

# **FORSYTH COUNTY OFFICE OF ENVIRONMENTAL ASSISTANCE AND PROTECTION**

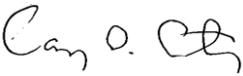


## **STANDARD OPERATING PROCEDURE (SOP)**

# **FRM PM 2.5**

**Signature Page**

By the signatures below, the Forsyth County Office of Environmental Assistance and Protection (FCEAP) certifies that the information contained in the following Standard Operating Procedure (SOP) is complete and fully implemented as the official guidance for our Office. However, due to circumstances that may arise during the sampling year, some practices may change. If a change occurs, a notification of change and a request for approval will be submitted to EPA Region 4 at that time.

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REVISION	DATE	CHANGES TO SOP
1.1	7/10/19	Wholesale changes for switch to 2025i unit
	7/10/19	Added iPort information & use of HA3 and CM3 samplers
1.2	6/21/21	Changed file structure from S:\A&M\PM2.5 to C: \Forsyth County\EAP - PM 2.5 - PM 2.5
	6/21/21	Changed Clemmons Middle 6 day to Clemmons Middle 3 day; Changed CM6 to CM3
	6/21/21	Removed wording of using USB to transfer files.
1.3	6/6/22	Removed wording about State of NC lab; added RTI as lab
	6/6/22	Updated database figures to the most current version
	6/7/22	Minor formatting changes. Updated all instances of CM3 to CM6 as this sampler is now run on a 6-day cycle.

## **STANDARD OPERATING PROCEDURES FOR FRM<sub>2.5</sub>**

### **Forsyth County Office of Environmental Assistance and Protection**

#### **6.0 SCOPE AND PURPOSE**

The U.S. Environmental Protection Agency (EPA) began regulating fine particles in July 1997. The regulation set forth the reference monitoring method in the Code of Federal Regulations (CFR) at 40 CFR Part 50, Appendix L. This document is intended to assist the Forsyth County Office of Environmental Assistance and Protection (FCEAP) to use the EPA reference method to monitor the ambient atmosphere for particles with an aerodynamic diameter of  $2.5 \mu\text{m}$  or less, known as fine particles (PM<sub>2.5</sub>). Fine particles are formed in the atmosphere from gases such as sulfur dioxide, reactive oxides of nitrogen, and volatile organic compounds. Sources include power plants, diesel trucks, wood stoves, and industrial processes.

The goal of the FCEAP PM<sub>2.5</sub> program is the measurement of fine particles in units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Using a Thermo Scientific Partisol<sup>®</sup>-Plus Model 2025i PM<sub>2.5</sub> Sequential Sampler, referred to as “PM<sub>2.5</sub> Sampler” for the remainder of this document, particles are collected on 47mm diameter, 2 $\mu\text{m}$  pore-size Teflon<sup>®</sup> filters over a 24-hour time period. The concentrations are then compared to the National Ambient Air Quality Standard (NAAQS) of  $35 \mu\text{g}/\text{m}^3$  for 24 hours and  $12 \mu\text{g}/\text{m}^3$  annual arithmetic mean concentration.

This document focuses on the assembly, operation, and repair of the PM<sub>2.5</sub> samplers and should be used in conjunction with the supplied Service Manual. The Service Manual is the reference method for all adjustments to the sampler by FCEAP technicians and will not be reproduced in this SOP.

#### **6.1 SAMPLER DESCRIPTION AND ASSEMBLY**

The PM<sub>2.5</sub> Sampler is designed to meet the regulatory monitoring requirements for PM<sub>2.5</sub> (40 CFR Part 50, Appendix L). The sampler draws a known volume of air at a constant flow rate through a PM<sub>10</sub> inlet followed by a Very Sharp Cut Cyclone(VSSC). After a 24-hour sampling period, the pre-weighed Teflon<sup>®</sup> filter is collected and gravimetrically analyzed. The mass concentration is reported as  $\mu\text{g}/\text{m}^3$ .

##### **6.1.1 Features of the PM<sub>2.5</sub> Sampler**

An active volumetric flow control system that maintains a constant volumetric flow rate of 16.67 L/min by incorporating a mass flow controller, and ambient temperature and pressure sensors.

The temperature of the collection filter is maintained within 5 °C of the outdoor ambient temperature by a continuous filter compartment ventilation system.

The inlet is designed to remove particles with an aerodynamic diameter of greater than 10  $\mu\text{m}$  and sends particles less than 10  $\mu\text{m}$  to the next filtration stage. Figure 1 is a schematic of the PM<sub>10</sub> inlet head.

Figure 2 depicts the VSSC that removes particles greater than 2.5  $\mu\text{m}$  and allows 2.5  $\mu\text{m}$  in diameter and smaller particles to be collected on a Teflon<sup>®</sup> filter.

The sampler uses standard 47 mm Teflon<sup>®</sup> filters housed in reusable cassettes.

The sampler has a filter exchange and storage system that simplifies transportation, minimizes contamination, and allows for up to 177 hours between site visits.

A record of filter data is stored for each filter used in the sampler, and includes all U.S. EPA specified values such as error condition flagging and average temperatures and pressures. Filter data records also include sampled volume and analog input data averaged over the collection period.

The sampler has a capacity to store 50 filter data records.

Interval data are stored every five minutes, and include the five-minute averages of the filter temperature, ambient temperature, ambient pressure, and flow rate.

The sampler has capacity to store 16 days of five-minute interval data.

The sampler has capacity to store 32 days of 30 minute input data.

A bi-directional RS-232 interface for data transfer to or from a PC or Palmtop device is used.

**An Ethernet cable from the instrument to the site computer inside the monitoring station building is used for data transfer via Thermo's iPort software.**

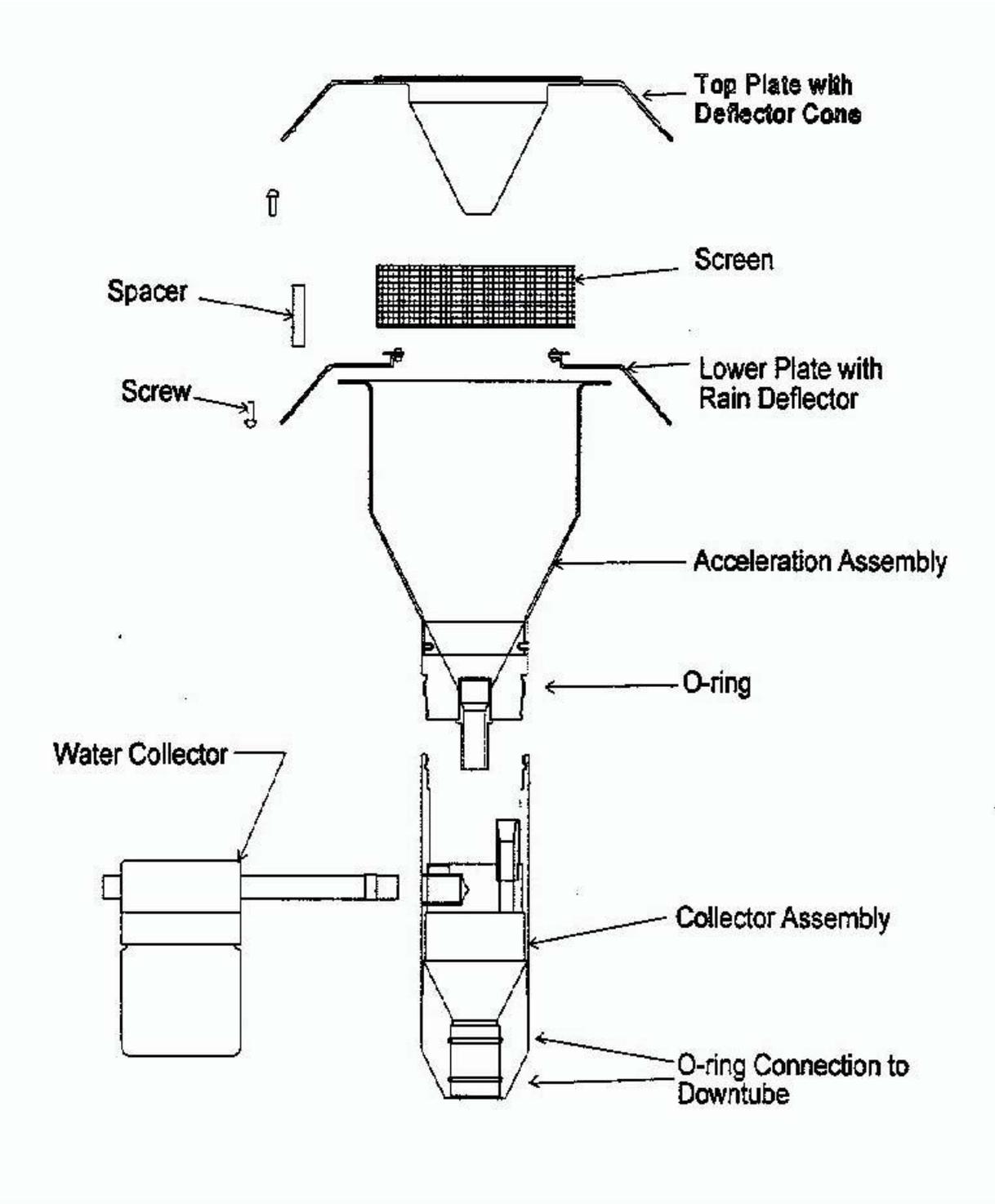
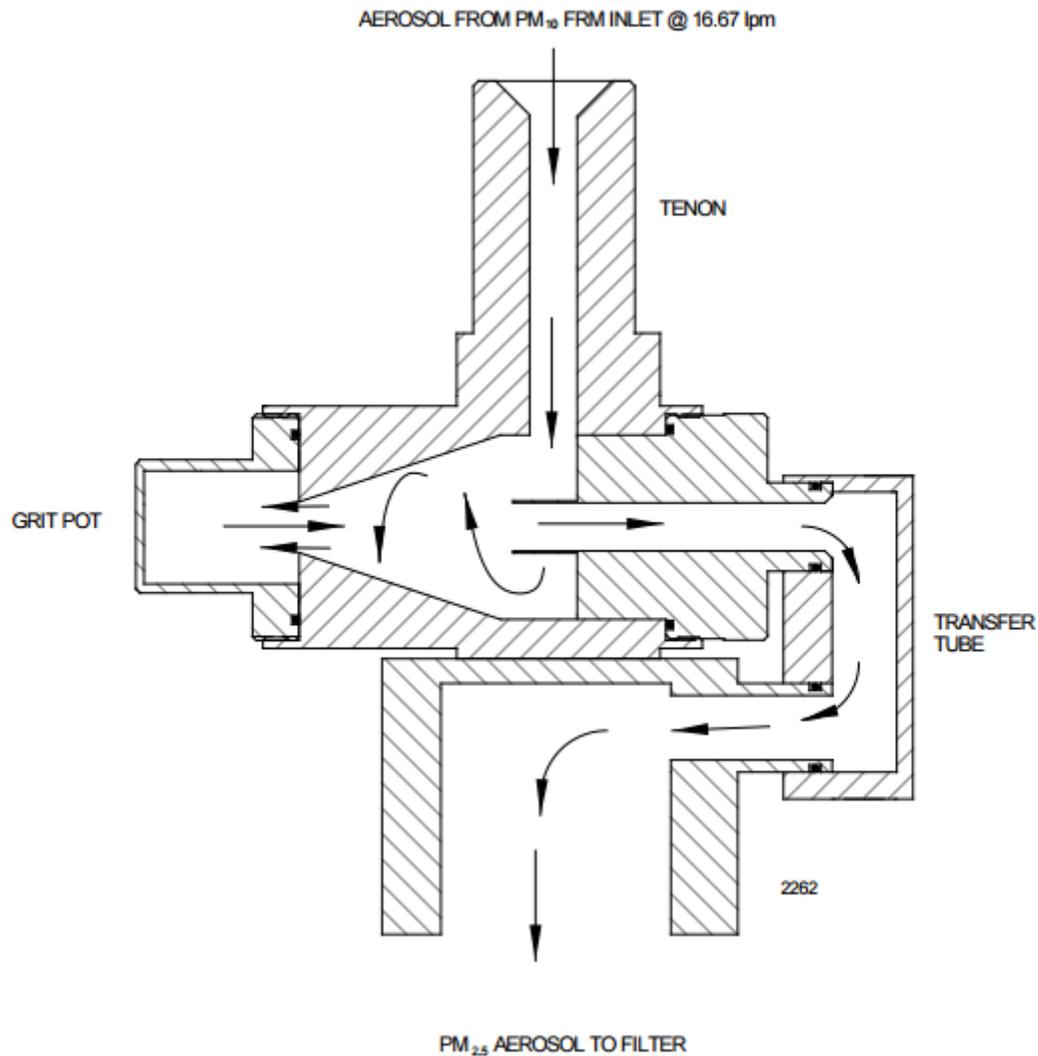


Figure 1. Cross-Sectional View of PM<sub>10</sub> Sampler Inlet Head



**Figure 2. Cross Sectional view of PM<sub>2.5</sub> Very Sharp Cut Cyclone**

## 6.1.2 Assembly of 2025i Sampler

### 6.1.2.1 Unpacking and Inspection

Inspect the packing container upon receipt of a new sampler for damage. Notify the carrier of any damage and hold for their inspection. The carrier, not Thermo Scientific, is responsible for damage incurred during transit.

### 6.1.2.2 Parts Inventory

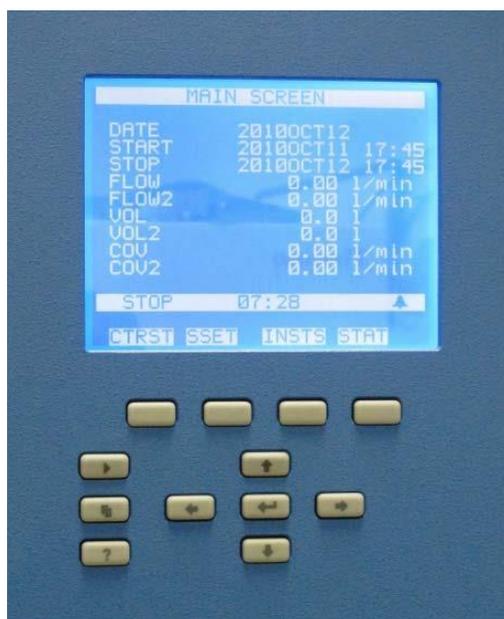
Inventory the shipping container contents using the enclosed packing list as a guide. Note any missing parts and notify Thermo Scientific of the discrepancies.

### 6.1.2.3 Sampler Assembly

Use the Quick Start Guide that accompanies the sampler for assembly instructions. Each new PM2.5 Sampler will undergo a series of tests taken from the EPA questionnaire (Appendix A) of this SOP. If the answer to any question is NO, then the acceptance criteria have failed and the sampler is rejected for service with the FCEAP.

## 6.2 2025i Sampler Setup

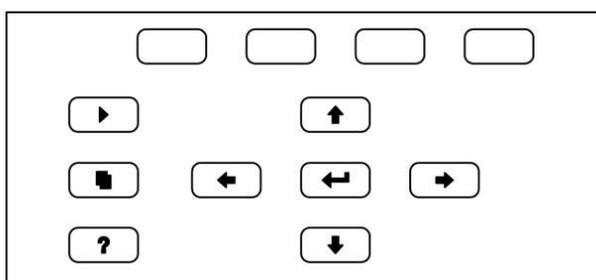
The 320 x 240 graphics liquid-crystal display (LCD) control panel shows the instrument parameters, instrument controls, help, and error messages (Figure 3). Some menus contain more items than can be displayed at one time. For these menus, use   to move the cursor up and down to each item.



**Figure 3. Model 2025i Control Panel**

### 6.2.1 Pushbuttons

Pushbuttons allow the user to traverse the various screens/menus (Figure 4).



**Figure 4. Front Panel Pushbuttons**

#### 6.2.1.1 Pushbutton Functions

 = Help  is context-sensitive, that is, it provides additional information about the screen that is being displayed. Press  for a brief explanation about the current screen or menu. Help messages are

displayed using lower case letters to easily distinguish them from the operating screens. Press  to return to the Run screen, or any other key to exit a help screen.

6.2.1.2     = Up, Right, Down, Left. The four arrow pushbuttons move the cursor Up, Right, Down, Left change values and states in specific screens.

= Enter  is used to select a menu item, accept/set/save a change, and/or toggle On/Off functions.

6.2.1.3 The soft keys are multi-functional keys that use part of the display to identify their function. The soft keys provide a shortcut to the most often used menus and screens. They are located directly underneath the display, and user-defined labels in the lower part of the display indicate the function of each key at that time.

6.2.1.4 To change a soft key, place the menu cursor “>” on the item of the selected menu or screen you wish to set. Press  followed by the selected soft key within 1 second of pressing . The “edit soft key prompt” will be displayed for configuration of the new label.

**Note:** Not all menu items may be assigned to soft keys. If a particular menu or screen item cannot be assigned, the “edit soft key prompt” screen will not come up upon entering right-arrow-soft key combinations. All items under the Service menu (including the menu itself) cannot be assigned soft keys.

## 6.2.2 Programming a Sample Run

This section describes the procedures for programming the Sampler for a sampling run using the Basic Sampling method. This procedure describes the process for the Partisol 2025*i*.

6.2.2.1 Prepare a filter cassette magazine with the desired number of conditioned 47 mm filters in cassettes (including blank filter cassettes or separator disk cassettes if required). For the Partisol 2025*i*, a single filled filter cassette magazine will be used for sampling.

6.2.2.2 Install the prepared filter cassette magazines in the filter shuttle mechanisms on the left side of the Partisol 2025*i* Samplers. A clean, empty storage magazine should be installed on the right side of each filter exchange mechanism.

