

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

**Protocol for the Ambient Air Monitoring
for Methyl Bromide and 1,3-Dichloropropene
In Ventura County
During Summer/Fall, 2005**

Prepared by
Special Purpose Monitoring Section
Air Quality Surveillance Branch
Monitoring and Laboratory Division

Date: August 23, 2005

APPROVED:

Ken Stroud, Chief
Air Quality Surveillance Branch

Michael Poore, Chief
Northern Laboratory Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	SAMPLING	1
III.	AMBIENT MONITORING.....	3
IV.	ANALYSIS.....	3
V.	QUALITY ASSURANCE	4
VI.	PERSONNEL	5

FIGURES

1. CANISTER FIELD LOG SHEET
2. RESTEK SilcoCan PESTICIDE DATA/SAMPLE TRACKING SHEET
3. CANISTER WITH ATTACHED FLOW CONTROLLER

ATTACHMENTS

- I. STANDARD OPERATING PROCEDURE FOR THE SAMPLING AND ANALYSIS OF BROMOMETHANE AND 1,3-DICHLOROPROPENE IN SILCO™ CANISTERS **(low concentration range method)**
- II. AMBIENT PESTICIDE SAMPLING PROCEDURES FOR CANISTERS

**Ambient Air Monitoring Protocol
for Methyl Bromide and 1,3-Dichloropropene
In Ventura County
During Summer/Fall, 2005**

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (August 30, 2004 Memorandum, Gosselin to Lloyd), the Air Resources Board (ARB) will conduct ambient air monitoring for the pesticides methyl bromide and 1,3-dichloropropene (Telone). Monitoring is will occur in Ventura County over an eight-week ambient monitoring period, tentatively scheduled from August 22, 2005 to October 14, 2005. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB, " to document the level of airborne emissions...of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. This is the first year the DPR has requested monitoring for methyl bromide and 1,3-dichloropropene in Ventura County, conducted to coincide with the primary use of these fumigants prior to planting strawberries. The sampling and analysis will follow the procedures outlined in this protocol.

The ARB previously conducted ambient air monitoring studies for Methyl Bromide and Telone in Kern, Monterey and Santa Cruz Counties in both 2000 and 2001.

The laboratory method, "Standard Operating Procedures for the Sampling and Analysis of Bromomethane and 1,3-dichloropropene in Silco™ Canisters," is included as Attachment I (May 2001 Version). This method will be used as the primary analysis method for methyl bromide (bromomethane) and 1,3-dichloropropene. Samples with concentrations above the calibration range of the primary method will be diluted prior to analysis.

II. Sampling

The collection media used for sampling of methyl bromide and 1,3-dichloropropene will involve Silcosteel® canister sampling. Individual samples will be collected for 24-hour periods four days per week, Monday through Friday, for an eight-week duration.

Methyl Bromide (MeBr) and 1,3-Dichloropropene Sampling

Integrated ambient air samples will be collected using evacuated, six-liter Silcosteel® canisters (from Restec Corporation). The target sample flow rate of 3 sccpm will be set and regulated using a passive flow controller and verified by a certified battery-operated mass flow meter. The sampling system will be operated continuously for 24 hours with the exact operating interval recorded on both the log and field data sheets presented in Figures 1 and 2 respectively. The canister vacuum reading will be recorded at the start and end of each sampling period using the -30 to 0 inHg flow controller gauge. The start and end canister vacuum readings will be approximately -30 inHg and -8 inHg, respectively. The canister vacuum reading will also be measured using a more accurate gauge in the lab before and after transport to/from the field. The laboratory gauge readings will be used to calculate the sample volume collected. The 3 sccpm sampling rate will yield a sample volume of 4.32 liters over the 24-hour sampling period. The EQL for MeBr is 0.036 ug/m³ (target EQL was 0.4 ug/m³) and the EQLs for cis and trans 1,3-dichloropropene are 0.015 and 0.03 ug/m³, respectively (target EQL for Telone was 0.01 ug/m³).

