed to the data coordinator and backup forms are archived in files in the lab supervisors office.

B. A signout sheet is kept on the file cabinet to record the removal of any backup forms. Any individual removing the files will record their name and date of removal on the sign-out sheet.

Table 1. Balances to be used in the weighing of each filter type.

Filter Type	**Sample Type** (Computer File Suffix)	**Balance**
37 mm Teflo Pre-weigh	31P	AE 163
37 mm Teflo Post-weigh	31S	AE 163
25 mm Teflo Pre-weigh	41P	AE 163
25 mm Teflo Post-weigh	41S	AE 163
Sentinel Filter Pre-weigh	12P	AE 163
Sentinel Filter Post-weigh	12S	AE 163
Vacuum Dust Filter Pre-weigh	71P	AE 163
Vacuum Dust Filter Post-weigh	N/A	AE 166
Vacuum Dust Filter Post sieve weigh	N/A	AE 166

Figure 1. PM Filter Pre-Weighing Form

25mm and 37mm TEFLO FILTER PRE-WEIGHING BACKUP FORM

		Balance
Equilibration Start Date	_______/_______/_______	0 AE 163
Equilibration Start Time	[ ][ ]:[ ][ ]	0 AE 166
Weighing Date	_______/_______/_______	0 #V-1200

Technician [ ][ ] _______ Code Init. Temperature [ ][ ] °F
Relative Humidity [ ][ ] %

File Name: ____________________

All Weights Are Recorded In Grams (g).

Sample ID#	Weight	Status	QA/QC
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0

Standard Weight ________________g. Number ____________ 0 0
Standard Weight ________________g. Number ____________ 0 0

Comments:

Figure 2. PM Filter Post-Weighing Form

25mm and 37mm TEFLO FILTER POST-WEIGHING FORM

Equilibration Start Date ______/______/______
Equilibration Start Time [ ][ ]:[ ][ ]
Weighing Date ______/______/______

Balance
0 AE 163
0 AE 166
0 #V-1200

Technician #1 [ ][ ] ______ Temperature [ ] [ ] °F
Technician #2 [ ][ ] ______ Relative Humidity [ ] [ ] %
Code Init.

File Name: ____________________

All Weights Are Recorded In Grams (g).

Sample ID#	Weight	Status	QA/QC
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0

Standard Weight ______________g. Number ___________ 0 0
Standard Weight ______________g. Number ___________ 0 0

Comments:

Figure 3. Sentinel Filter Pre-Weighing Form

SENTINEL FILTER PRE-WEIGHING BACK-UP FORM

Equilibration Start Date ______/______/______
Equilibration Start Time [ ][ ]:[ ][ ]
Weighing Date ______/______/______

Balance
0 AE 163
0 AE 166
0 #V-1200

Technician #1 [ ][ ] ______
Technician #2 [ ][ ] ______
Code Init.

Temperature [ ][ ] °F
Relative Humidity [ ][ ] %

File Name: ______________________

All Weights Are Recorded In Grams (g).

Sample ID#	Weight	Status	QA/QC
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0

Standard Weight ______________g. Number ____________ 0 0
Standard Weight ______________g. Number ____________ 0 0

Comments:

Figure 4. Sentinel Filter Post-Weighing Form

SENTINEL FILTER POST-WEIGHING BACK-UP FORM

Equilibration Start Date _______/_______/_______ Balance
Equilibration Start Time [ ][ ]:[ ][ ] 0 AE 163
Weighing Date _______/_______/_______ 0 AE 166
0 #V-1200

Technician #1 [ ][ ] _______ Temperature [ ][ ] °F
Technician #2 [ ][ ] _______ Relative Humidity [ ][ ] %
Code Init.

File Name: ____________________

All Weights Are Recorded In Grams (g).

Sample ID#	Weight	Status	QA/QC
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ][ ].[ ][ ][ ][ ]	[ ][ ]	0 0

Standard Weight ________________g. Number _____________ 0 0
Standard Weight ________________g. Number _____________ 0 0

Comments:

Figure 5. Vacuum Dust Filter Pre-Weighing Form

VACUUM DUST FILTER PRE-WEIGHING BACK-UP FORM

Equilibration Start Date _______/_______/_______ Balance
Equilibration Start Time [ ][ ]:[ ][ ] 0 AE 163
Technician [ ][ ] _______ 0 AE 166
Code Init. 0 #V-1200
Weighing Date _______/_______/_______ Temperature [ ][ ] °F
Technician [ ][ ] _______ Relative Humidity [ ][ ] %
Code Init.

File Name: ________________________

All Weights Are Recorded In Grams (g).