6.2.2.3 Use the following procedure to program the Sampler for a sampling run. Refer to the “Firmware Screen Descriptions” chapter that follows for detailed information about the screens in this procedure.

**Note** The front panel pushbuttons shown in the following procedure are used to traverse the screens and menus.

Accessing the Main Menu – To access the Main Menu, press  repeatedly until the Main Menu appears. Sample ID information can be entered in the Sample mode, but the Sampler must be in the Stop mode to enter a new sampling program. If the Sampler is in the Wait mode or Sample mode, press  to enter the Stop mode. If the Sampler is in the Audit mode, press  repeatedly to display the Main Menu, scroll to Audit and Calibration and press  to display the Audit and Calibration menu, with the cursor at Audit  mode, press to display the Audit Mode screen. In the Audit Mode screen, press  to exit Audit mode and press  to confirm the change.

6.2.2.4 On the Main screen, confirm that the date and time (EST) are correct.

6.2.2.5 If the date or time is not correct, in the Main Menu, scroll   to Instrument Setup and press  scroll   to Date/Time and press  to display the Date and Time screen. In the Date and Time screen, press  to access the Edit mode and follow the screen directions to edit the date and/or time. When the changes are complete, press  to save the changes. Press  to return to the Instrument Setup menu

6.2.2.6 Confirm that the Site ID is correct.

6.2.2.7 In the Main Menu, scroll   to Instrument Setup and press  to display the Instrument Setup menu. In the Instrument Setup menu, scroll   to Site ID, press , and confirm that the Site ID is correct. If the Site ID is not correct, scroll   to the incorrect Site ID, press  to display the alphanumeric entry screen, enter the correct Site ID description, and save it.

Press  repeatedly to return to the Main Menu. In the Main Menu with the cursor at Sample Setup, press  to display the Sample Setup menu.

6.2.2.8 The Sample Setup menu allows you to choose modes such as:

“Auto Populate”, which calculates the default start time and date once sample 01 is programmed;

“Apply EPA Times”, which is a shortcut key for midnight-to midnight, 24-hour continuous sampling;

“Apply Default Times”, which automatically applies the default time settings.

6.2.2.9 To apply EPA default conditions (midnight-to-midnight, continuous, 24-hour sampling) scroll to “Apply EPA Times” in the Sample Setup menu, press  to display the Apply EPA Times screen, and press  to set the EPA times. To “Apply Default Times,” scroll to Apply Default Times in the Sample Setup menu, press  to display the “Apply Default Times” screen, and press  to set the default times. In our case we sample 1 in 3 days (every 72 hrs) and 1 in 6 days (every 144hrs).

6.2.2.10 Use the following procedure to set sample parameters manually. At Sample Setup, scroll to Sample 01, press  and use the pushbuttons as indicated on the screen to set the sample start time and date for the first sample. Alternately, press   again and use the pushbuttons to select a field and change the value. Note that holding the pushbutton down causes the value to increment faster. When the start time setting is complete, scroll to Save and press  to save the start time and date. Press  repeatedly to return to the Sample 1 menu.

6.2.2.11 At the Sample 1 menu, scroll   to Stop, press , and use the pushbuttons as indicated on the screen to set the sample stop time and date. When the stop time setting is complete, scroll to Save and press  to save the start time and date. Press  to return to the Sample 1 menu.

At the Sample 1 menu, scroll   to Filter Blank, press  to display the “Filter is a Blank” screen, and press  to toggle to Yes or No as appropriate. Press  to return to the Sample 1 menu.

At the Sample 1 menu, scroll   to Filter ID, and press  to display the “Filter ID” screen. Use the pushbuttons as indicated on the screen to set the Filter ID number, and press  to save the setting. Press  to return to the Sample 1 menu.

At the Sample 1 menu, scroll to Cassette ID, and press to display the “Cassette ID” screen. Use the pushbuttons as indicated on the screen to set the Cassette ID number, and press  to save the setting. Press  to return to the Sample 1 menu.

At the Sample 1 menu, scroll to Filter Type, and press  to display the “Filter Type” screen. Use the pushbuttons as indicated on the screen  to change the Filter Type to “T”, and press  to save the setting. Press  to return to the Sample 1 menu.

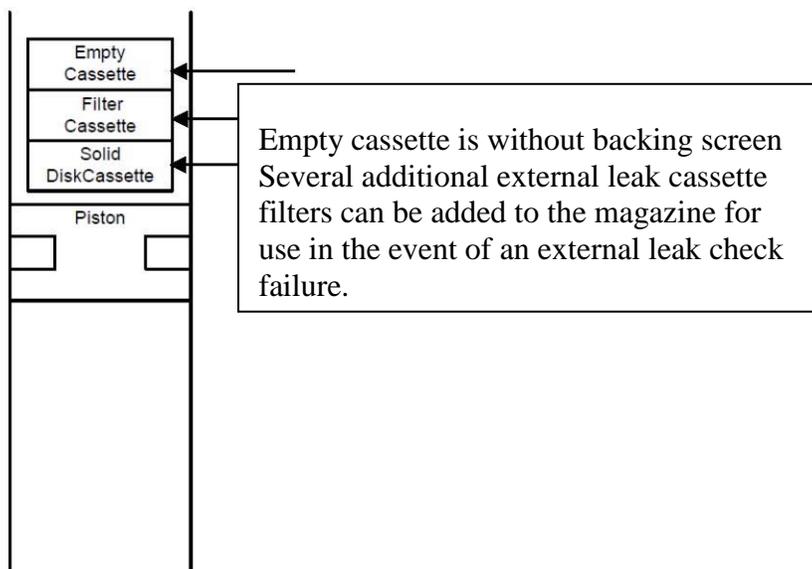
6.2.2.12 Continue to program Sample 02-Sample 16 as appropriate. If the Sampler is in Stop mode, press   to return to the Wait mode.

## 6.3 Site Visits

### 6.3.1 External Leak Check

An external leak check must be performed once a month or whenever the upper lid is opened.

For these audit procedures, prepare a set of audit magazines consisting of a supply magazine and a clean empty storage magazine. The audit supply magazines (Figure 5) should contain an open test cassette part # 36-012077, an external leak check cassette (with a 47mm filter) and a blocked test filter cassette part # 36-012078. The empty cassette should be in the topmost position as shown in Figure 5. Load the disks starting with the blocked test disk cassette, then the filter cassette, and the empty test cassette (no backing screen) last.



**Figure 5. Loaded Audit Magazine – 2025i**

6.3.1.1 Use the following procedure to perform an external leak check.

Note: To ensure leak tightness, a filter cassette containing a new 47 mm filter must be installed in the sampling position of the Sampler.

6.3.1.2 Press  to go to the Audit and Calibration menu, scroll to  Advance Filter, and press 2x to advance the audit filter cassette into sampling position.

6.3.1.3 Attach the flow audit adapter to the sample tube (Figure 6) and close the valve on the flow audit adapter.



**Figure 6. Flow Audit Adapter with Valve in Closed Position**

6.3.1.4 Scroll to “Leak Checks,” press , scroll to External, and press . The following message displays:

**MAKE SURE THAT FILTER IS IN PLACE AND LEAK CHECK ADAPTER IS CLOSED!!!**

6.3.1.5 Press  to begin testing.

6.3.1.6 A Pass or Fail message will display at the end of the leak check cycle. The leak check pass criterion is a pressure drop of 25 mmHg or less. If a Fail message is displayed, slowly release the adapter and advance a new audit test cassette and repeat the leak check test. Several attempts can be made with different audit test cassettes. If a Fail message is STILL displayed, slowly release the adapter and advance a blocked test cassette and repeat the leak check test.

If a leak check fail message is displayed on the screen after multiple external leak checks, while using several different external leak check filters, an internal leak check can be performed using the solid disk cassette. An internal leak checks can help to isolate the cause of the leak. Additionally, a cleaning of the sample V-seals may be necessary. If leak checks continue to fail inspect all “O” rings for faults or breaks and test pump performance. After a successful leak check, slowly open the valve on the flow audit adapter.

### 6.3.2 Return sample filters

6.3.2.1 Press  to go to the Audit and Calibration menu, scroll to  Advance Filter, and press to advance the sample filter cassette back into the sampling position. The sample filter cassette needs to be returned to its position before the leak checks were done.

6.3.2.2 Press  repeatedly to display the Main Menu, scroll to Audit and Calibration and press  to display the Audit and Calibration menu, with the cursor at Audit  mode, press to display the “Audit Mode” screen. In the “Audit Mode” screen, press  to exit Audit mode and press  to confirm the change.

6.3.2.3 Once back in the office open the PM<sub>2.5</sub> Database (*\\Forsyth County\EAP - PM 2.5 - PM 2.5\DATABASE\PM<sub>2.5</sub>V2006*) and select the Leak Check button (Figure 7). Enter in the data for the appropriate site and dates. Another leak check MUST be performed EVERY 10 sample periods, at a MINIMUM.

PM2.5v2006 Menu

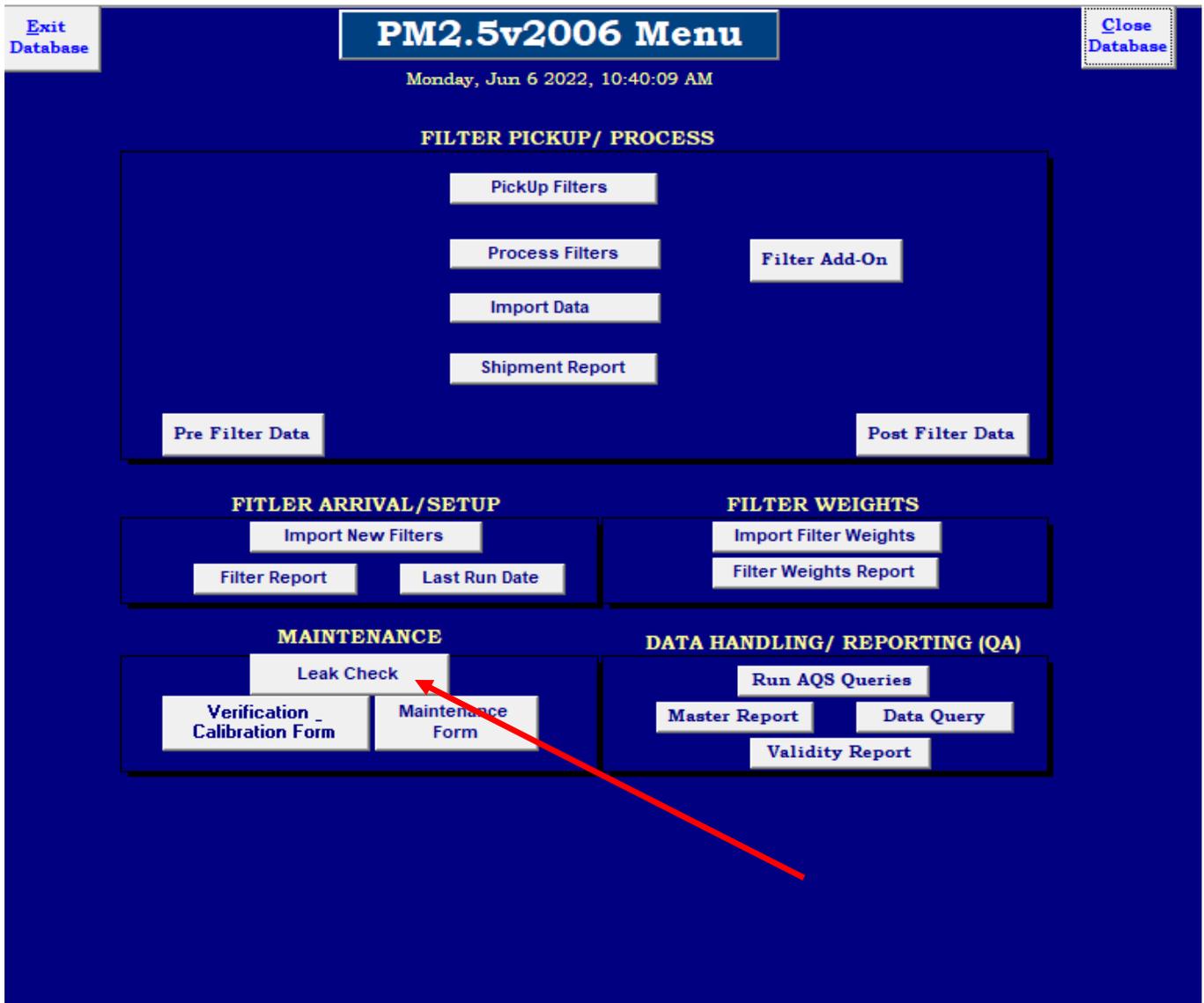


Figure 7. Leak Check Button

### 6.3.3 Verification Checks

**NOTE: If temperature and/or pressure have to be recalibrated for any reason, the flow must also be recalibrated (see section 6.3.4)**

6.3.3.1 The Sampler may be in the Stop Mode or in Audit mode to perform the verification audits. If the Sampler is in the Stop Mode proceed with the verification audit. If the Sampler is running a sample and an audit must be performed, interrupt the sample by entering the Audit mode. When the audit is completed, replace the current sample filter and resume the sample. Enter the Audit mode by pressing , scrolling to Audit and Calibration, and pressing  to display the Audit and Calibration menu. With the cursor at Audit Mode, press  to display the Audit Mode screen, press  to enter the Audit mode, and press  to confirm the setting.

6.3.3.1.1 Press  to return to the Audit and Calibration menu.

6.3.3.1.2 Remove the currently installed storage magazine(s) from the right side of the Sampler and cover with an orange storage cap. Label the magazine(s) orange storage cap with instrument designation(s).

6.3.3.1.3 Remove supply magazine from the left side of the filter shuttle mechanism and install on storage side.

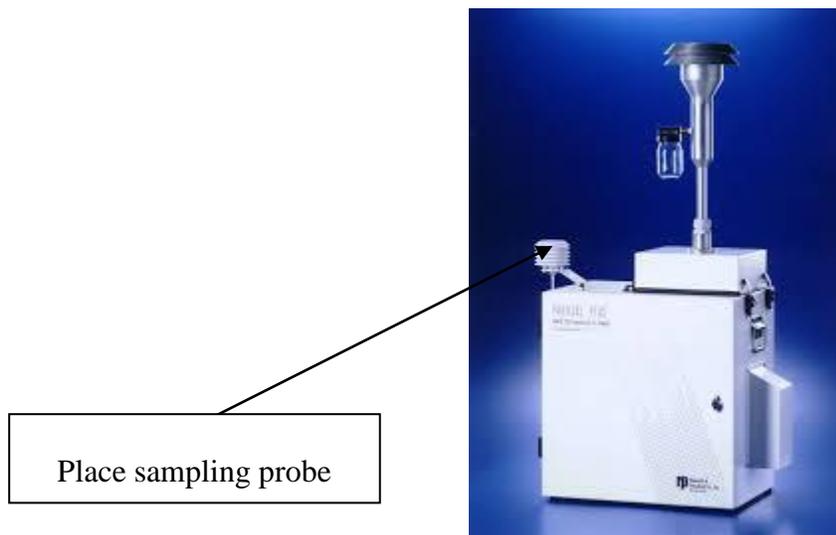
6.3.3.1.4 Install the audit magazine on the supply side. Ensure that the pressure supply line is connected at the bottom of the magazine.

6.3.3.1.5 At the Audit and Calibration menu, scroll to Advance Filter, and press  to advance the filter. This will transfer the current sampling filter to the respective supply magazine temporarily placed in the right side of the filter shuttle mechanism.

6.3.3.1.6 Remove the supply magazine(s) from the right side of the Sampler, cover with an orange storage cap to prevent contamination of the partially exposed filters, and set aside.

6.3.3.1.7 Use Verification form found: *\Forsyth County\EAP - PM 2.5 - PM 2.5\Verif&CalSheet.xls* to print out sheet and take to field. Refer to Figure 9 for the Verification and Calibration Spreadsheet page.

### 6.3.3.2 Ambient Air Temperature



**Figure 8: Ambient Temperature Sensor**

6.3.3.2.1 Determine the current temperature ( $^{\circ}\text{C}$ ) at the ambient temperature sensor using an external thermometer [ $^{\circ}\text{C} = 5/9 \times (^{\circ}\text{F} - 32)$ ]. Insert probe into the external radiation shield (see Figure 8).