The passive flow controllers (Silcosteel-treated Veriflo SC423XL) will be attached to the valve fitting on the canister using a Silcosteel treated Swagelock connector as presented in Figure 3. A six foot section of 1/8 inch O.D, Silcosteel tubing will be attached to the inlet end of an in-line, 7 micron filter that will be attached to the inlet end of the flow controller. The inlet end of the tubing will be bent into a U shape (to prevent rain from entering) and supported about six feet above the building rooftops for the ambient monitoring. At the end of each sampling period, the canisters will be placed in shipping containers, with a sample identification/chain of custody sheet, and will be shipped as soon as reasonably possible to the ARB Monitoring and Laboratory Division laboratory for analysis. The current plan for Ventura is to pickup canisters from the lab on Friday, transport to Ventura on the following Sunday, and return sampled canisters to the lab on the following Monday. The samples will be stored at ambient laboratory temperature prior to analysis.

By using a passive flow controller for integrated sampling, the potential change in flow rate as the vacuum in the canister changes is minimized. The Veriflo SC423XL controller uses a metal diaphragm downstream of a critical orifice to regulate the flow as the vacuum in the canister changes. It is capable of maintaining a constant flow rate at vacuum ranges from -30 to approximately -5 inHg. An in-line filter installed in the controller's inlet fitting is designed to prevent particles from entering and potentially clogging the controller's critical orifice. The outside temperature can also affect the flow rate. For example, there could be an approximately six percent flow drop when the temperature changes from 80 °F to 125 °F (according to manufacturer's specifications). For this reason, a solar radiation shield will be installed on each flow controller.

The ambient pesticide sampling procedures for canisters are presented in Attachment II. The Canister Field Log Sheet and Restek SilcoCan Pesticide Data/Sample Tracking Sheet used to record start and stop times, start and stop vacuum readings, sample identifications, weather conditions, operator's initials and any other significant observations are enclosed as Figures 1 and 2 respectively.

III. AMBIENT MONITORING

In Ventura County, historical use patterns from 2002 and 2003 indicated that ambient monitoring for methyl bromide and Telone should occur during August and September. However, according to the DPR, the most recent use pattern from 2004 indicates that shifts to June and July may have occurred. Five sampling sites will be selected in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations or other public buildings). Also, samples will again be collected at a "background" sampling site located in an urban area in the city of Ventura. At each site, a target of 32 discrete 24-hour samples will be taken during the eight-week sampling period. Collocated (duplicate) samples will be collected for eight dates at each sampling location.

ARB personnel selected sampling sites based upon use-maps supplied by the DPR. An effort was made to select sites based upon high-use areas as indicated by the maps. Sites were selected for their proximity to agricultural fields and the presence of residents or students, with considerations for both accessibility and security of the sampling equipment. The sites are near areas of historical use of methyl bromide and 1,3-dichloropropene. ARB understands that DPR staff will verify and quantify the actual use of these fumigants that takes place during the study when the information becomes available.

IV. Analysis

The laboratory method, "Standard Operating Procedures for the Sampling and Analysis of Bromomethane and 1,3-dichloropropene in Silco™ Canisters," is included as Attachment I (May 2001 Version). This method will be used as the primary analysis method for methyl bromide (bromomethane) and 1,3-dichloropropene. Samples with concentrations above the calibration range of the primary method will be diluted prior to analysis. The procedures are based on EPA Method TO-15 and consist of cryogenic pre-concentration of an aliquot of the whole air sample followed by GC/MS analysis. The canisters arrive from the field at sub-ambient pressure and are pressurized (diluted) by ARB's Sacramento laboratory prior to their analysis.

V. Quality Assurance

Field Quality Control for the ambient monitoring will include the following:

- 1) Field Spikes: For the 2000 ambient monitoring, field spikes were prepared (spiked) at approximately 0.6 ug/m^3 for both methyl bromide and 1,3-dichloropropene. The 2000 field spikes were collocated with samples collected at the urban sampling sites of Bakersfield and Salinas for the two respective studies. However, the pesticide levels observed in the collocated ambient samples were significantly higher than the spike levels, causing poor results in the recovery calculation. For 2001, the field spikes were prepared (spiked) at levels of approximately 10 ug/m^3 each for methyl bromide and cis and trans 1,3-dichloropropene in the canister samples. For 2005 in Ventura, spike levels will be the same as in 2001.

The four field spikes will be obtained by sampling ambient air at the urban-background monitoring site for 24-hour periods (i.e., collocated with a background sample at the same environmental and experimental conditions). The four field spikes will be collected over the eight-week monitoring period. For example, one each of the field spikes will be collected every other week. In the event that field spikes are unavailable during the first few weeks of the monitoring study, field spikes will be collected every week until all four field spikes are obtained over the eight-week monitoring period.