Sample ID#	Weight	Tie	Status	QA/QC
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0
[ ][ ][ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ].[ ][ ][ ][ ][ ]	[ ][ ]	0 0

Standard Weight ________________g. Number _____________ 0 0
Standard Weight ________________g. Number _____________ 0 0

Comments:

Figure 6. Vacuum dust sample chain of custody form.

Sample Weights and Chain of Custody Sheet NHEXAS Arizona
Vacuum Dust Sample

Sample ID# :_____	Tech ID _____ [ ][ ] Init. Code	QA/QC 0 0
Filter Weight :_____ g.	Tie Weight :_____ g.	
Total Weight :_____	Balance	0 0
Pesticide Aliquot ID#: _____ _	0 AE 163	0 0
Metals Aliquot ID#: _____	0 AE 166	0 0
	0 V#1200	
Standard Weight #: _____	Weight: _____ g.	0 0

Custody Record

Relinquished or Received	Signature	Date mo./day/yr.	Time	Action
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	
[Rel] [Rec]		___/___/___	___:___	

Figure 7. Vacuum Dust Characterization Form

VACUUM DUST CHARACTERIZATION FORM

Technician _____ [ ][ ] Start Date ____/____/____
Init. Code

[ ][ ][ ][ ][ ][ ][ ] [ ]
Sample ID Status

Total Sample Y N

_____ g. - _____ g. = _____ g. 0 0
Total Wt. Filter + Tie Wt. Collected Wt.
Tech ID (Init.)_____ (Code) [ ][ ] Balance [ ] AE 163 [ ] AE 166

_____ g. - _____ g. = _____ g. 0 0
Total Wt. Dirty Filter + Tie Wt. Sample Wt.
Tech ID (Init.)_____ (Code) [ ][ ] Balance [ ] AE 163 [ ] AE 166
Screen Set [ ][ ] Archive Code [ ][ ]-[ ]-[ ][ ][ ][ ][ ]

Aliquots *Pesticide* Sample ID# [ ][ ][ ][ ][ ][ ][ ]

_____ g. - _____ g. = _____ g. 0 0
Split Wt. Weighing Paper Wt. Pesticide Sample Wt.
Tech. ID (Init.)_____ (Code) [ ][ ] Balance [ ] AE 163 [ ] AE 166

Metals Sample ID# [ ][ ][ ][ ][ ][ ][ ]

_____ g. - _____ g. = _____ g. 0 0
Split Wt. Weighing Paper Wt. Metals Sample Wt.
Tech. ID (Init.)_____ (Code) [ ][ ] Balance [ ] AE 163 [ ] AE 166
XRF Cup # [ ][ ] XRF Form Header Completed Y [ ] N [ ]

Other Fractions

_____ g. - _____ g. = _____ g. 0 0
>10 Screen Wt. Weighing Paper Wt. >10 Sample Wt.

_____ g. - _____ g. = _____ g. 0 0
10-230 Screen Wt. Weighing Paper Wt. 10-230 Sample Wt.
Tech. ID (Init.)_____ (Code) [ ][ ] Balance [ ] AE 163 [ ] AE 166

QA/QC Check Total Screened Weight _____ g. 0 0

(_____ g. - _____ g.) * 100 = _____ % 0 0
Sample Wt. Total Screened Wt. % Dust Loss

Total Sample Aliquots Other Fractions

Standard Wt. Number _____ _____ _____
Weight _____ g. _____ g. _____ g . 0 0
QA/QC Signature; _____ Date; ____/____/____

Figure 8. Vacuum dust aliquot chain of custody form.

Sample Protocol and Chain of Custody Sheet
NHEXAS Arizona
Vacuum Dust Aliquots

√ √√

Sample ID# :_____ Original Sample ID# :_____ 0 0

Status: ____ FS: ____ HHID: _____

(#4)Total Wt.:_____ g. - (#3)_____ g. = (#5)_____ g. 0 0

Filter + Tie Wt. Collected Wt.

(#4)Total Wt.:_____ g. - (#6)_____ g. = (#7)_____ g. 0 0

Dirty Filter + Tie Wt. Sample Wt.

Aliquot Type: Pesticides ID _____ 0 0

(#8)Split Wt. _____ g. - (#10)_____ g. = (#12)_____ g. 0 0

Weighing Paper wt. Aliquot wt.

Aliquot Type: Metals ID: _____ 0 0

(#9)Split Wt. _____ g. - (#11)_____ g. = (#13)_____ g. 0 0

Weighing Paper wt. Aliquot wt.

Standard Wt. #: _____ Weight: _____ g. 0 0

Custody Record

Relinquished or Received	Signature	Date mo./day/yr.	Time	Action
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	
[Rel] [Rec]		/ /	:	

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