Write the Ambient Temperature on Verification sheet (see Figure 9).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
690	Date	Site	Instrument	Standard	Diff	±4°C	Instrument	Standard	Diff	±4°C	Instrument	Standard	Diff	±10mmHg	Instrument	Standard	Diff	±4%				
691	31-Jan	HA1	12.2	11.8	0.4	PASS	14.0	11.8	2.2	PASS	740	739	1	PASS	16.68	17.35	4.0%	PASS				
692	28-Feb		4.7	4.6	0.1	PASS	6.4	4.2	2.2	PASS	740	740	0	PASS	16.67	16.95	1.7%	PASS				
693	31-Mar		15.0	15.1	0.1	PASS	17.3	14.1	3.2	PASS	738	739	1	PASS	16.68	16.98	1.8%	PASS				
694	2-May		16.7	16.8	0.1	PASS	18.6	18.9	0.3	PASS	735	735	0	PASS	16.68	17.19	3.1%	PASS				
695	6-Jun		24.9	23.6	1.3	PASS	24.0	27.9	3.9	PASS	735	734	1	PASS	16.67	17.04	2.2%	PASS				
696	9-Jul		27.4	27.0	0.4	PASS	25.2	29.0	3.8	PASS	737	736	1	PASS	16.66	16.85	1.1%	PASS				
697	6-Aug		31.7	31.1	0.6	PASS	33.5	33.5	0.0	PASS	735	736	1	PASS	16.68	16.88	1.2%	PASS				
698	4-Sep		29.5	29.2	0.3	PASS	31.1	31.5	0.4	PASS	733	734	1	PASS	16.67	17.01	2.0%	PASS				
699	3-Oct		27.1	26.6	0.5	PASS	30.1	30.5	0.4	PASS	734	735	1	PASS	16.68	17.02	2.0%	PASS				
700																						
701																						
702																						
703																						
704	Date	Site	Instrument	Standard	Diff	±4°C	Instrument	Standard	Diff	±4°C	Instrument	Standard	Diff	±10mmHg	Instrument	Standard	Diff	±4%				
704	31-Jan	CM3	8.4	8.1	0.3	PASS	10.9	11.1	0.2	PASS	11.0	12.0	1.0	PASS	743	743	0	PASS	16.69	16.68	0.1%	PASS
705	28-Feb		4.3	4.4	0.1	PASS	5.3	5.5	0.2	PASS	4.7	5.0	0.3	PASS	742	741	1	PASS	16.69	16.45	1.4%	PASS
706	31-Mar		14.2	14.1	0.1	PASS	15.6	15.7	0.1	PASS	15.1	15.0	0.1	PASS	741	740	1.0	PASS	16.69	16.68	0.7%	PASS
707	2-May		15.7	15.4	0.3	PASS	16.8	16.7	0.1	PASS	17.2	17.1	0.1	PASS	739	739	0	PASS	16.69	16.60	0.5%	PASS
708	6-Jun		24.2	23.7	0.5	PASS	25.6	25.3	0.3	PASS	27.0	26.0	1.0	PASS	739	738	1	PASS	16.69	16.72	0.2%	PASS
709	9-Jul		24.6	24.6	0.0	PASS	26.8	27.1	0.3	PASS	28.0	28.0	0.0	PASS	741	740	1	PASS	16.70	16.63	0.4%	PASS
710	6-Aug		30.4	30.6	0.2	PASS	32.6	32.7	0.1	PASS	33.0	33.0	0.0	PASS	739	741	2	PASS	16.74	16.70	0.2%	PASS
711	4-Sep		28.6	28.9	0.3	PASS	30.0	30.2	0.2	PASS	30.6	30.5	0.1	PASS	739	740	1	PASS	16.71	16.78	0.4%	PASS
712	3-Oct		23.1	23.1	0.0	PASS	24.7	25.0	0.3	PASS	26.3	25.7	0.6	PASS	740	739	1	PASS	16.71	16.75	0.2%	PASS
713																						
714																						
715																						
716																						
717	31-Jan	CM6	8.0	8.1	0.1	PASS	10.5	11.3	0.8	PASS	12.2	11.6	0.6	PASS	743	743	0	PASS	16.62	16.60	0.1%	PASS
718	28-Feb		4.5	4.4	0.1	PASS	5.4	5.5	0.1	PASS	4.9	5.4	0.5	PASS	741	741	0	PASS	16.65	16.41	1.4%	PASS
719	31-Mar		14.0	14.1	0.1	PASS	15.2	15.7	0.5	PASS	15.3	15.2	0.1	PASS	741	740	1	PASS	16.64	16.38	1.6%	PASS
720	2-May		15.4	15.4	0.0	PASS	15.5	15.7	0.2	PASS	16.8	16.6	0.2	PASS	739	739	0	PASS	16.64	16.40	1.4%	PASS
721	6-Jun		23.3	23.7	0.4	PASS	25.5	25.4	0.1	PASS	25.1	25.0	0.1	PASS	738	738	0	PASS	16.60	16.48	0.7%	PASS
722	9-Jul		24.3	24.6	0.3	PASS	26.3	26.6	0.3	PASS	26.8	27.2	0.4	PASS	740	740	0	PASS	16.60	16.33	1.7%	PASS
723	6-Aug		30.1	29.9	0.2	PASS	33.7	33.7	0.0	PASS	34.1	34.6	0.5	PASS	739	743	4	PASS	16.67	16.41	1.6%	PASS

Figure 9: Verification Worksheet

6.3.3.2.2 Verify that the value of Ambient Temp displayed in the Audit screen is within  $\pm 2$  °C of the measured temperature. If the value is not within the limits, a calibration needs to be performed on the ambient temperature sensor (see Section 6.3.4.2) as soon as possible and inform the program manager. . All verification checks are noted in the site logbook and PM 2.5 database.

### 6.3.3.3 Filter Temperature

6.3.3.3.1 Perform leak check PRIOR to Filter Temperature check (see Section 6.3.1). Remove the PM-10 inlet from the sample tube by pulling straight up on the sample tube. Unlatch and open the Sampler’s hood. Pull straight up to remove the VSCC (Figure 10).



**Figure 10: Removing the Very Sharp Cut Cyclone**

6.3.3.3.2 Verify the Sampler filter temperature by inserting an external thermometer into the sampling chamber (see Figure 11). Do not let the external probe contact anything within the sampling chamber.

**Note:** The empty cassette (without a filter installed) should be in sampling position.



**Figure 11: 2025i – Inserting an External Temperature Probe into the Sampling Chamber**

6.3.3.3.3 Write the Filter Temperature on Verification sheet (see Figure 9). All verification checks are noted in the site logbook and PM<sub>2.5</sub> database.

6.3.3.3.4 Compare the measured temperature (°C) with the Filter Temp displayed in the Audit screen. If the measured and Filter Temp readings are not within  $\pm 2$  °C [ $^{\circ}\text{C} = 5/9 \times (^{\circ}\text{F} - 32)$ ] perform the filter temperature calibration procedure (see Section 6.3.4.3) and inform the program manager.

6.3.3.3.5 Re-install the VSCC and perform an external leak check (Section 6.3.1). Close the hood and latch.

#### 6.3.3.4 Ambient Pressure

6.3.3.4.1 Determine the current ambient station pressure, using the Streamline Pro in mm Hg (absolute pressure, not corrected to sea level). Verify the Sampler's ambient pressure by measuring the current ambient station pressure in mm Hg with an external measurement device.

6.3.3.4.2 Use the following conversion factors if needed:

To convert from Atmospheres @ 0 °C to mmHg, multiply by 760.

To convert from millibars to mmHg, multiply by 0.75012.

To convert from inches Hg @ 32 °F to mmHg, multiply by 25.4.

6.3.3.4.3 Write Ambient Pressure on Verification sheet (see Figure 9).

6.3.3.4.4 Verify that the value for Ambient Pres in the Audit screen is within  $\pm 10$  mm Hg of the measured ambient pressure. If the value is not within the limits, a calibration must be performed as soon as possible (see Section 6.3.4.3) and inform the program manager. All verification checks are noted in the site logbook and PM<sub>2.5</sub> database.

### 6.3.3.5 Flow Verification

6.3.3.5.1 Perform the leak check, all temperature verifications, and pressure verification, before performing the flow verification procedure.

Note: Ensure that the filter cassette carrier previously installed in the Sampler (which was used to perform the external leak check) remains in the unit for the flow verification.

6.3.3.5.2 The proper values for the Streamline Pro constants can be entered into the Sampler for proper calculation of the measured flow values. Use the following procedure to perform a flow audit on the Partisol 2025i:

6.3.3.5.3 Remove the flow audit adapter used during the leak check and install the Streamline Pro on the sample tube.

6.3.3.5.4 Press  repeatedly to display the Main Menu. Scroll to Audit and Calibration, press , scroll to Audit, press , scroll to Flow, press  to turn on the flow, and wait for the flow to stabilize (minimum of 5 minutes). The default sample flow should be 16.7 L/min, unless it was changed in the default settings of the Sampler. Record the flow rate from the Pro and the Sampler.

6.3.3.5.5 Write Flow Check Values on Verification sheet (see Figure 9).

6.3.3.5.6 Press  to turn Off the flow. The measured flow should be within  $\pm 4\%$  of the displayed Cur Flow. If this is not the case, perform the flow calibration procedure and inform the program manager.

### 6.3.3.6 Maintenance/Return to Sample/Wait mode Procedures

6.3.3.6.1 The FCEAP PM<sub>2.5</sub> Maintenance Schedule Form (see Figure 12), found in the *\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\Verif&Calsheet.xls* spreadsheet is both a guide and a log of the maintenance 30, 60, 90 days work to be performed on a sampler. A copy of this form will be signed by the technician performing the preventive maintenance. Any other maintenance performed should also be noted on the form.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
103	2014														
104	Date	Timer	Inspect O-rings	Inspect Sampling Case	Battery Check & Clock Accuracy	Clean PM head	Clean Impactor Housing	Clean Sampler Downtube	Inspect Water Seal Gasket	Inspect Vacuum Tubing	Inspect Tube Fittings	Inspect Air Intake Filter and Fan	Inspect Pump Connections	Initials	Comments
105	31-Jan	x	x	x	x									CDG	
106	28-Feb	x	x	x	x									CDG	
107	31-Mar	x	x	x	x	x	x	x	x	x	x	x	x	CDG	
108	2-May	x	x	x	x									CDG	
109	6-Jun	x	x	x	x									CDG	
110	9-Jul	x	x	x	x	x	x	x	x	x	x	x	x	CDG	
111	6-Aug	x	x	x	x									CDG	
112	4-Sep	x	x	x	x									cdg	
113	3-Oct	x	x	x	x	x	x	x	x	x	x	x	x	CDG	
114															
115															

**Figure 12: Maintenance Schedule Form**

6.3.3.6.2 Return to Sample/Wait Mode

6.3.3.6.3 Install the previous supply magazine on the left side.

6.3.3.6.4 Press  repeatedly to return to the Audit and Calibration menu, scroll to Advance Filter, and press  to put the original sample filter back into the sampling position and to collect the audit filters.

6.3.3.6.5 Put a fresh storage magazine on or put the original storage magazine with exposed filters back on the right side.

6.3.3.6.6 Reinstall the PM10 inlet on the sample tube.

6.3.3.6.7 Press  to restart the Sampler and continue the current sampling program.

### 6.3.4 Calibration

6.3.4.1 This section contains the procedures needed to perform calibrations on the Sampler. Calibrations should be performed when the instrument is in Service mode. Thermo strongly advises that the calibrations described in this section be performed in the order presented. Refer to the “Firmware Screen Descriptions” chapter for detailed information about the screens and parameters in these calibration procedures.

For these Calibration procedures, prepare a set of audit magazines consisting of a supply magazine and a clean empty storage magazine. Audit magazine requirements are described in detail in Section 6.3.1.

6.3.4.1.1 Press  repeatedly to display the Main Menu, scroll to Service mode and press . In the Service Mode screen, press  to toggle the Service mode to On. Press  to return to the Main Menu.

6.3.4.1.2 Display the Audit and Calibration Menu by pressing  , scrolling to Audit and Calibration, and pressing  to display the Audit and Calibration menu.

6.3.4.1.3 Remove the currently installed storage magazine(s) from the right side of the Sampler and cover with an orange storage cap. Remove supply magazine(s) from the left side of the filter shuttle mechanism and install on storage side.

6.3.4.1.4 Install the audit magazine(s) on the supply side. Ensure that the pressure supply line is connected at the bottom of the magazine.

6.3.4.1.5 At the Audit and Calibration menu, scroll to Advance Filter, and press  to advance the filter. This will transfer the current sampling filters to the respective supply magazine temporarily placed in the right side of the filter shuttle mechanism.

6.3.4.1.6 Remove the supply magazine(s) from the right side of the Sampler, cover with an orange storage cap to prevent contamination of the partially exposed filters, and set aside. Install the clean storage filter magazines on the right side of the Sampler.

6.3.4.1.7 Enter the Calibration menu by pressing  , scrolling to Audit and Calibration, and pressing  , to display the Audit and Calibration menu. With the cursor at Calibration, press  , to display the Calibration menu.

#### 6.3.4.2 Ambient Air Temperature Calibration

6.3.4.2.1 Use the following procedure to calibrate the ambient air temperature.

**Note:** The Service mode must be set to ON to perform the following procedure. To turn the Service mode ON refer to Section 6.3.4.1.1 above.

6.3.4.2.2 The calibration will be done at ambient conditions, so, the reference temperature measurement taken by a Streamline Pro (not the same Streamline Pro kit used for verification checks) can be taken with the probe installed in the radiation sensor. FCEAP does a 1-pt check.

6.3.4.2.3 In the Calibration menu, scroll to Ambient Temp and press  . At the Ambient Temperature Calibration screen, use the pushbuttons to enter the reference value in °C [ $^{\circ}\text{C} = 5/9 \times (^{\circ}\text{F} - 32)$ ], and press  to save the value. The Sampler automatically adjusts the corresponding offset based on this input.

6.3.4.2.4 Write the Ambient Temperature on the Calibration Sheet (see Figure 13).

Date	Site	Ambient Temp (°C)			Filter Temp (°C)			Compartment Temp (°C)			Pressure (mmHg)			Flow Rate (l/min)			Offset	Span	
		Instrument	Standard	Diff	Instrument	Standard	Diff	Instrument	Standard	Diff	Instrument	Standard	Diff	Instrument	Standard	Diff			
20-Feb-13	CM3	11.4	12.2	0.80	0.72					-1.29	739	740	-0.11	Low	15.03	14.93	0.10		
														Mid	16.7	16.62	0.08		
														High	18.4	18.16	0.24		
	HA1	23.4	22.8	0.60		24.9	23.8	1.10			25.4	23.5	1.90		Low	15.02	14.17	0.85	New Instrument
											737	737	0		Mid	16.7	15.47	1.23	
														High	18.3	16.87	1.43	0.800	2.11
5-Dec-13	HA1	16.6	16.6	0.00		20.8	17.0	3.80			739	739	0		Low	14.17	13.53	0.64	
														Mid	15.47	15	0.47		
														High	18.37	16.23	2.14	0.810	1.39
5-Dec-13	CM3	16.3	16.3	0.00		20.2	19.8	0.40			20.1	20.1	0.00		Low	15.03	15.00	0.03	
														Mid	16.63	16.56	0.07		
														High	18.38	18.24	0.14	-0.126	0.396
5-Dec-13	CM6	18.3	18.3	0.00		18.3	18.1	0.20			18.2	18.4	-0.20		Low	14.94	14.94	0.00	
														Mid	16.67	16.11	0.56		
														High	18.24	18.04	0.20		
14-Mar-14	CM6	12.1	12.3	0.20		14.0	14.5	0.50			14.3	14.7	0.40		Low	14.86	14.98	-0.12	
														Mid	16.63	16.39	0.24		
														High	18.23	18.15	0.08		

Figure 13: Calibration Worksheet

### 6.3.4.3 Filter Temperature Calibration.

6.3.4.3.1 Perform leak check PRIOR to Filter Temperature check (see Section 6.3.1). Remove the PM-10 inlet from the sample tube by pulling straight up on the sample tube. Unlatch and open the Sampler’s hood. Pull straight up to remove the VSCC (Figure 10). Verify the Sampler filter temperature by inserting an external thermometer of the Streamline Pro (not the same Streamline Pro kit used for verification checks) into the sampling chamber as shown in Figure 11. Do not let the external probe contact anything within the sampling chamber.

**Note:** The empty cassette (without a filter installed) should be in sampling position.

6.3.4.3.2 Press  to return to the Calibration menu, scroll to Filter Temp and press .

6.3.4.3.3 At the Filter Temp Calibration screen, use the pushbuttons to enter the reference value in °C [ $^{\circ}\text{C} = 5/9 \times (^{\circ}\text{F} - 32)$ ], and press  to save the value. The Sampler automatically adjusts the corresponding offset based on this input.

6.3.4.3.4 Write the Filter Temperature on the Verification and Calibration Sheet (See Figure 13)

### 6.3.4.3 Ambient Pressure Calibration

6.3.4.3.1 Use the following procedure to perform an ambient pressure calibration. Press  to return to the Calibration menu, scroll to Ambient Pres and press .

6.3.4.3.2 Determine the current ambient station pressure in mmHg (absolute pressure, not corrected to sea level) using a NIST calibrated Streamline Pro (not the same Streamline Pro kit used for verification checks).

6.3.4.3.3 Use the following conversion factors if needed:

To convert from Atmospheres @ 0 °C to mmHg, multiply by 760.

To convert from millibars to mmHg, multiply by 0.75012.

To convert from inches Hg @ 32 °F to mmHg, multiply by 25.4.

6.3.4.3.4 Enter the measured ambient pressure and press . Write the Ambient Pressure on the Calibration Worksheet (see Figure 13). The Sampler automatically adjusts the corresponding offset based on this input.

#### 6.3.4.4 Flow Calibration

6.3.4.4.1 An external leak check must be performed **BEFORE FLOW CALIBRATION**. The Partisol 2025i contains a single flow sensor, operating at a default flow rate of 16.7 L/min. The calibration of the flow controllers in the Partisol 2025i can be performed using a three-point calibration using the Streamline Pro Transfer Standard.

6.3.4.4.2 Prior to performing a Flow Calibration, perform the temperature and pressure calibrations, and external leak test procedures described in this chapter. The filter cassette used to perform the leak test should remain in the sample position for the flow calibration.

6.3.4.4.3 Remove the inlet from the external sample tube of the Partisol 2025i. Attach the Streamline Pro (not the same Streamline Pro kit used for verification checks) to the sample tube.

6.3.4.4.4 Press  repeatedly to return to the Main Menu. Scroll to Audit and Calibration and press  to display the Audit and Calibration menu. Scroll to Calibration and press  to display the Calibration menu. Scroll to Flow and press  to display the Calibration Flow menu.