- 2) Four trip spikes will be prepared at the same level as the field spikes. A trip spike will be transported and analyzed along with each of the field spikes.
- 3) Four lab spikes will be prepared at the same level as the field and trip spikes. A lab spike will be analyzed along with each of the field and trip spike sets.
- 4) Collocated samples will be taken (collected) for eight dates at each sampling location. Typically, a collocated is run at least once per week at each sampling site on the same day. Although this requires two samplers at each site, it simplifies the collocated schedule.
- 5) A trip blank will be obtained each week of sampling. The purpose of the trip blank is to help assure quality control during canister transport and storage.

VI. Personnel

ARB sampling personnel will consist of staff from the ARB Air Quality Surveillance Branch. Laboratory personnel will consist of staff from the ARB Northern Laboratory Branch.

Attachment I

Draft

Standard Operating Procedure for the Sampling and Analysis of Bromomethane, and
Telone by GC/MS using a Varian Cryogenic Sampler and Silco™ 6 liter Canisters
(**low concentration range method**)

California Environmental Protection Agency



Air Resources Board

**Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division**

Draft

**Standard Operating Procedure for the Sampling and
Analysis of Bromomethane, and Telone by GC/MS using
a Varian Cryogenic Sampler and Silco™ 6 liter Canisters**

**version
May, 2001**

Approved by:

1. SCOPE

This method is for the sampling and analysis of bromomethane (Methyl Bromide) and telone (cis-1,3-dichloropropene and trans-1,3-dichloropropene) in ambient air using 6 liter Silco™ canisters for sample collection. Collected samples are analyzed by gas chromatography/mass spectrometry using a Varian Stand Alone cryogenic sampler.

2. SUMMARY OF METHOD

Ambient air is collected into evacuated 6-liter Silco™ canisters. Field sampling uses a sub-atmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using deuterated bromomethane (bromomethane-d3) and toluene (toluene-d8) as internal standards.

3. INTERFERENCES/LIMITATIONS

Interferences may result from improperly cleaned canisters. Analysis of samples containing high concentrations of method analytes may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.

4. EQUIPMENT AND CONDITIONS

A. Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:

Column: Restek Rtx-200, 60 meter, 0.32mm I.D., 1.50 micron film thickness

GC temperature program: initial -10° C, initial time 0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min, hold 1 minute, to 240° C @ 25° C/min, hold 1 minute.

Carrier Gas: Helium, grade 5

Hewlett Packard 5973 mass selective detector:

Acquisition Mode: SIM

Tune File: PFTBA Autotune

Ions Monitored: 74.8, 93.8, 95.8, 96.8, 98.8, 110.0

Quant Ions: 74.8, 93.8

Solvent Delay: 5.00 min

Varian Stand Alone cryogenic concentrator:

Valve Oven: 60° C
Autosampler Oven: 60° C
Nafion Dryer: 60° C
Sample Line: 60°
Cryotrap: -180° C to 150°
Transfer Line: 150° C
Cryofocus: -180° C to 150° C
Sample Size: 15 ml to 400 ml
Internal Standard Loop: 1 ml

B. Auxiliary Apparatus

Compressed helium: grade five
Compressed air: ultra zero grade
Compressed nitrogen: grade five
Liquid nitrogen
Gas standards: certified if available
Restek, 6.0 liter Silcosteel canisters: with silcosteel valve
Pressure gauge: able to measure -30mm to 30 psig
Canister cleaning system (see appendix)

5. ANALYSIS OF SAMPLES

- 1) Perform a PFTBA autotune and evaluate tune criteria (Appendix 2). Place a copy of the autotune results in the autotune folder.
- 2) Check and record the pressure of the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
- 3) Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a system blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
- 4) Prepare a sample sequence for the Varian sampler. Organize the sample sequence as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within $\pm 20\%$ of its expected value the system must be evaluated and recalibrated if necessary.
- 5) Attach the sample canisters to the Varian autosampler ring as per the sequence. Execute the sequence.
- 6) Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization prior to analysis. Instrument reports will be in units of ng/m³ and must be corrected for the analysis dilution using the following calculation:

$$(F_p / I_p) \times C_i = C_r$$

I_p = initial canister pressure in mm Hg

F_p = final canister pressure in mm Hg

C_i = concentration from the analysis report in ng/m³

C_r = reported concentration in ng/m³

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five replicate samples of each target compound at three concentrations (low, mid and high range). Reproducibility study results are presented in Table 1.