6.3.4.4.5 Default calibration setpoints are already entered into the sampler. Thermo recommends that these setpoints be used as they are configured for 10% above and below the usual setpoint. For the Partisol 2025i Sampler, the following values are recommended for a three-point calibration of the 16.7 L/min flow rate setpoint:

Setpoint 1 (Min Flow): 15.0 L/min (10% below the usual 16.7 L/min set point)

Setpoint 2: The usual 16.7 L/min setpoint. Setpoint 3 (Max Flow): 18.4 L/min (10% above the usual 16.7 L/min set point)

6.3.4.4.6 Scroll to Setpoint 1 and press  to display the Setpoint 1 screen. The Sampler will automatically open the proper valves and start the pump. After 5 minutes, the flow will stabilize to the desired setpoint.

6.3.4.4.7 Enter the actual flow rate measured by the Streamline Pro.

6.3.4.4.8 Repeat 6.3.4.4.6 and 6.3.4.4.7 for the remaining flow setpoints. The sampler will automatically calculate the Slope and Intercept when the calibration is complete.

6.3.4.4.9 Write the Flow Calibration values on the Calibration Sheet (see Figure 13).

6.3.4.4.10 Restore the sampling hardware to its original state by removing the Streamline Pro from the sample tube and reinstalling the inlet.

**Note:** It is not necessary to remove the filter cassette used for the leak check and flow calibration from the sampling position, since the Sampler automatically replaces this cassette with a new one upon entering the Sample Operating mode.

6.3.4.5 Maintenance/Return to Sample/Wait mode Procedures (Refer to 6.3.3.6)

## 6.4 Pre/Post Sampling Filter Procedures

PM<sub>2.5</sub> Database: The PM<sub>2.5</sub> Database (\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM<sub>2.5</sub>V2006), referred in this document, was created in Microsoft Access and is used as a tool to streamline the numerous aspects of the PM<sub>2.5</sub> program. Similar to a digital logbook, the database is used to store information from when a filter arrives from the Lab, is taken to the site for sampling, and shipped back to the Lab post sampling. ALL filter information (pre and post) from the beginning of the PM<sub>2.5</sub> network (January 1, 1999) to the current date is stored in the database. Additionally, ALL comments and leak checks performed on the FRMs are input into the database. The database is also used to aid the process of creating AQS files for each filter post sampling. The operator needs to understand how to use and work with the PM<sub>2.5</sub> database so that a proper, complete, record is stored for each filter.

**Hattie Avenue 3 day (HA3): Every three days based on US EPA's 3 day sampling schedule, Duration: 24hrs, midnight to midnight (standard time)**

**Clemmons Middle 6 day (CM6): Every six days based on US EPA's 6 day sampling schedule, Duration: 24hrs, midnight to midnight (standard time)**

### 6.4.1 Receive Filter from RTI Lab

6.4.1.1 Retrieve cooler from mail area.

6.4.1.2 Open cooler box and retrieve the filters stored in the cassette magazine(s) and filter list provide by the Lab. Review chain of custody and sign/date.

6.4.1.3 Open Excel spreadsheet \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\FilterCheckIn.xls (see Figure 14). Go to "SetUp" tab and enter the first filter number at the top of the highlighted column. Simply fill in the column with the remaining filter numbers.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	T	4625249	4625249	RP	00															
2	T	4625250	4625250	RP	00															
3	T	4625251	4625251	RP	00															
4	T	4625252	4625252	RP	00															
5	T	4625253	4625253	RP	00															
6	T	4625254	4625254	RP	00															
7	T	4625255	4625255	RP	00															
8	T	4625256	4625256	RP	00															
9	T	4625257	4625257	RP	00															
10	T	4625258	4625258	RP	00															
11	T	4625259	4625259	RP	00															
12	T	4625260	4625260	RP	00															
13	T	4625261	4625261	RP	00															
14	T	4625262	4625262	RP	00															
15	T	4625263	4625263	RP	00															
16	T	4625264	4625264	RP	00															
17	T	4625265	4625265	RP	00															
18	T	4625266	4625266	RP	00															
19	T	4625267	4625267	RP	00															
20	T	4625268	4625268	RP	00															
21	T	4625269	4625269	RP	00															
22	T	4625270	4625270	RP	00															
23	T	4625271	4625271	RP	00															
24	T	4625272	4625272	RP	00															
25	T	4625273	4625273	RP	00															
26	T	4625274	4625274	RP	00															
27	T	4625275	4625275	RP	00															
28	T	4625276	4625276	RP	00															
29	T	4625277	4625277	RP	00															
30	T	4625278	4625278	RP	00															
31	T	4625279	4625279	RP	00															
32	T	4625280	4625280	RP	00															
33	T	4625281	4625281	RP	00															
34	T	4625282	4625282	RP	00															

Figure 14: FilterCheckIn Worksheet (Setup tab)

6.4.1.4 Go to the “FilterIDSheet” tab (see Figure 15). This sheet is in the format to import into the PM<sub>2.5</sub> Access database. Determine and fill in the “strSiteName,” “datePlannedRunDate,” “dateDateCheckedIn,” “dateInitialWeighDate,” “dateDateofSetup,” “dateTimeofSetup,” “strOperator,” and “strComments” FOR EACH FILTER

FilterIDSheet = Filter ID

strSiteName = Site name

datePlannedRunDate = Planned sample date

dateDateCheckedIn = Date filters added to database

dateInitialWeightDate = Date filters initially weighed by Lab

dateDateofSetup = Date filters taken to site

dateTimeofSetup = Time of day filters taken to site

strOperator = Operator

strComments = Comments (if any)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
strFilterID	strCassetteID	strSiteName	datePlannedRunDate	dateDateCheckedIn	dateInitialWeighDate	dateDateofSetup	dateTimeofSetup	sb	bd	ct	strOperator	strComments	dateActionDate	intWinsID	boolExternalID		
1	T4625249	RP00	HA1	10/17/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
2	T4625250	RP00	HA1	10/18/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
3	T4625251	RP00	HA1	10/19/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
4	T4625252	RP00	HA1	10/20/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
5	T4625253	RP00	HA1	10/21/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
6	T4625254	RP00	HA1	10/22/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
7	T4625255	RP00	HA1	10/23/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
8	T4625256	RP00	HA1	10/24/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
9	T4625257	RP00	HA1	10/25/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
10	T4625258	RP00	HA1	10/26/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
11	T4625259	RP00	HA1	10/27/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
12	T4625260	RP00	HA1	10/28/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
13	T4625261	RP00	HA1	10/29/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
14	T4625262	RP00	HA1	10/30/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
15	T4625263	RP00	HA1	10/31/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
16	T4625264	RP00	HA1	11/1/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
17	T4625265	RP00	HA1	11/2/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
18	T4625266	RP00	HA1	11/3/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
19	T4625267	RP00	HA1	11/4/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
20	T4625268	RP00	HA1	11/5/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
21	T4625269	RP00	HA1	11/6/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
22	T4625270	RP00	HA1	11/7/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
23	T4625271	RP00	HA1	11/7/2014	10/14/2014	11/8/2014	10/14/2014				CDG	SCHEDULE BLANK					
24	T4625272	RP00	CM3	10/17/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
25	T4625273	RP00	CM3	10/20/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
26	T4625274	RP00	CM3	10/23/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
27	T4625275	RP00	CM3	10/26/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
28	T4625276	RP00	CM3	10/29/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
29	T4625277	RP00	CM3	11/1/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
30	T4625278	RP00	CM3	11/4/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
31	T4625279	RP00	CM3	11/7/2014	10/14/2014	11/8/2014	10/14/2014				CDG						
32	T4625280	RP00	CM3	11/7/2014	10/14/2014	11/8/2014	10/14/2014				CDG	SCHEDULE BLANK					
33	T4625281	RP00	CM6	10/20/2014	10/14/2014	11/8/2014	10/14/2014				CDG						

**Figure 15: FilterCheckIn Worksheet (FilterIDSheet tab)**

Note: For each batch of filters, use one as a BLANK for each site.

6.4.1.5 Save file.

6.4.1.6 Open Access (\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM<sub>2.5</sub>V2006) Press the “Import New Filters” button (see Figure 16). Press the “Filter Report” button (see Figure 17).

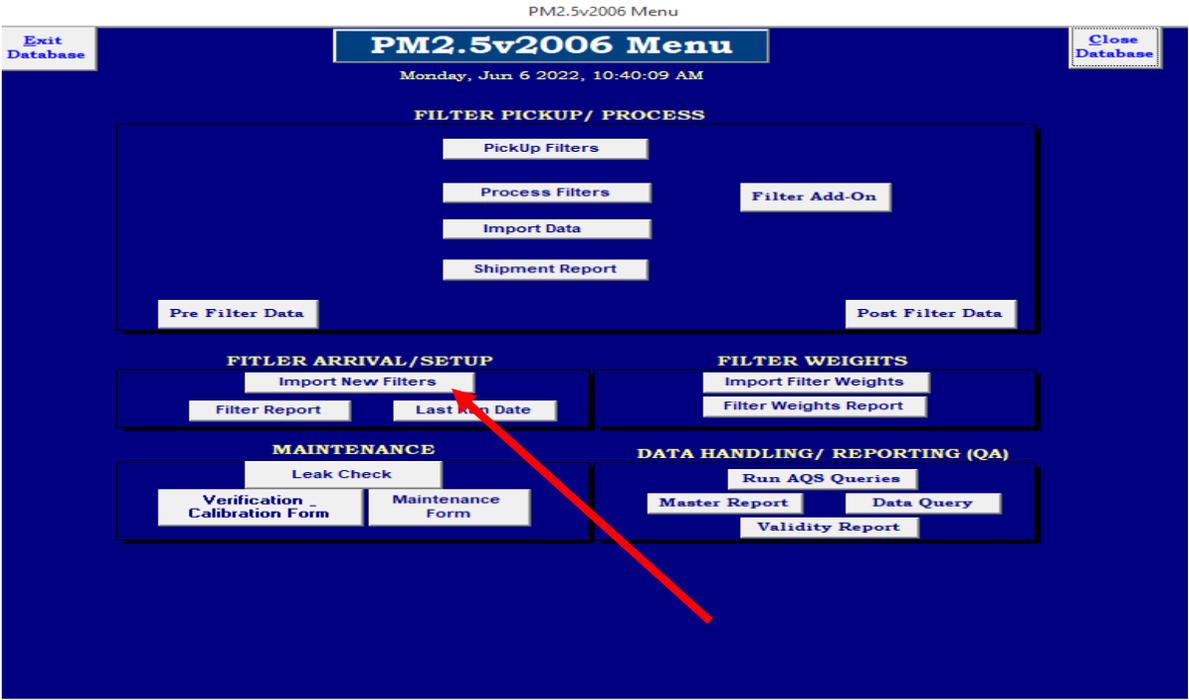


Figure 16: Import New Filters Button

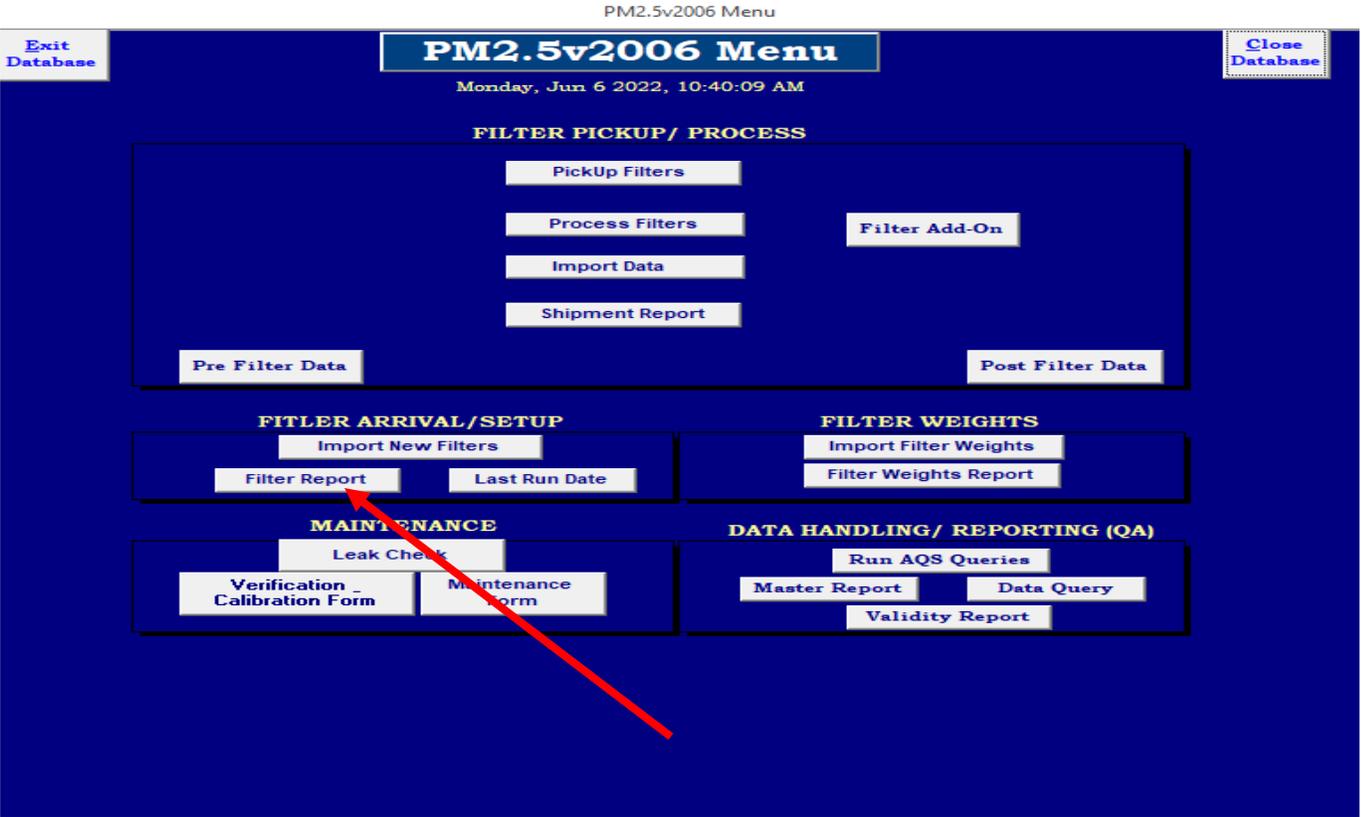


Figure 17: Filter Report Button

6.4.1.7 Review for errors and fix as needed and print for field use.

6.4.1.8 Separate filters for each monitor based on the sampling schedule. For example, the 1 in 3 sampler (HA3) will receive double the amount of filters than the 1 in 6 sampler (CM6).

### 6.4.2 Loading Pre Sampled Filters

6.4.2.1 Bring printed Setup/Pickup Report from Access (*\Forsyth County\EAP - PM 2.5 - PM 2.5\DATABASE\PM2.5V2006*) for HA3, CM6 (see Figure 18) and unsampled filters. Open sampler.

<b>Setup/Pickup</b>				
<b>HA3</b>	Filter Id	Cassette Id	Run Date	
	T5644360	RP00	5/21/2016	
	T5644361	RP00	5/24/2016	
	T5644362	RP00	5/27/2016	
	T5644364	RP00	5/30/2016	
	T5644365	RP00	6/2/2016	
	T5644367	RP00	6/5/2016	
SCHEDULED BLANK	T5644368	RP00	6/5/2016	SCHEDULED BLANK

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**Figure 18: Setup/Pickup Form**

6.4.2.1.1 Load filters into the LEFT magazine holder. Any filters already in the magazine will have to remain on top of the newer filters. The following sites run on the schedule listed below:

Hattie Avenue 3 day sampler: HA3

Clemmons Middle 6 day sampler: CM6

6.4.2.1.2 Program sampler with Filter IDs and any BLANK(S) using the following procedures taken from the Partisol 2025i Sequential Air Sampler/Partisol 2025i-D Dichotomous Sequential Air Sampler Instruction Manual (15Jul2014), Thermo Fisher Scientific Co., Inc. Part Number 110100-00.

6.4.2.2 Program Sampler for New Filters

Refer to Section 6.2.2

6.4.2.2.1 In the Main Menu, choose Sample Setup > Apply EPA Times. The Apply EPA Times screen is used to automatically apply midnight-to-midnight, 24-hour continuous sampling EPA times.

For BOTH instruments (3 day AND 6 day sampling) In the Main Menu, choose Sample Setup > Apply Default Times

Hattie Avenue 3 day sampler: 72hrs for 3 day

Clemmons Middle 6 day sampler: CM6

Filter ID is used to enter the filter's serial number. This field displays the Filter ID numbers for the filters that are in sampling positions 1-16. **Enter the Filter ID number(s) from the Setup/Pickup Form** (see Figure 18)

6.4.2.2.2 Cassette ID is used to enter the filter cassette screen serial number. Cassette ID numbers are entered, incremented and edited in the manner described above for Filter ID numbers. Currently, the Cassette IDs are RP000000 for ALL samples

6.4.2.2.3 FCEAP sets aside one field blank per sampler per filter batch. Ideally, filter blanks should occur on the same sampling day at all samplers in the network. In the Main Menu, choose Sample Setup > Sample > Filter Blank.

This parameter is either Yes or No and it defines whether the filter numbers are intended to be used as sampling filters or blank filters. If you set this parameter to Yes, the first filter in each supply magazine will be a blank filter and the next filters advanced by the Sampler will be the sampling filters.

Please refer to Partisol 2025*i* Sequential Air Sampler/Partisol 2025*i*-D Dichotomous Sequential Air Sampler Instruction Manual (15Jul2014), Thermo Fisher Scientific Co., Inc. Part Number 110100-00.

### 6.4.3 Picking Up Sampled Filters and Retrieving Data

#### 6.4.3.1 Preparation for Field Work

**Sampled filters MUST be picked up <=7days 9 hours from sample end date**, per CFR (*QA Handbook Volume II Appendix D, Revision No. 0, Date: 05/13, pg 24*). Equipment to bring: cassette magazine and cooler with several ice packs.

6.4.3.1.1 Open Access (`\\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM2.5V2006`)

6.4.3.1.2 Flash drives are no longer allowed to be used with Forsyth County computers. Data are downloaded using iPort.

6.4.3.1.3 On the database screen hit "2. Pickup Filters" (see Figure 21). "Filter Shipment and Pickup" form will open (see Figure 22).

6.4.3.1.4 Fill in HIGHLIGHTED CELLS ONLY for each filter being picked up.

"Filter Collection Date" mm/dd/yyyy

"Filter Collection Time" hh:mm The time entered is an estimate of the actual time the filters are picked up from the site. This estimate used is 20 m later than departure time from the office, which accounts for travel time to the site. Edits WILL be made if actual collection times vary from the estimate by more than 2 minutes by using the Pre Filter Data button.

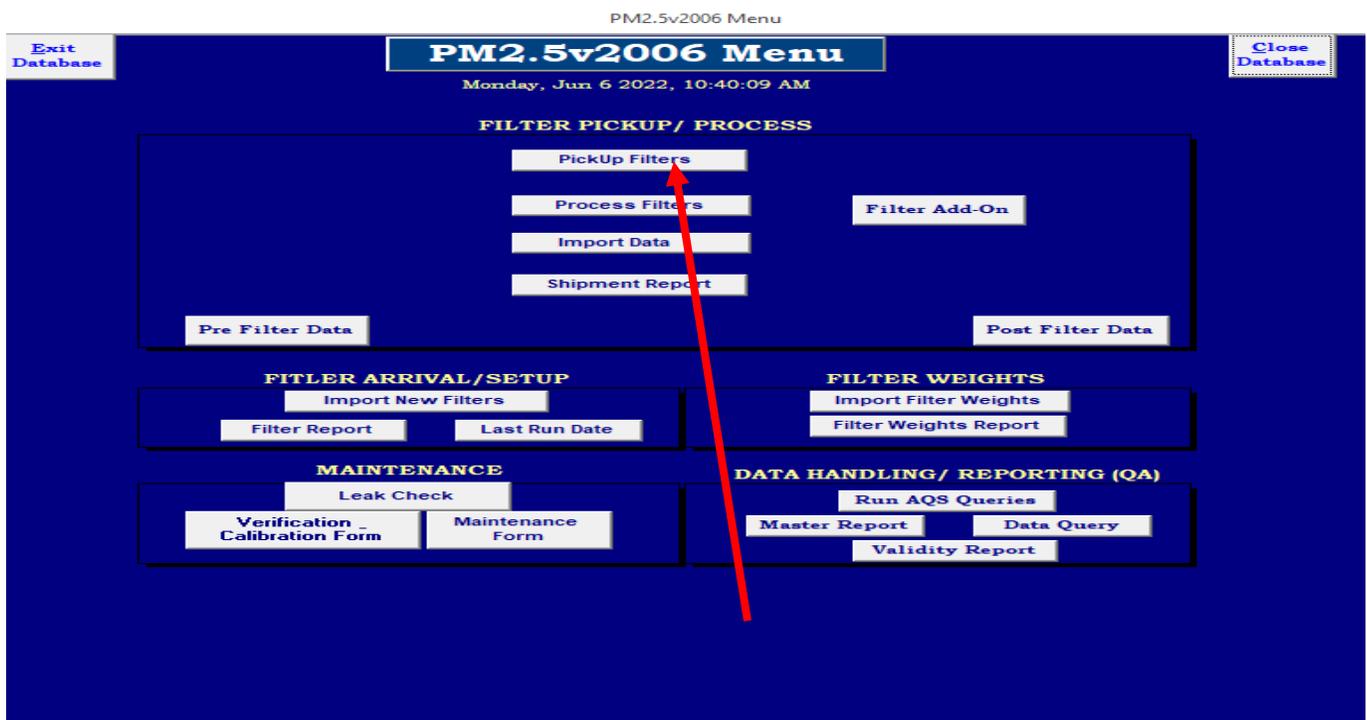
“Date Shipped Back” mm/dd/yyyy

6.4.3.1.5 Hit “Enter Data” button OR hit



6.4.3.2 Picking Up Sampled Filters

6.4.3.2.1 Open the PM<sub>2.5</sub> sampler. Remove the cassette magazine from the RIGHT (sampled) side, place on cap and store in cooler with frozen ice packs. Replace with an empty supply magazine.



**Figure 21: Pickup Filters Button**

The screenshot shows a software window titled "Filter Shipment & Pickup Form". At the top right is a "Close" button. Below the title bar, there are several input fields: "Filter Id" with a left arrow, "T5644174", a right arrow, "Cassette ID" with "RP00", and an "End Record" button. Below these are "Planned Run Date" with "5/15/2016" and "Site" with "HA3". A large red-bordered box contains the main data entry section, which is divided into two sub-sections: "Filter Pickup Data" and "Filter Shipping Data". Under "Filter Pickup Data", there are "Filter Collection Date" and "Filter Collection Time" fields. Under "Filter Shipping Data", there is a "Date Shipped Back" field, three checkboxes for "Questionable Sample?", "Filter Damaged?", and "Filter Void?", a "Comments" text area, and an "Operator" field with "CDG". An "Enter Data" button is located at the bottom right of the red-bordered box. A double-headed arrow is visible at the bottom right of the main window area.

**Figure 22: Filter Shipment & Pickup Form**

6.4.3.2.2 Downloading Sampled Filter Data by opening the iPort software on the site computer which can be found on the Desktop.

6.4.3.2.3 Connect to the instrument by selecting "Instrument" from the main menu, then "TCP Connect" and then "Connect."

6.4.3.2.4 Filter, Interval (Short Records) and Input (Long Records) data all need to be downloaded since the previous download. Choose the "Download Records" icon to open up the download window (see Figures 23 & 24).



**Figure 23: iPort Downloading Data Interface**



**Figure 24: iPort Icons**

6.4.3.2.5 Select the “starting at” date, which is the previous date of the last download (Figure 23) then “Save to file” for “filter records,” “short record,” and “long records” (Figure 23). Name the files “filter-mmddyyyy,” “interval-mmddyyyy,” and “input-mmddyyyy.” Each file will download to the \Forsyth County\EAP - PM 2.5 - PM 2.5\Hattie Avenue Site\HA3\filterdata or \Forsyth County\EAP - PM 2.5 - PM 2.5\ClemmonsSite\CM6\filterdata folder.

6.4.3.2.6 Rename the three files to the correct format eg for HA3 on September 1, 2016: 160901FILTER-HA3

Interval data Format eg for HA3 on September 1, 2016: 160901INTERVAL-HA3

Input data Format eg for HA3 on September 1, 2016: 160901INPUT-HA3

### 6.4.4 Process Sampled Filter Data

6.4.4.1 Click “3. Process Filters” (see Figure 25). This opens up an Excel Macro Macro05v4.xls (make sure to “enable macros” if prompted) (see Figure 26).

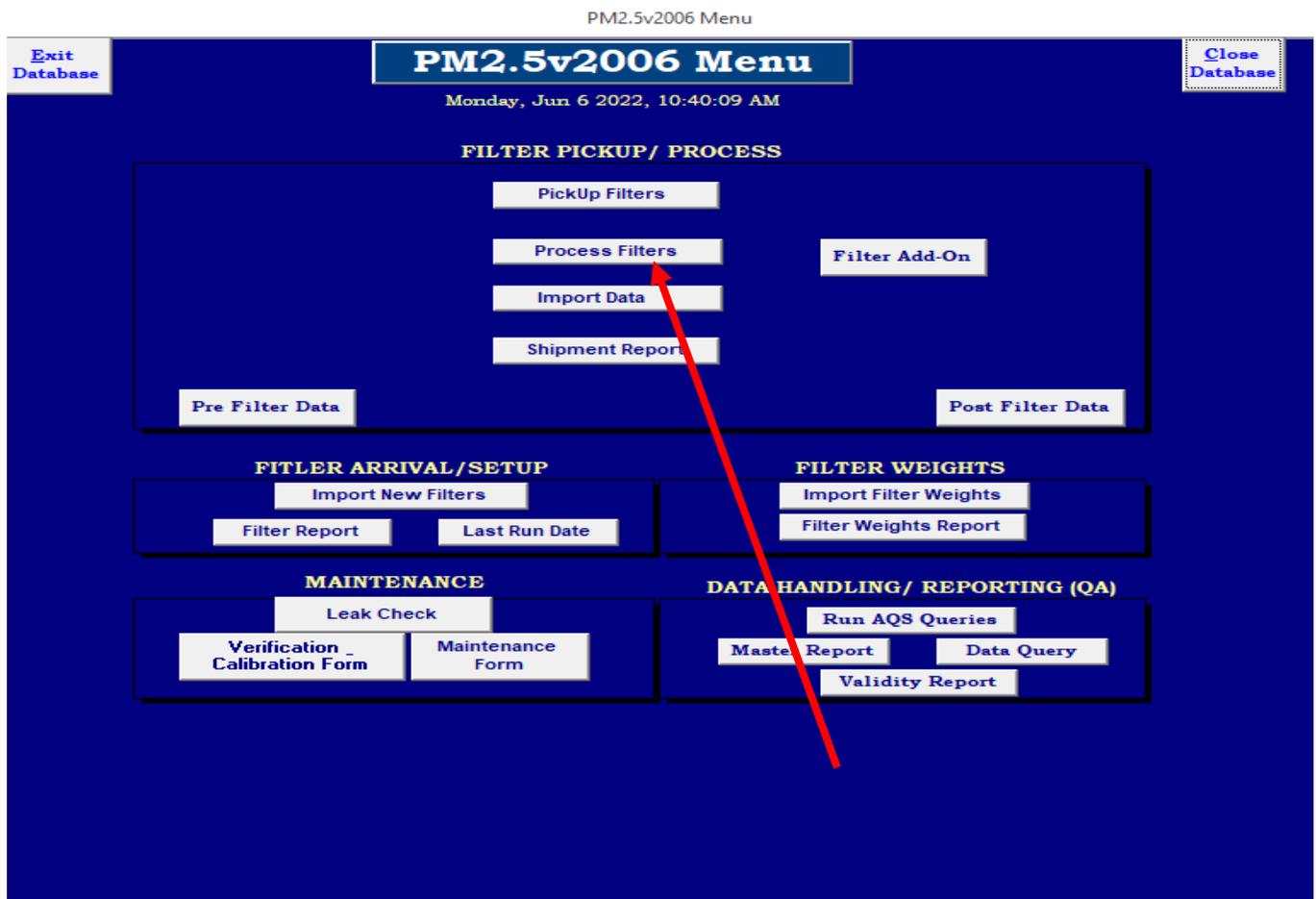


Figure 25: Process Filters Button

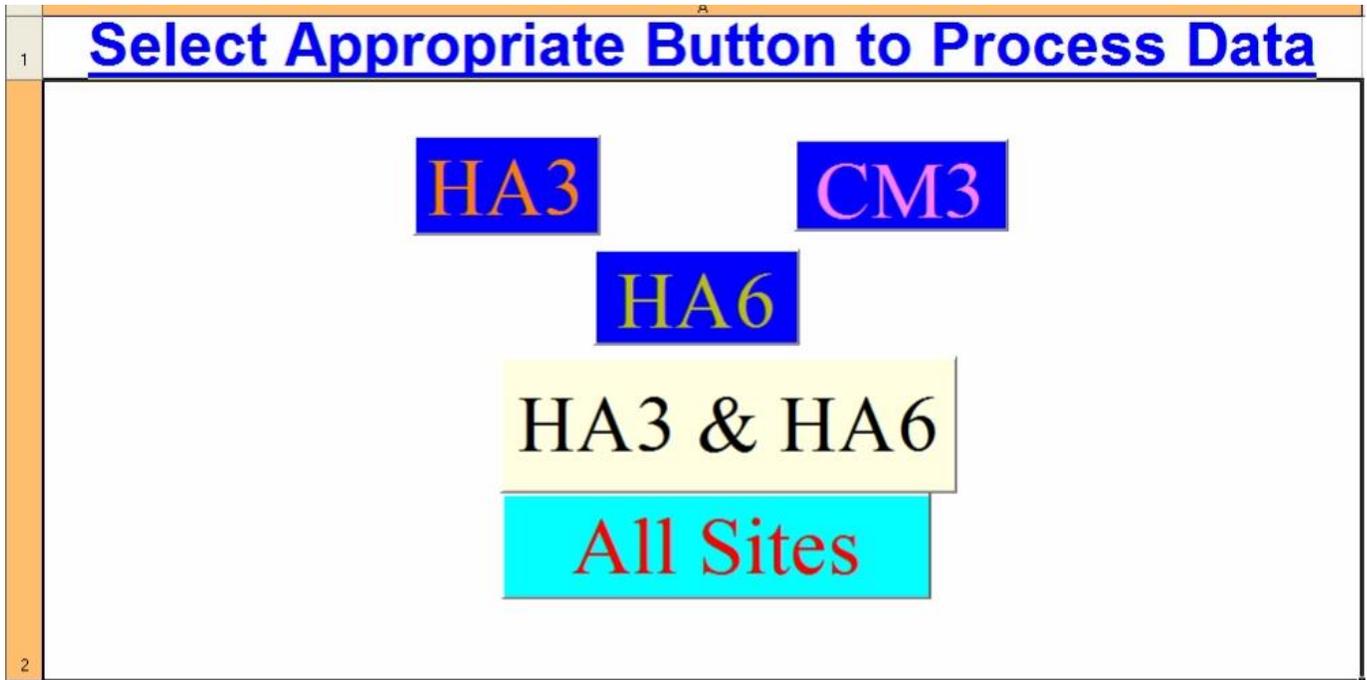


Figure 26: Macro05v4.xls

6.4.4.2 Select the appropriate button corresponding to the site(s) visited. Input the download date (yymmdd) and wait for the program to process the data.

6.4.4.3 Exit Excel and return to the PM<sub>2.5</sub>V2006 database and Press “4. Import Data” button (see Figure 27). Select the site(s) visited and date (mm/dd/yyyy) then press “Begin Import”.

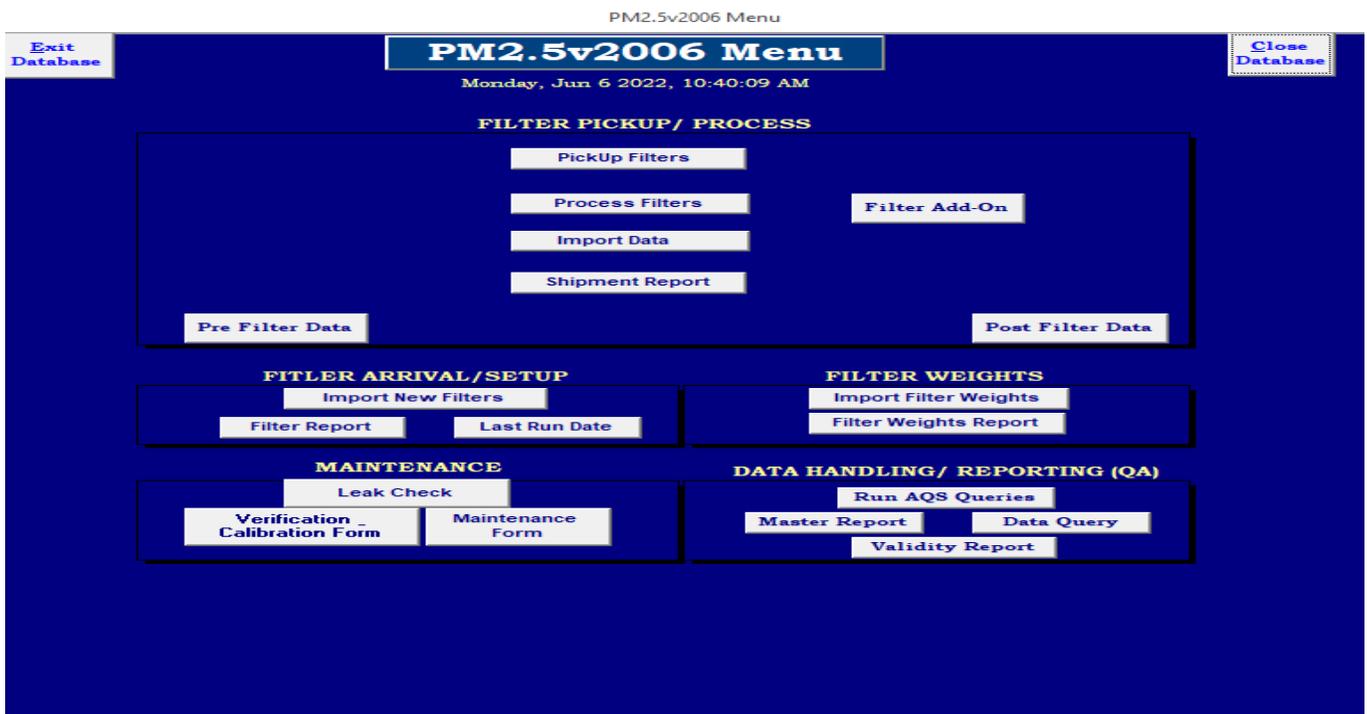


Figure 27: Import Data Button

6.4.4.4 The uploaded data can be found under the “Post Filter Data” button. Note: The database WILL NOT IMPORT data with the same filter IDs.

6.4.4.5 Press “5. Shipment Report” (see Figure 28). A Shipment Report MUST be printed out for EACH filter being shipped.

### **Figure 28: Shipment Report Button**

6.4.4.6 Match each filter ID to the appropriate Shipment Report sheet. Review the sheet for any run errors, etc (see Figure 29). Notes from the operator concerning filter condition or sampling issues should appear on the sheet as well. Initial “Sampler record states the proper filter ran as scheduled” OR “Sampler record states the proper filter did not run as scheduled”.