B. Linearity

A six-point calibration curve is made for each of the target compounds. The curve is constructed using linear regression analysis. Appendix 3 contains method calibration data.

C. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spikes, the method detection limit (MDL), and the estimated quantitation limit (EQL) for method compounds are calculated by:

$$MDL = 3.14 \times s$$

$$EQL = 5 \times MDL$$

where: s = the standard deviation of the response calculated for the seven replicate spikes. The MDL and EQL are calculated as follows.

$$\begin{aligned} \text{bromomethane MDL} &= 3.14 (0.0015 \text{ ug/m}^3) = 0.0047 \text{ ug/m}^3 \\ \text{EQL} &= 5(0.0047 \text{ ug/m}^3) = 0.024 \text{ ug/m}^3 \end{aligned}$$

$$\begin{aligned} \text{cis-1,3-dichloropropene MDL} &= 3.14 (0.0007 \text{ ug/m}^3) = 0.0021 \text{ ug/m}^3 \\ \text{EQL} &= 5(0.0021 \text{ ug/m}^3) = 0.010 \text{ ug/m}^3 \end{aligned}$$

$$\begin{aligned} \text{trans-1,3-dichloropropene MDL} &= 3.14 (0.001 \text{ ug/m}^3) = 0.0031 \text{ ug/m}^3 \\ \text{EQL} &= 5(0.0031 \text{ ug/m}^3) = 0.015 \text{ ug/m}^3 \end{aligned}$$

Assuming a 1:1.5 dilution to pressurize ambient samples:

Bromomethane EQL = 1.5 (0.024 ug/m³) = 0.036 ug/m³

cis-1,3-dichloropropene EQL = 1.5 (0.010 ug/m³) = 0.015 ug/m³

trans-1,3-dichloropropene EQL = 1.5 (0.015 ug/m³) = 0.03 ug/m³

Results are reported to 3 significant figures above the EQL. Results below EQL and above MDL are reported as det (detected). Results less than MDL are reported as less than MDL.

D. Calibration Check

A calibration check sample is analyzed at the beginning of each analytical batch and following each batch of ten samples. The value of the check must be $\pm 20\%$ of the expected value. If the check is outside limits the prior batch of 10 samples must be reanalyzed.

E. Laboratory Control Sample

A laboratory control sample (LCS) is included with each analytical batch. The analysis value of the LCS must be within three standard deviations of its historical mean ($\pm 3\sigma$). If the LCS is outside of limits then the samples in the analytical batch must be reanalyzed.

F. Storage Stability

If the method storage stability of target compounds is unknown then a storage stability study should be conducted. The study should be conducted for a time period which represents the maximum hold time for field samples.

7. SAFETY PRECAUTIONS

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

8. DISCUSSION:

Table 1

REPRODUCIBILITY STUDY

Low Level	Bromomethane (ng/m3)	Cis-1,3- Dichloropropene (ng/m3)	Trans- 1,3- Dichloropropene (ng/m3)
1	27.7	13.1	12.0
2	28.4	12.7	10.8
3	28.7	11.7	9.5
4	28.8	11.3	9.7
5	27.8	11.4	10.9
Average	28.3	12.0	10.6
SD	0.51	0.81	1.01
RSD	1.8%	6.8%	9.5%
Medium Level			
1	217	118	106
2	214	113	103
3	210	116	105
4	215	109	100
5	215	111	101
Average	214	113	103
SD	2.56	3.65	2.50
RSD	1.2%	3.2%	2.4%
High Level			
1	827	385	355
2	830	387	355
3	851	384	358
4	853	383	355
5	838	413	382
Average	840	391	361
SD	11.7	12.6	11.6
RSD	1.4%	3.2%	3.2%

Notes:

m³ cubic meters

ng nanograms

RSD Relative standard deviation

SD standard deviation

Appendix 1
CAN CLEANING PROCEDURE

The canister cleaning procedure uses repeated cycling from -30 inches Hg to 30 pounds per square inch gauge with humidified ultra pure nitrogen. Each cycle is 24 minutes (12 minutes vacuum & 12 minutes pressure) at 80 degrees C. The procedure includes eight complete cycles.