6.4.4.7 Status codes are often generated by the sampler during a sample run indicating various validity “flags” and/or codes which invalidate a sample. Several of these codes, which are listed below, are programmed in the database and will be listed under the “Status Codes” section of the “PM2.5 Filter/Sampler Run Data Sheet.” Status codes NOT programmed into the database will produce “Check Codes” listing. ALL status codes and “Check Codes” listings are a GUIDE ONLY for the operator. The operator is ultimately responsible for determining if a sample is Valid or Invalid with the aid of the status codes and “Check Codes” listing.

#### **Status codes in database:**

800000 = Blank

400000 = Audit Performed

0 = OK

8 = Power Failure

2000 = Temp. Problem

4000 = Temp Problem

4 = System Reset

40000 = Flow Problem

20000 = Flow Problem

ALL OTHER CODE(S) = Check Codes

*PM2.5 Filter/Sampler Run Data Sheet*

**Forsyth County**

Setup Date/Time:	<input type="text"/>	Date/Time Postsampling visit:	<input type="text"/>
Setup Operator:	<input type="text"/>	End Operator:	<input type="text"/>
Site ID:	<input type="text"/>	Site Name:	<input type="text"/>

Filter ID:	<input type="text"/>	Cassette ID:	<input type="text"/>
Filter Weigh Date:	<input type="text"/>	(Start Date - Weigh Date <= 30 days)	

Scheduled Date:	<input type="text"/>	Set Start Time Always	00:00
Actual Start Date:	<input type="text"/>	This is run # <input type="text"/> since the latest leak check (Must be performed once a month)	

Leak Check initial **PASS** (pres)  2nd **PASS** (pres)   
 3rd (pres)  STOP at a pass

(initials) Sampler record states the proper filter ran as scheduled **OR**  
 (initials) Sampler record states the proper filter did not run as scheduled

<input type="checkbox"/> Filter damaged? (Comment required)	<u>Required sample parameters</u>
<input type="checkbox"/> Filter should be considered for void? (Comment required)	Flow cv <input type="text"/>
<input type="checkbox"/> Filter supply canister pumped up? (required action)	Sample volume <input type="text"/>
<input type="checkbox"/> Used filter canister pumped up? (required action)	Status code <input type="text"/>

Conditions at time of initial site visit that may affect results (fires, etc.)

Conditions at time of final site visit that may affect results (fires, etc.)

Filter removed from sampler...Date/Time	<b>#Err</b> <=177hrs. from end of ru
Elapsed Run Time:	
Sample Ship Date (to lab)	

<b>Laboratory</b>
Sample Receipt Date: <input type="text"/>
Was the sample received <= 4degC <input type="text"/> <=25degC <input type="text"/> >25degC <input type="text"/> (Min/Max Temp received in space)
Comments by either the Field or Lab Technicians:
<input type="text"/>

use the back for further comments

Figure 29: Shipment Report Worksheet

6.4.4.8 Put the filters back into the cassette magazine for shipping. If the filters are NOT going to be shipped back, then store the filters in the lab refrigerator along with the paperwork. **The sampled filters MUST be shipped back to the Lab within 48 hours of collection to avoid any hold time problems.**

### 6.4.5 Shipping Sampled Filters to RTI Lab

6.4.5.1 **Note: Sampled filters MUST be ready to go by 12:30pm on the shipping day.**

6.4.5.2 Obtain a cooler box from laboratory and place the filter cassette(s) inside. Place ice packs on the bottom of the cooler. Fold the **SIGNED** Chain of Custody Form(s) (see Figure 29) and lay on TOP. Close the lid and seal with tape.

6.4.5.3 MAKE SURE to check that the UPS overnight label was adhered to the shipping container.

6.4.5.4 Place the cooler in the shipment area and turn over sign found in the front office area to “Package to be Picked Up”. If the mail has been picked up for the day, take cooler to mailroom located in the basement of the Forsyth County Government Center.

## 6.5 Analyzing the PM<sub>2.5</sub> Data

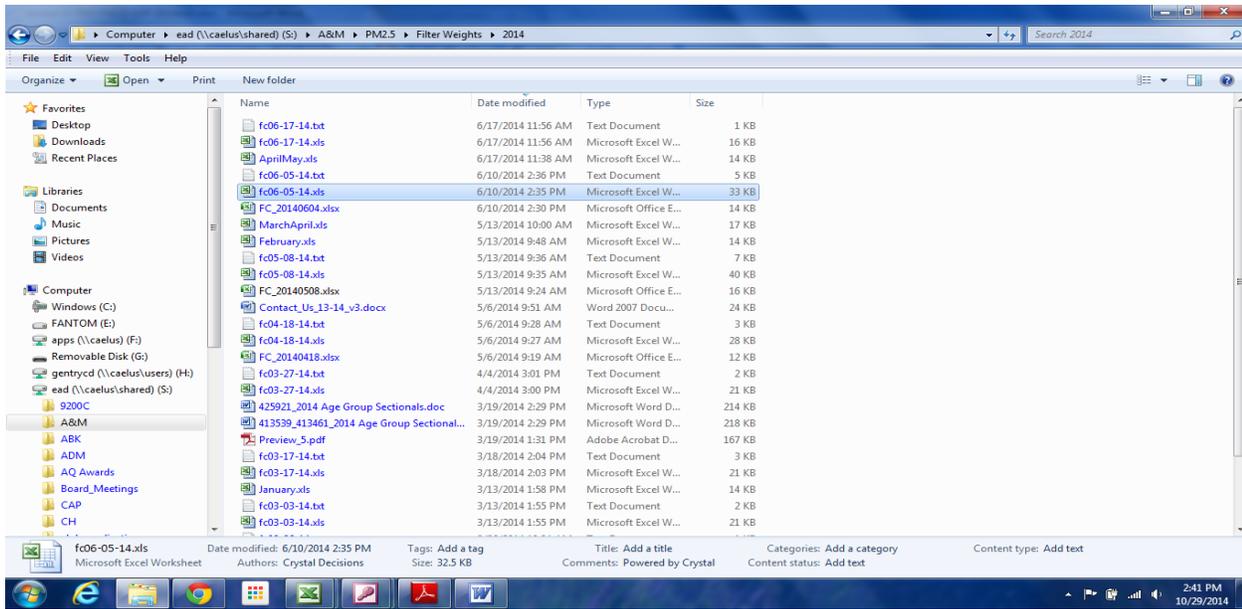
### 6.5.1 Filter Weights Review

6.5.1.1 Filter weights will be sent from the lab approximately once every two weeks. The weights will be sent via email and arrive in a \*.xls format (see Figure 30).

A2	A	B	C	D	E	F	G	H	I	J	K	L	M
	FILTER_ID	REGION	SITE	AIRS_NO	POLL	INITIAL_WEIGHT	FINAL_WEIGHT	net_mass	VOLUME	SAMPLE_DATE	FINAL_WEIGH_DATE	COMMENTS_LAB	COMMENTS
1	T2671521	FC	Hattie Avenue	37-067-0022		379.314	379.448	0.134		04/30/2014	05/13/2014		
2	T2671522	FC	Hattie Avenue	37-067-0022		384.522	384.665	0.143		05/01/2014	05/13/2014	filter tear	
3	T2671523	FC	Hattie Avenue	37-067-0022		387.634	387.802	0.168		05/02/2014	05/13/2014		
4	T2671524	FC	Hattie Avenue	37-067-0022		374.066	374.197	0.131		05/03/2014	05/13/2014		
5	T2671525	FC	Hattie Avenue	37-067-0022		373.630	373.809	0.179		05/04/2014	05/13/2014	dark spots	
6	T2671526	FC	Hattie Avenue	37-067-0022		377.817	378.064	0.247		05/05/2014	05/13/2014		
7	T2671527	FC	Hattie Avenue	37-067-0022		383.227	383.236	0.009		05/06/2014	05/13/2014	field blank	
8	T2671753	FC	Hattie Avenue	37-067-0022		381.151	381.437	0.286		05/06/2014	05/13/2014		
9	T2671752	FC	Hattie Avenue	37-067-0022		388.577	388.607	0.030		05/08/2014	05/13/2014	trip blank	
10	T2671755	FC	Hattie Avenue	37-067-0022		383.422	383.743	0.321		05/08/2014	05/20/2014		
11	T2671756	FC	Hattie Avenue	37-067-0022		381.154	381.473	0.319		05/09/2014	05/20/2014	tear	
12	T2671757	FC	Hattie Avenue	37-067-0022		372.394	372.612	0.218		05/10/2014	05/20/2014		
13	T2671758	FC	Hattie Avenue	37-067-0022		382.333	382.590	0.257		05/11/2014	05/20/2014		
14	T2671759	FC	Hattie Avenue	37-067-0022		384.650	384.952	0.302		05/12/2014	05/20/2014		
15	T2671760	FC	Hattie Avenue	37-067-0022		379.069	379.445	0.376		05/13/2014	05/20/2014	white spot	
16	T2671761	FC	Hattie Avenue	37-067-0022		382.078	382.378	0.300		05/14/2014	05/28/2014		
17	T2671762	FC	Hattie Avenue	37-067-0022		381.692	381.767	0.075		05/15/2014	05/28/2014		
18	T2671763	FC	Hattie Avenue	37-067-0022		379.601	379.757	0.156		05/16/2014	05/28/2014		
19	T2671764	FC	Hattie Avenue	37-067-0022		378.476	378.756	0.280		05/17/2014	05/28/2014		
20	T2671765	FC	Hattie Avenue	37-067-0022		381.422	381.663	0.241		05/18/2014	05/28/2014		
21	T2671766	FC	Hattie Avenue	37-067-0022		385.946	386.208	0.262		05/19/2014	05/28/2014		
22	T2671767	FC	Hattie Avenue	37-067-0022		390.922	391.225	0.303		05/20/2014	06/02/2014	filter tear from field or shipping	
23	T2671768	FC	Hattie Avenue	37-067-0022		389.856	389.872	0.016		05/21/2014	06/02/2014	filter exchange error - labeled as FB	
24	T2671769	FC	Hattie Avenue	37-067-0022		386.726	386.750	0.024		05/22/2014	06/02/2014	filter exchange error - labeled as FB	
25	T2671770	FC	Hattie Avenue	37-067-0022		388.638	388.652	0.014		05/23/2014	06/02/2014	filter tear, filter exchange error - labeled as FB	
26	T2672040	FC	Hattie Avenue	37-067-0022		370.742	370.729	-0.013		05/24/2014	06/02/2014	filter exchange error - labeled as FB	
27	T2672041	FC	Hattie Avenue	37-067-0022		379.255	379.259	0.004		05/25/2014	06/02/2014	filter exchange error - labeled as FB	
28	T2672042	FC	Hattie Avenue	37-067-0022		367.916	367.929	0.013		05/26/2014	06/02/2014	filter exchange error - labeled as FB	
29	T2672043	FC	Hattie Avenue	37-067-0022		369.438	369.448	0.010		05/27/2014	06/02/2014	filter exchange error - labeled as FB	
30	T2671532	FC	Clemmons Middle 3 day	37-067-0030		372.559	372.714	0.155		05/02/2014	05/13/2014		
31	T2671533	FC	Clemmons Middle 3 day	37-067-0030		377.198	377.620	0.422		05/05/2014	05/13/2014	filter tear	
32	T2671537	FC	Clemmons Middle 6 day	37-067-0030A		376.799	377.058	0.259		05/05/2014	05/13/2014		
33	T2671534	FC	Clemmons Middle 3 day	37-067-0030		381.128	381.191	0.063		05/06/2014	05/13/2014	field blank, filter tear	

Figure 30: Filter Weights Worksheet

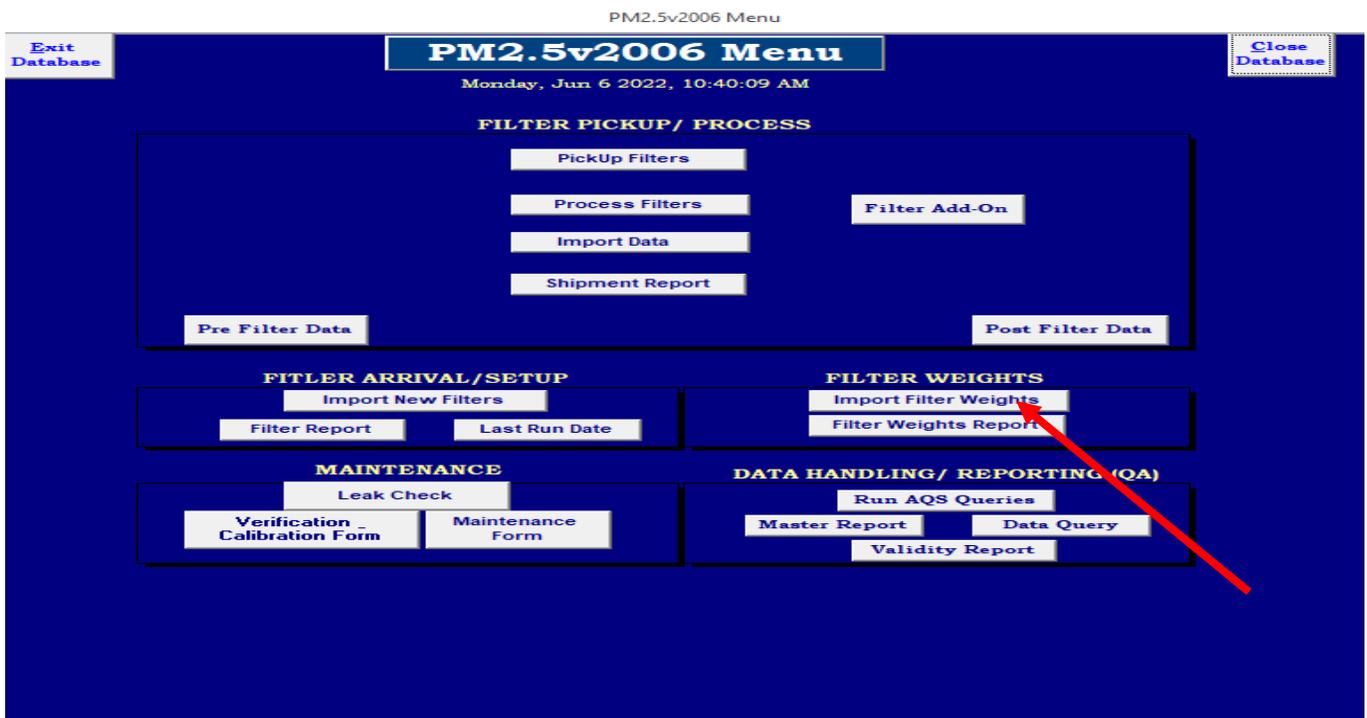
6.5.1.2 Once the weights arrive, save to \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\Filter Weights\(\YYYY) directory (see Figure 31).



**Figure 31: Filter Weights Directory**

6.5.1.3 Open the attachment in MS Excel. \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\Filter Weights\(\YYYY)\filterdata\_00.xls. Sort the records by Sample Date. To prepare the new filter weight data for inclusion in the database, first delete the header line. Then, save the file as a \*.txt file (Tab delimited). Remember the file name!

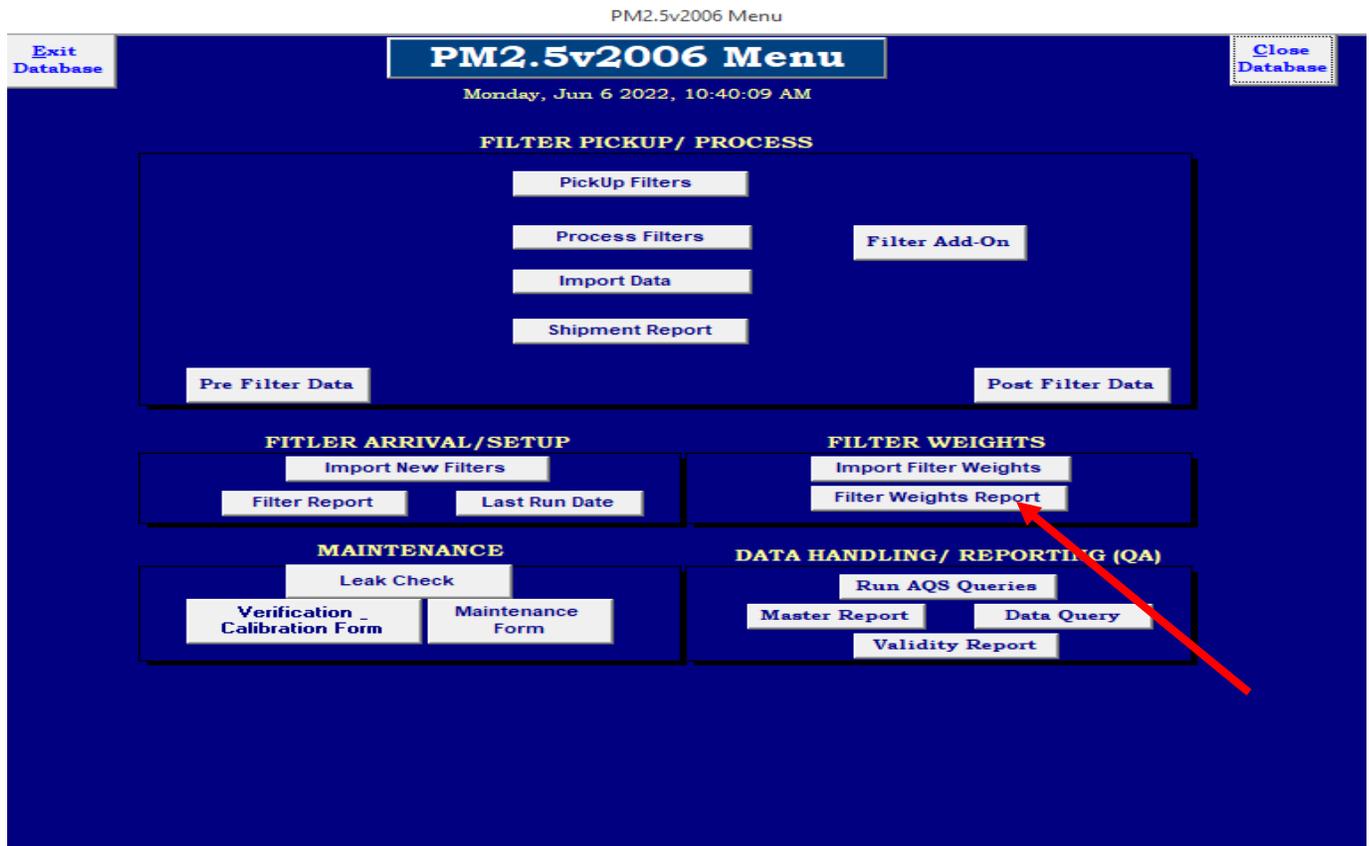
6.5.1.4 Open Access (\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM2.5V2006) and press “Import Filter Weights” (see Figure 32).



**Figure 32: Import Filters Weights Button**

6.5.1.5 Input previously saved file name, hit “Enter”

6.5.1.6 Once entered, press “Filter Weights Report,” (see Figure 33) and input date range and site(s) (see Figure 34).



**Figure 33: Filters Weights Report Button**

6.5.1.7 Verify each filter weight and corresponding date is correct, along with potential invalid sample comments based on filter conditions at the lab. Also verify cooler temperature upon arrival in the lab is lower the requirements of 4°C.

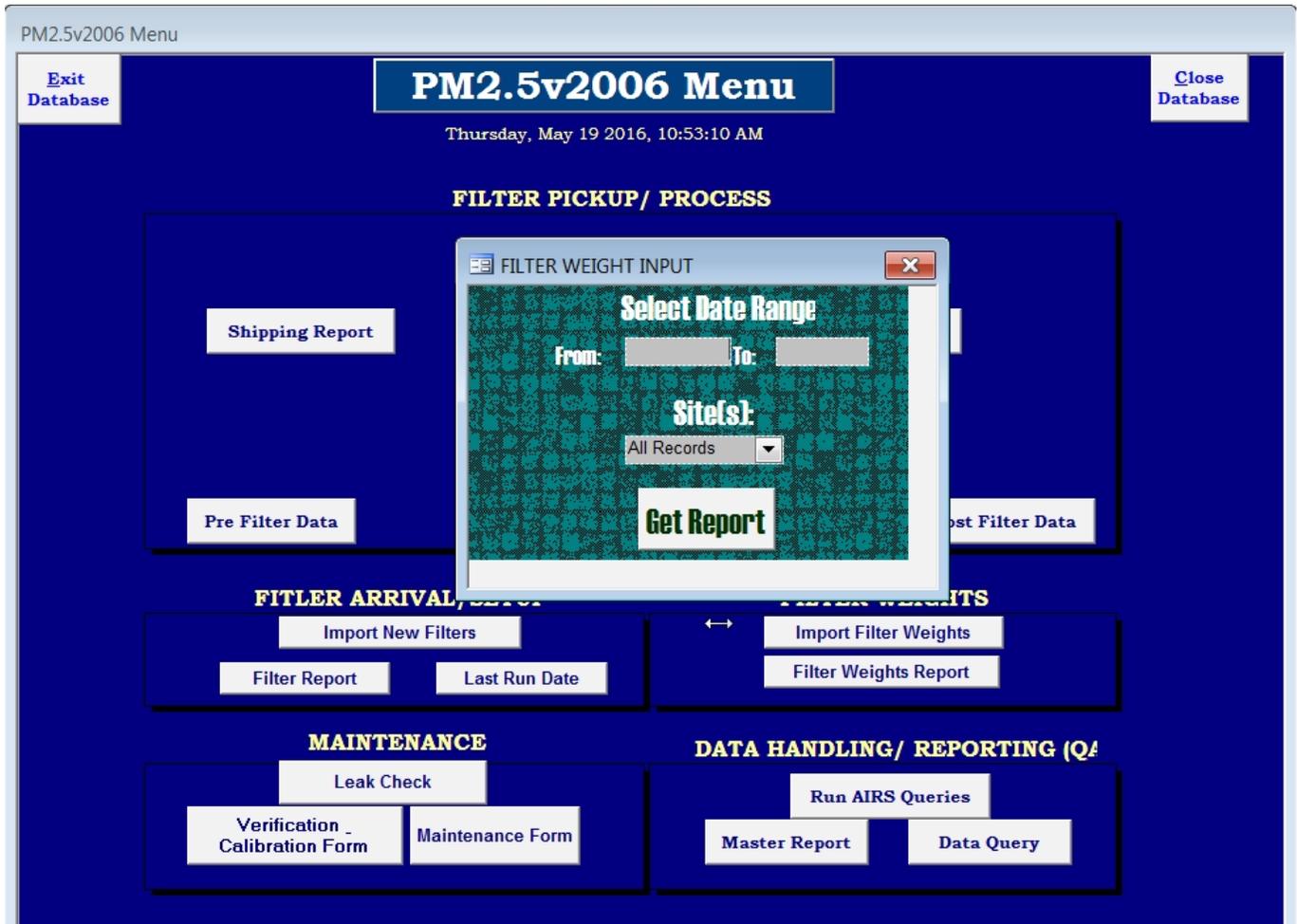
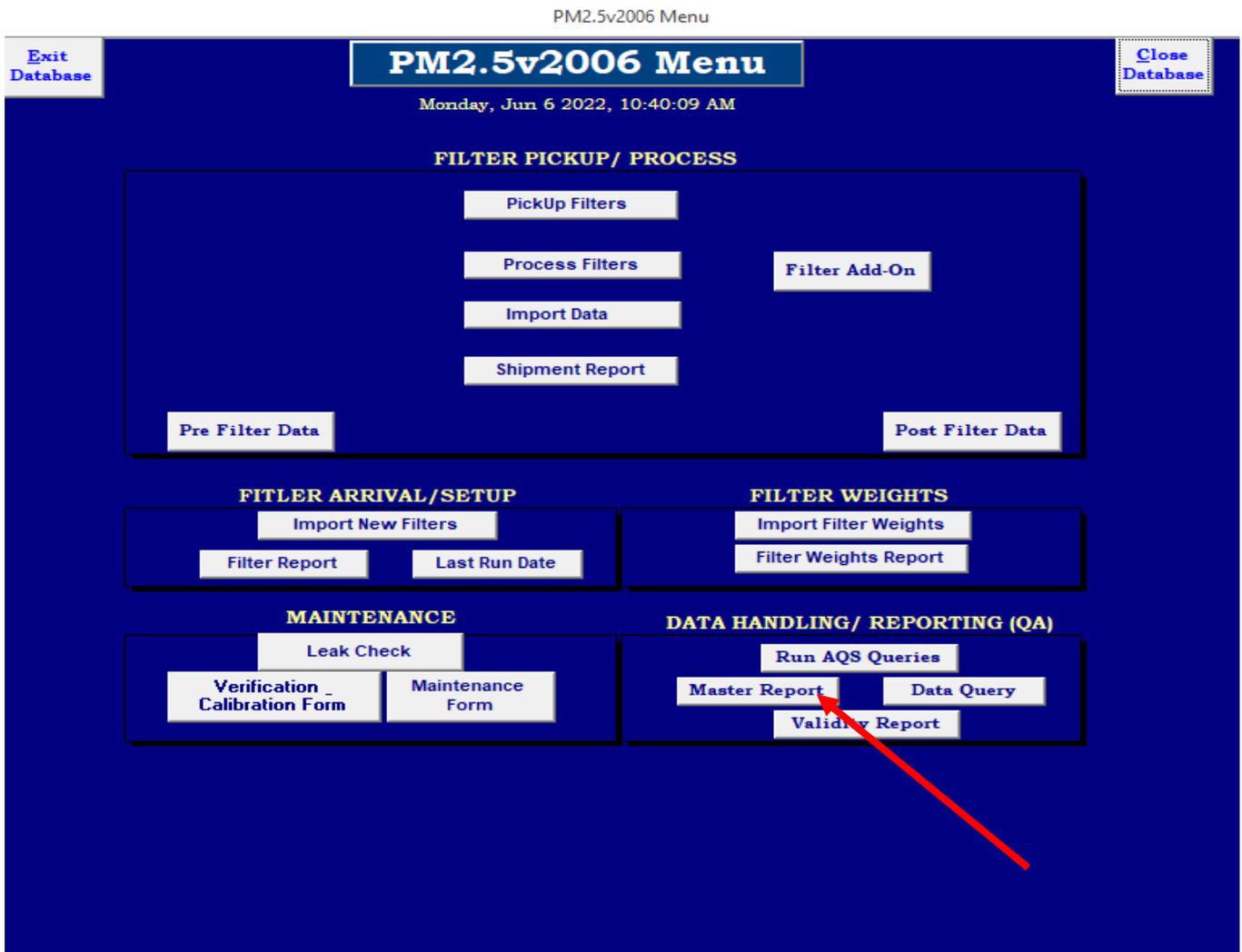


Figure 34: Filters Weight Input

## 6.6 Data Processing/AQS Data Generator

### 6.6.1 PM<sub>2.5</sub> Database Quarterly Filter Analysis

6.6.1.1 Open Access (\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM<sub>2.5</sub>V2006). Go to the "Data Handling/Reporting(QA) box Press the "Master Report" button. (see Figure 35)



**Figure 35: Master Report Button**

6.6.1.2 Choose the date range (usually 3 month quarter).

6.6.1.3 Select the preferred site(s) (HA3 & CM6) (see Figure 36). Press the “Daily Report Sheet” button and review each sheet (see Figure 37). Confirm all parameters, especially “total sample time,” “total volume,” “CV%,” “total flow rate,” and “comments” are listed and within the parameters listed on the “Daily Report Sheet.” Verify filter weight cell is populated. If ALL the parameters are within the specified range and the filter weight is there, then the sample is considered VALID, otherwise, the sample is INVALID. The filter weight for ALL INVALID samples can not be used. In addition, ALL INVALID samples MUST have comment specifying the problem(s) leading to the INVALID sample.

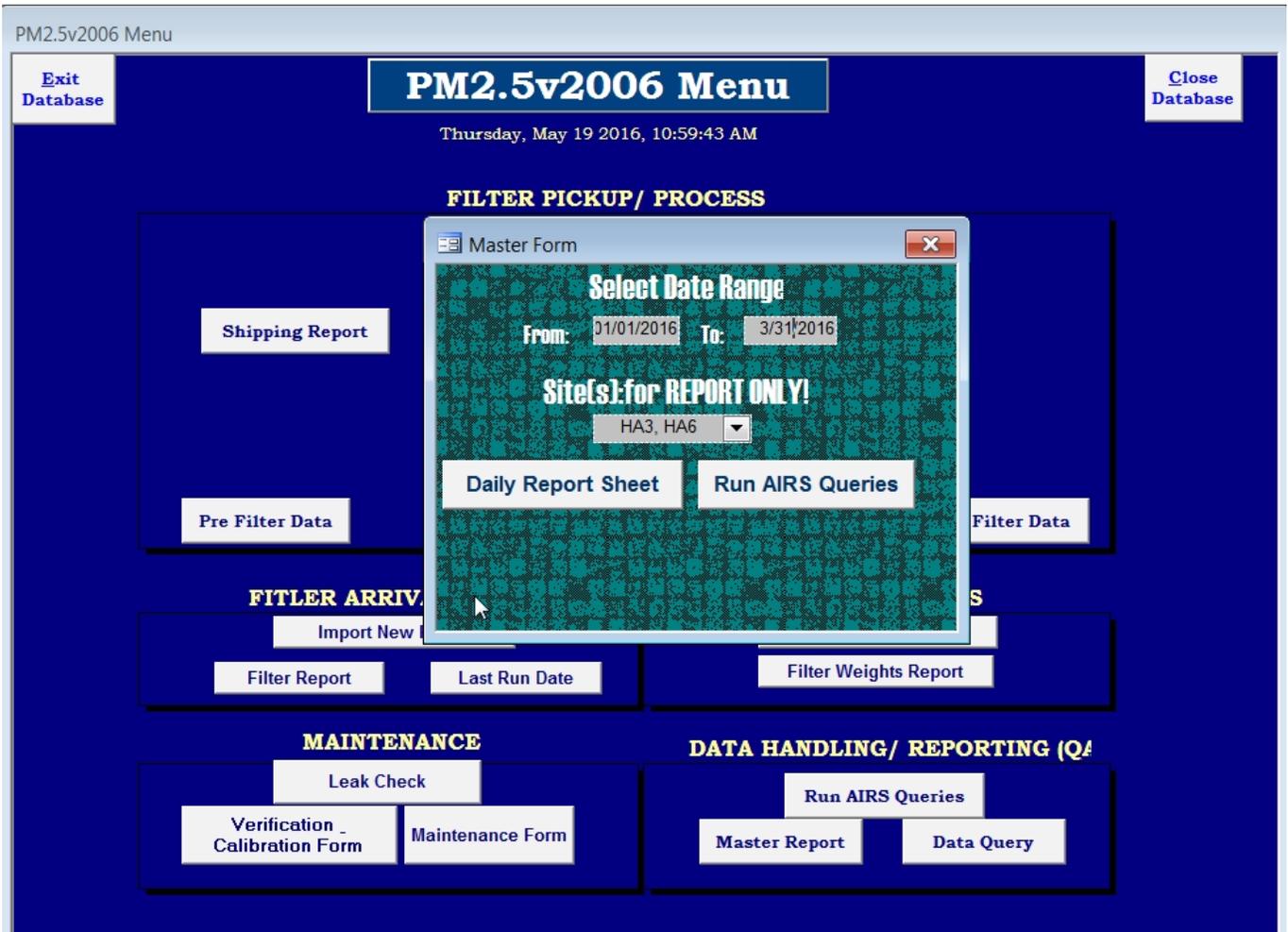


Figure 36: Master Form Input

### Forsyth County: PM2.5 Daily Sampling Report

<b>SITE NAME:</b>	<b>Clemmon Middle 6-Day Sampling</b>	<b>For</b>	<b>4/3/2016</b>
-------------------	--------------------------------------	------------	-----------------

<b>TIMING DATA</b>	Filter Id: <input type="text" value="T5643787"/> Site ID: <input type="text" value="HA3"/> Act Start Date: <input type="text" value="4/3/2016"/> Act Stop Date: <input type="text" value="4/4/2016"/> Act Start Time: <input type="text" value="0:00"/> Act Stop Time: <input type="text" value="0:00"/> Total Minutes Sampled (1380-1500): <input type="text" value="1439"/>
--------------------	---

<b>FLOW DATA</b>	Average Flow (16.67 +/- 5%): <input type="text" value="16.7"/> Volume M3: <input type="text" value="24.3"/> FlowCv (<=2%): <input type="text" value="0.1"/>
------------------	--

<b>EXPOSURE DATA</b>	Pressure Min: <input type="text" value="7.28"/> Pressure Ave: <input type="text" value="7.36"/> Pressure Max: <input type="text" value="7.38"/> Amb Temp Min: <input type="text" value="4.3"/> Amb Temp Ave: <input type="text" value="12.1"/> Amb Temp Max: <input type="text" value="20.2"/> Max Diff Temp (<=5degC): <input type="text" value="3.9"/> # Minutes >5degC: <input type="text"/>
----------------------	---

<b>FILTER RESULTS</b>	Initial Weight: <input type="text" value="366.690"/> Final Weight: <input type="text" value="366.761"/> PM2.5 ug/m3: <input type="text" value="2.9"/>
-----------------------	---

<b>VALIDITY EVALUATION</b>	Status Codes: <input type="text" value="OK"/> Questionable Sample? <input type="checkbox"/> Pre-Sampling Filter Holding Time: <input type="text" value="VALID"/> Filter Collection 177hr Limit: <input type="text" value="VALID"/> Post Sampling Filter Holding Time: <input type="text" value="VALID If Stored at 4degC"/> Comments: <input type="text" value="Sampler last everyday sample was 3/31/16, changed to 1 in 3 samples"/>
----------------------------	--

<b>FINAL QA VALIDATION</b>	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">VALID _____</td> <td style="text-align: center;">INVALID _____</td> <td style="text-align: center;">INITIALS _____</td> <td style="text-align: center;">DATE _____</td> </tr> <tr> <td colspan="4" style="border: none;"> </td> </tr> <tr> <td colspan="4" style="border: none;"> </td> </tr> <tr> <td colspan="4" style="border: none;">NULL CODE = _____ VALIDITY FLAG (W=5 min flow, X=delta Temp, Y=elapsed time)= _____</td> </tr> </table>	VALID _____	INVALID _____	INITIALS _____	DATE _____									NULL CODE = _____ VALIDITY FLAG (W=5 min flow, X=delta Temp, Y=elapsed time)= _____			
VALID _____	INVALID _____	INITIALS _____	DATE _____														
NULL CODE = _____ VALIDITY FLAG (W=5 min flow, X=delta Temp, Y=elapsed time)= _____																	

Thursday, May 19, 2016

**Figure 37: Daily Report Sheet**

6.6.1.4 Note ALL Blanks, Invalid samples (Blanks: get filter weight; Invalid: get AIRS code).

6.6.1.5 Export sheet(s) (File/Export) and save as \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\FRMdata\(\yyyy)\(??Qtr-HA3.rtf) and \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\FRMdata\(\yyyy)\(??Qtr-CM6.rtf).