Canister data should be logged into the canister cleaning book for each cleaning batch. When the batch is complete one canister is chosen for analysis. The canister is pressurized with ultra pure nitrogen and analyzed by the GCMS method. If target analytes are not less than two times their MDL the entire batch should be cleaned again.

Procedure:

A. Fill dewar with LN2

1. Remove dewar cover.
2. CAREFULLY place hose from LN2 tank into dewar (Orange and silver container behind oven).
3. Open LN2 tank 3 turns
4. Close tank when LN2 can be seen near top of dewar.
5. CAREFULLY remove hose and replace dewar cover.

B. Turn on the vacuum pump.

1. Switch is located on pump to the left of the can oven.

C. Open N₂ Tank

1. Open regulator on N₂ tank to the left of the can oven.

D. Load cans in oven

1. Attach cans to manifold in oven and tighten.
2. If you are cleaning less than 8 cans the unused ports must be capped.
3. Open the can valve

E. Start Timers Located on top left of can oven

1. Push Auto button on top timer and Auto light should come on. If the light is off, hit the button again and it should light.
2. Push the Run button on the bottom timer. The 1 light should light up briefly then switch to 2. On the top timer the 2 light should light.
3. Push the ADV on the top timer. The 2 light should go off and the 1 light

- should light. The system should also begin to evacuate.
4. Verify the system evacuates all the way by reading the gauge on the back of the oven. The gauge should go to -30 psi.

F. Fill cans and shutdown system.

1. Close all can valves except the ones you want to fill.
2. On the top timer hit the ADV button until the 2 light comes on.
3. Monitor the pressure of the cans on the gauge on the back of the oven.
4. Close can valves when filled.
5. Close N_2 Regulator
6. Turn off Vacuum pump.
7. Remove cans and place plugs on manifold ports.
8. Hit the stop button on both timers.

Appendix 2 Autotune Criteria

A standard autotune should be performed on the detector each day prior to sample analysis. The autotune report should be evaluated for the following:

1. An unusual change in the EM voltage
2. Peak width for all tune masses should be between 0.4 aAmu and 0.6 amu.
3. The relative abundance of tune mass 219.0 should be greater than 30% of tune mass 69.0.
4. Isotope abundance ratio for tune mass 70.0 should be between 0.54% and 1.6 %; isotope abundance ratio for tune mass 220.0 should be between 3.2% and 5.4%.
5. Masses 28 and 18 should be evaluated to check for air leaks in the system.

If autotune criteria are not met the system should be evaluated for problems. After the system problems are corrected the detector should be autotuned prior to sample analysis. Autotune reports should be filed in the instrument autotune folder.

Appendix 3

Calibration Standard Preparation for Bromomethane and Telone

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gases and has the following specifications:

Cylinder No AAL 2013
Expiration date 8/14/01
BROMOMETHANE 13.1 PPB/M
CIS 1,3-DICHLOROPROPENE 5.05 PPB/M
TRANS 1,3-DICHLOROPROPENE 4.93 PPB/M

Working analysis standard is prepared by diluting the stock gas using the following procedure.

1. A 6 liter Silco canister is evacuated to -30 " Hg.
2. 300 ml of stock gas is transferred to the canister using a gas tight syringe.
3. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter.
4. The canister is pressurized to 29.4 psig with ultra pure nitrogen.

The canister will contain analytes at the following concentrations:

BROMOMETHANE 0.847 ug/m³
CIS 1,3-DICHLOROPROPENE 0.382 ug/m³
TRANS 1,3-DICHLOROPROPENE 0.343 ug/m³

The standard sample injection is 400 ml. A calibration curve is generated by using the cryo sampler to introduce the following volumes of working standard to the GCMS.

<u>Volume</u>	<u>methylbromide</u>	<u>cis 1,3-DCP</u>	<u>trans 1,3-DCP</u>
400 ml	0.847 ug/m ³	0.382 ug/m ³	0.343ug/m ³
200 ml	0.423 ug/m ³	0.191 ug/m ³	0.171 ug/m ³
100 ml	0.212 ug/m ³	0.095 ug/m ³	0.086 ug/m ³
50 ml	0.106 ug/m ³	0.048 ug/m ³	0.043 ug/m ³
25 ml	0.053 ug/m ³	0.024 ug/m ³	0.021 ug/m ³
15 ml	0.032 ug/m ³	0.014 ug/m ³	0.013 ug/m ³