#### 6.6.2 QA Data Validation/Blanks

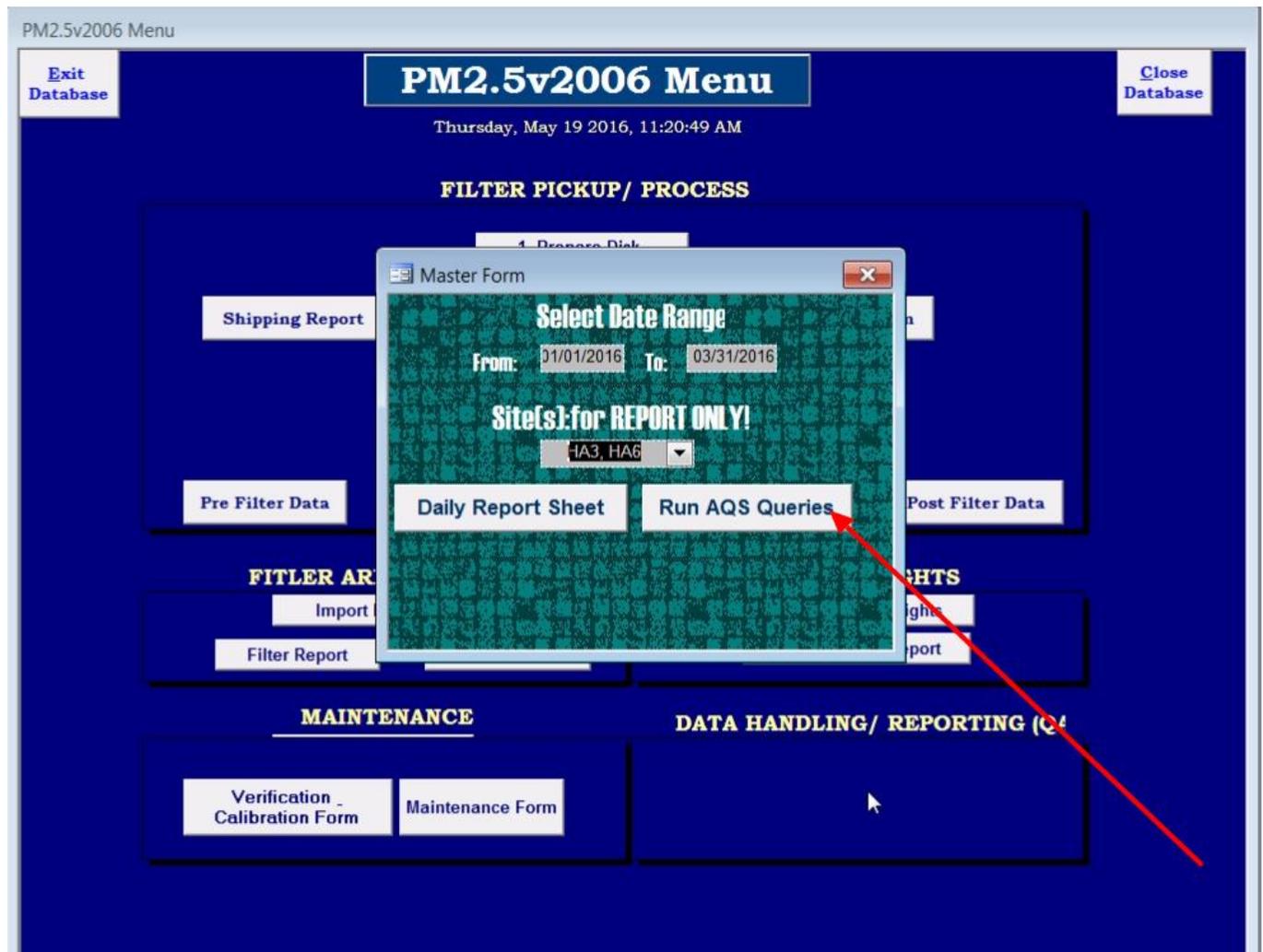
6.6.2.1 Open \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\FRM Data\yyyy\”QAVValidation(YY).xls and find “??QtrInvalid” tab (see Figures 38 & 39).



Check for issues related to the transporting, holding, transferring, and collecting of the filters. Report all information to the Program Manager.

### 6.6.3 Prepare PM<sub>2.5</sub> AQS Report

6.6.3.1 Open Access (\FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\DATABASE\PM<sub>2.5</sub>V2006) Press “Run AQS Query” (see Figure 40).



**Figure 40: Run AQS Queries Button**

6.6.3.2 Ten AQS data files are created.

88101.txt ,68101.txt,68102.txt,68103.txt,68104.txt,68105.txt,68106.txt,68107.txt,68108.txt,68109.txt

6.6.3.3 Go to \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\AIRSData\ToBeProcessed and open AQSDATA\Macro.xls. Press “ctrl-r” so the editing macro can run. (see Figure 41).

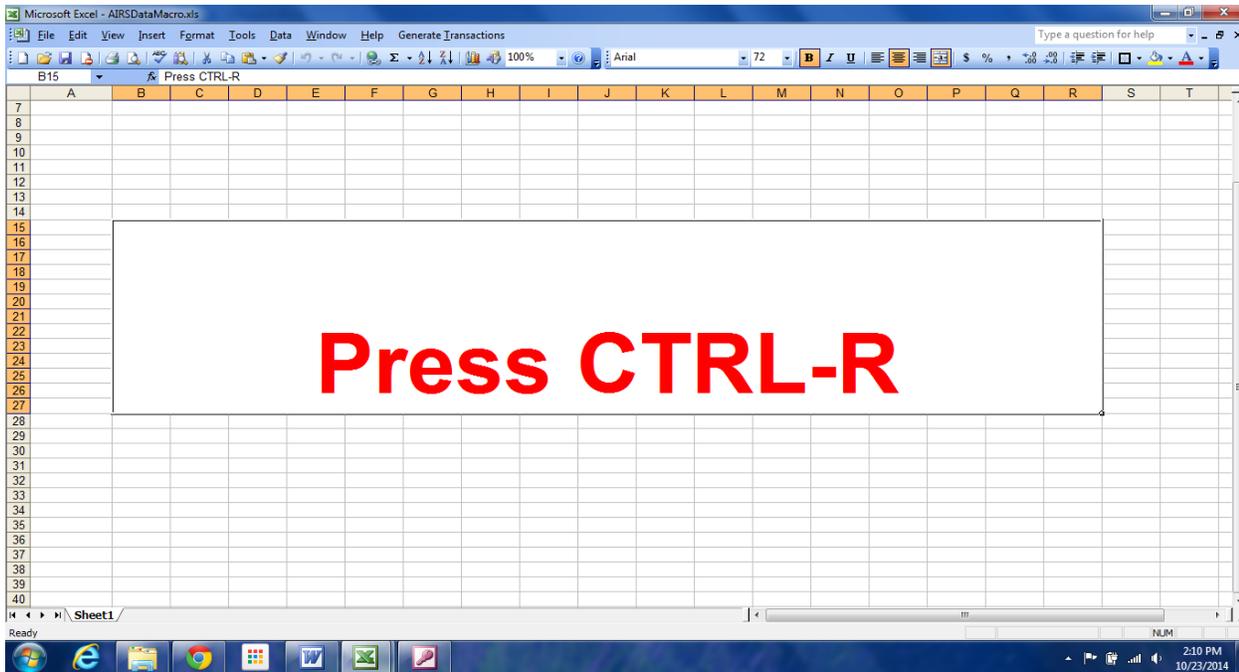


Figure 41: AQSDDataMacro

6.6.3.4 Files written to \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\AIRSData\Processed. Edit EACH AIRS data file using Notepad (see Figure 42). Start with 88101.txt, which is the filter weight data. Follow formatting example below:

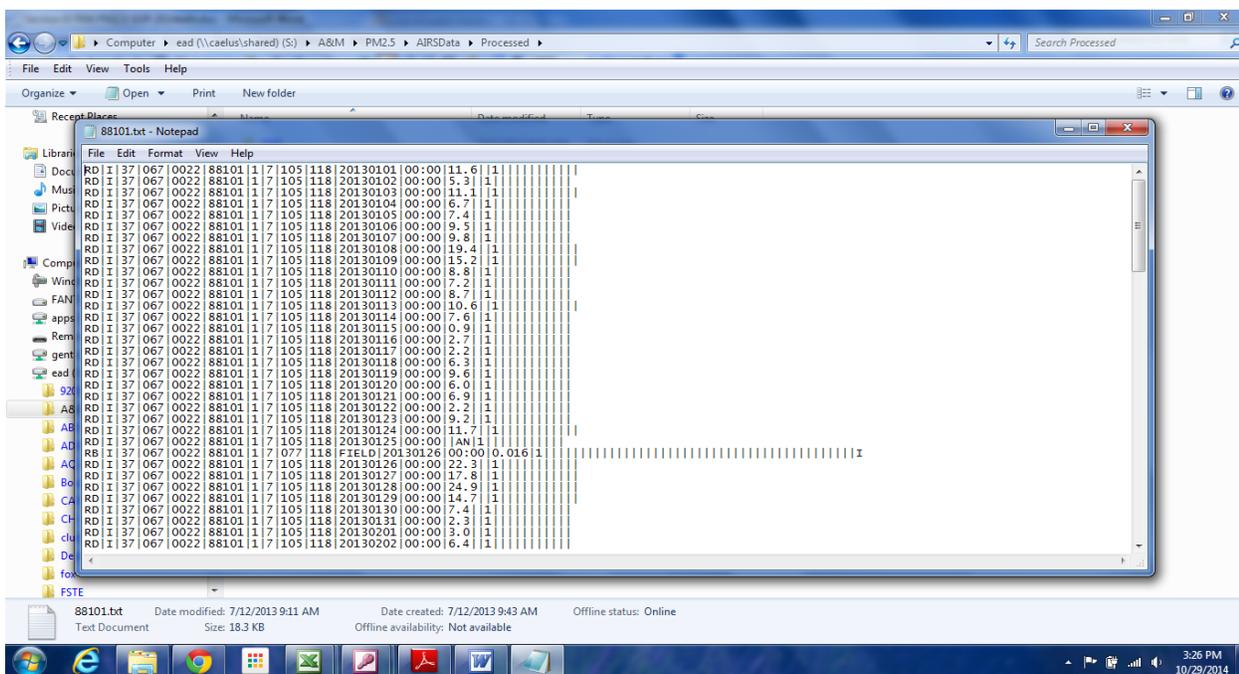


Figure 42: 88101.txt

**HA3 “Good” filter on March 24, 2016 with a weight of 11.7 ug/m3**

RD|I|37|067|0022|88101|1|7|105|118|20160324|00:00|11.7|||||||||

**HA1 “Bad filter with “AN” AQS code (change AQS code as needed) on March 25, 2016**

RD|I|37|067|0022|88101|1|7|105|118|20160325|00:00||AN|||||||||

**HA1 Blank filter (put in appropriate weight...eg. 0.016 ug) on March 26, 2016**

RB|I|37|067|0022|88101|1|7|077|118|FIELD|20160326|00:00|16|||||||||||||||||||||I

**CM3 “Good” filter on March 17, 2016 with a weight of 12.5 ug/m3**

RD|I|37|067|0022|88101|2|7|105|118|20160317|00:00|12.5|||||||||

**CM3 “Bad filter with “AN” AQS code (change AIRS code as needed) on March 18, 2016**

RD|I|37|067|0022|88101|2|7|105|118|20160318|00:00||AN|||||||||

**CM3 Blank filter (put in appropriate weigh eg 0.005ug) on March 18, 2016**

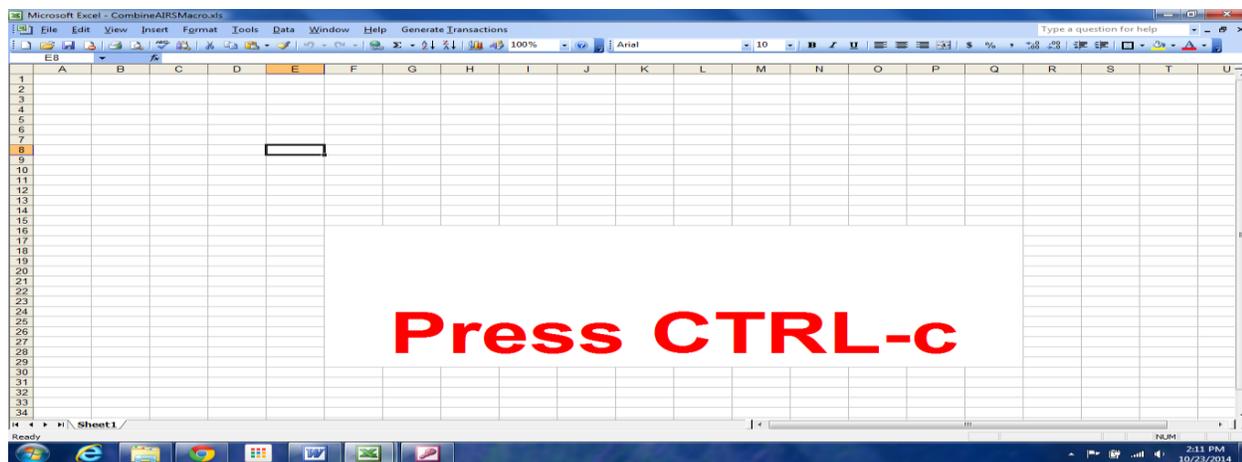
RB|I|37|067|0022|88101|2|7|077|118|FIELD|20160318|00:00|5|||||||||||||||||||||I

6.6.3.5 Delete any extra filter(s) line(s) and save.

6.6.3.6 Open/Edit all other data files (68101.txt, 68102.txt, 68103.txt, 68104.txt, 68105.txt, 68106.txt, 68107.txt, 68108.txt, 68109.txt).

6.6.3.7 Go through and Delete lines for ALL Invalid filter dates AND ALL Extra filter dates and save.

6.6.3.8 Open \FORSYTH COUNTY\EAP - PM 2.5 - PM 2.5\AIRSData\Processed\  
 “CombineAQSMacro.xls” (see Figure 43) Press ctrl-c so the editing macro can run. This creates file  
 “CombinedAQSS.txt”.



**Figure 43: CombineAQSMacro.txt**

6.6.3.9 Save As \FORSYTH COUNTY\EAP - PM 2.5 - PM  
2.5\AIRSData\Processed\yyyy\”??Qtr(yyyy)AQS.txt.

6.6.3.10 Notify Greg Perrotte, Lawrence Akoje and Jason Bodenhamer files are ready.

## References

EPA. 1998. Quality Assurance Guidance Document 2.12. Monitoring PM<sub>2.5</sub> in Ambient Air Using Designated Reference or Class I Equivalent Methods. U.S. Environmental Protection Agency. National Exposure Research Lab. Research Triangle Park, NC 2016 EPA-454/B-16-001.

EPA. 1997. Reference Method for the Determination of Fine Particulate Matter as PM<sub>2.5</sub> in the Atmosphere. U.S. EPA. 40 CFR Part 50, Appendix L.(as amended at FR 19719, April 22, 1999, 71 FR 61226, Oct. 17, 2006.)

EPA. 1995. Guidance for the Preparation of Standard Operating Procedures (SOPs). U.S.Environmental Protection Agency. Publication QA/G-6, U.S. EPA Quality Assurance Division, Washington, DC. November, 1995.

EPA. 2013. QA Handbook Volume II, Appendix D, Measurement Quality Objectives and Validation Templates. Revision No. 0, Date: 05/13.

Partisol 2025*i* Sequential Air Sampler/Partisol 2025*i*-D Dichotomous Sequential Air Sampler Instruction Manual (15Jul2014), Thermo Fisher Scientific Co., Inc. Part Number 110100-00. 27 Forge Parkway, Franklin, MA 02038, 1-508-520-0430, [www.thermo.com/aqi](http://www.thermo.com/aqi)

## Appendix A

### Sequential and Single Channel FRM Sampler Testing and Acceptance Criteria Form

#### SEQUENTIAL AND SINGLE CHANNEL FRM SAMPLER

#### TESTING AND ACCEPTANCE CRITERIA

Yes    No

1. Check the enclosed packing list. Were all parts listed included in the delivery of the monitor?
2. Were any of the enclosed parts broken during the shipping of the monitor?
3. Check the enclosed assembly instructions. Did all parts fit together during assembly of the monitor?
4. Does the motor turn on when supplied with electrical power?
5. Using an independent timing mechanism, check to ensure the timer operates properly. Check to see if the timer will automatically turn on and off during a set time by setting the timer to start and stop the monitor while the operator is present.
6. Does the computer boot up and operate properly? Check to see if the computer has working software by performing manual input of information into the computer.
7. Does the computer download information properly? Check this by manually trying to download information.
8. Does the internal fan operate properly? Check this by supplying electrical power to the unit and checking if the fan will turn on and off.
9. Does the temperature sensor operate properly? Check this by taking a temperature reading with the internal fan off and then with the internal fan on and checking to see if the temperature readings change.
10. Does the filter holder apparatus operate properly? Check this by manually installing a filter into the holder apparatus and checking to see if the filter is sealed into the unit.
11. Does the casing protect the internal unit from weather? Check this by visually inspecting the unit's gaskets and seals for holes, leaks, etc. Note: This is a visual inspection only. Do not take apart the unit.
12. Does the unit support structure keep the unit secure and upright?
13. When all parts are assembled and operated together, does the unit function properly? Check this by assembling the unit as the instructions dictate, installing a filter, setting the timer, and operating the unit as a normal monitoring period.

14. a. Does unit calibrate?

Does unit pass calibration?

\_\_\_\_\_

( Accept / Reject )

Certifying Official

City/State: \_\_\_\_\_ Telephone Number: \_\_\_\_\_

Serial Numbers for Samplers Accepted:  
Rejected:

Serial Numbers for Samplers Being