Attachment II

Ambient Pesticide Sampling Procedures
For Canisters

Ambient Pesticide Sampling Procedures For Canisters

Overview:

- Collect samples for 24 hour periods; Four sampling periods per week per site; Five sampling sites plus an urban background site (e.g., ARB Bakersfield station).
- Start the collocated sample at each site on the second or third sampling period per week.
- Submit 1 trip blank per week (unused, evacuated can, carry on route for 1 day, log-in and ship back with the others).
- With the trip blank there normally will be 31 samples shipped per week.
- 4 field spikes will be run at the ARB site (time collocated exactly with the ambient sample. The field spikes will be distributed over the monitoring period (e.g., 1 per week every other week). A trip spike will also accompany each field spike. These field and trip spikes will be delivered to the laboratory with the rest of the samples.
- The field log sheet is filled out as the sampling is conducted. The originals stay in the field binder. Please include a copy with sample shipments. All QA samples must be logged onto the log sheet.
- The canister Data Sheet forms are started by the lab staff before can shipment to the field (beginning pressures, dates, etc. are recorded). The field staff fills out the appropriate portions during sampling and before shipment. The lab staff completes the Data Sheet upon receipt of the samples.
- (Disregard if samples are driven back to Sacramento) The samples are shipped by UPS, regular ground, to 13th and T (e.g., to John Roll but to the attention of Jim Omand/Mike Orbanosky). This is normally done each day, Monday thru Thursday (e.g., along with the PAMS samples from Bakersfield). Review the Data Sheets and log sheet to insure that all documentation is correct and that the appropriate QA samples have been included. A custody seal is filled out and placed on each shipping container.

Sampling Procedure:

Materials that will be needed on the roof to conduct the sampling include:

- Clip board with log sheets
- pencils/pens
- 9/16 inch open end wrench
- allen wrench
- sample cans with data sheets
- 0 to 10 sccpm mass flow meter (MFM) with battery

Figure out your route for sampling the six locations and try to keep this the same throughout the study. In general, try to make each sampling period exactly 24 hours; e.g., if start time is 11:10 then end time should be 11:10. (round off to the nearest 5 minutes.) Due to field logistical issues, the sample period may not always be exactly 24 hours; but that is the target time frame.

Sample Start:

On the way to the first site, plug the MFMs into the batteries. It takes the MFMs about 10 minutes to warm up before they can be used. Leave the MFMs plugged in until the last sample for the day is taken; then unplug for the night to minimize drop in battery charge. Recharge the batteries once per week.

Upon arrival at the site, check in if needed. I suggest a backpack (big enough to hold a canister) and fanny-pack to carry the sampling gear to the roof.

- a) check to make sure that the canister valve is closed,
- b) remove the ¼ inch brass cap from the inlet of the can,
- c) securely attach the canister to the passive sampler, tighten the ¼ inch swagelock fitting,
- d) open the canister valve,
- e) record the canister pressure; if the can vacuum is **less than -29 "Hg** (e.g., -25) then replace with a new can (and return the bad one with appropriate comments made on the data sheet). Sometimes the cans will read beyond the scale, e.g., -31 or -32 "Hg; this is OK. When in doubt use the spare gauge to verify the vacuum reading.

Using the 0 to 10 sccpm MFM measure the flow rate; should be 3.0 sccpm; if the reading is **between 2.95 and 3.05** then record the value on the data sheet. If outside of this range then record the value and adjust the flow back to 3.0 sccpm using an allen wrench. If you have to adjust the flow then note it on the log sheet.

Fill out the Data Sheet and field log sheet, including: log #, start date, time, beginning vacuum reading, any comments, samplers initials, and the general weather conditions (e.g., sunny, cloudy, raining, etc.).

Sample collection and Shipment:

Measure (do not re-set) the flow rates at the end of the sampling period with the MFM; record the end data on the log sheet and data sheet. **Close the can valve! (Do not use excessive force when closing the valve. When the knob stops turning the valve is closed.)** Detach the can from the sampler and put a ¼ inch brass swagelock cap on the can inlet **and tighten**. Put the can back into a shipping container.

Start the collocated (duplicate) samples. These should be started and stopped at the same times as the regular samples.

Log-in a trip blank (TB), once per week. It doesn't matter which site (or which day) but you can note it in the comment section of the log sheet. Log the TB into the log sheet.

After samples are collected and before shipment, store in the Bakersfield office (i.e., at room temp).

