CANISTER SAMPLNG
STANDARD OPERATING PROCEDURE

Office of Environmental Measurement and Evaluation
Ecosystems Assessment Team
EPA New England-Region 1
11 Technology Dr.
North Chelmsford, MA 01863

The controlled version of this document is the electronic version viewed on-line only. If this is a printed copy of the document, it is an uncontrolled version and may or may not be the version currently in use.

This document contains direction developed solely to provide internal guidance to U.S. Environmental Protection Agency (EPA) personnel. EPA retains the discretion to adopt approaches that differ from these procedures on a case-by-case basis. The procedures set forth do not create any rights, substantive or procedural, enforceable at law by a party to litigation with EPA or the United States.

Prepared by: _____ Date: 9/15/11
Peter Kahn, Environmental Engineer

Approved by: _____ Date: 9/20/11
Robert Judge, ECA Air Section Team Leader

Note: The effective date is considered to be the last approval date.

Revision Page

Date	Rev. #	Summary of Changes	Sections
8/31/07	4	New format applied	All sections
9/19/11	5	Changed approving authority on title page	Title Page

Table of Contents

1.0 Scope and Application

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures for sampling volatile organic compounds (VOCs) in ambient or indoor air environments. The samples are collected as whole air samples in passivated SUMMA‘ or Silco lined stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by an ion trap mass spectrometer (MS) at the EPA Region I New England Regional Laboratory. The laboratory analytical operating procedures for the GC/MS are described under separate cover.

The canister sampler configuration and procedure, the number of samples to be collected, where they are collected, and the duration of the sampling event, are dependent upon the project objectives. Therefore, prior to field sampling activities, a detailed sampling and analysis work plan is prepared for each project. The plan will incorporate the procedures specified in the following SOP document.

The sampling procedures are described in three separate parts. Part 1 describes the grab sampler configuration and sampling procedures, Part 2 the sub-atmospheric time-integrated sampler configuration and sampling procedures and Part 3 the pressurized time-integrated sampler configuration and sampling procedures.

2.0 Summary of Method

This canister sampling SOP describes procedures for sampling with canisters at final pressures above atmospheric pressure (referred to as pressurized sampling), below atmospheric pressure (referred to as sub-atmospheric sampling), and at atmospheric pressure (referred to as grab sampling). This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and sub-atmospheric pressure canisters. The organic compounds that have been successfully collected in canisters by this method are listed on Table 1.

3.0 Definitions

3.1 QAO: Quality Assurance Officer

3.2 QC: Quality Control

3.3 QA: Quality Assurance

3.4 SOP: Standard Operating Procedure

3.5 NA: Not applicable

3.6 PDF: Portable document format

3.7 **SIGNIFICANT REVISION: a change in documented procedure that will likely alter the outcome of the task.**

3.8 **ECA: Ecosystems Assessment**

3.9 **VOC: Volatile Organic Compound**

3.10 **GC/MS: Gas Chromatography and Mass Spectrometer**

3.11 **QA/QC: Quality Assurance and Quality Control**

3.12 **OSHA: Occupational Safety and Health Administration**

3.13 **psig: Pounds per Square Inch Gauge**

3.14 **psia: Pounds per Square Inch Absolute**

3.15 **ml/min: milliliters per minute**

4.0 Health and Safety Warnings

4.1 When working with potentially hazardous materials or situations, follow EPA, OSHA and site specific health and safety procedures.

4.2 All proper personal protection clothing for the specific task must be worn.

5.0 Interferences

5.1 Do not handle sources of VOCs, such as gasoline or other solvents prior to collecting samples with canisters. These may contaminant the canisters and interfere with sampling results.

6.0 Personnel Qualifications

6.1 All personnel should be trained by an experienced individual before initiating the procedures on their own.

6.2 All personnel working in the field at Superfund Sites are required to take a 40-hour health and safety training course and an annual refresher course prior to engaging in any field activities.

6.3 All personnel shall be responsible for complying with all quality assurance and quality control (QA/QC) requirements that pertain to their organization/technical function.

PART 1
Canister Grab Sampler Configuration and Sampling Procedures

7.0 Equipment and Supplies

See Figure 1 for a diagram of the canister grab sampling system.

7.1 Sampling inlet line is made of chromatographic-grade stainless steel tubing to connect canister to sample inlet.

7.2 Sample canister is a stainless steel pressure vessel of desired volume (6-liter or 15-liter) with valve and either a SUMMA passivated or Silco lined interior surface. All canisters mush be certified clean, leak free and evacuated prior to sampling event. Canisters can be purchased from Scientific Instrumentation Specialists (SIS), Andersen Instruments Inc., RESTEK, or equivalent. A vacuum/pressure gauge (0-30 in Hg and 0-30 psig) can be attached to canister as an option.

7.3 A separate vacuum/pressure gauge is used if not attached to the canister for taking vacuum/pressure readings before and after the sampling event.

7.4 A 2 micrometer stainless steel in-line particulate matter filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.

8.0 Procedures

The standard operating procedure (SOP) described below outlines the procedures used for collecting an instantaneous grab canister sample. Configure the sampler as shown in Figure 1 using the components described in Section 7.0.

8.1 If the canister does not have a vacuum/pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and remove the gauge.

8.2 If a vacuum/pressure gauge is attached, open valve, read the gauge, and then close the valve.

8.3 Connect the 2 micrometer particulate matter filter and sampling line to the canister inlet as shown in Figure 1. The flow controller shown will not be needed for collecting a grab sample.

8.4 Open the canister valve slightly, just enough to slowly allow a sample to be drawn into the canister. The canister pressure differential causes the sample to flow into the canister. It will take approximately 30 seconds for the canister pressure to go from 30 psig vacuum to atmospheric pressure or 0 gauge.

8.5 In a field log book record the project name, sampling event date, sampling location, canister number, initial canister pressure gauge reading, and the sampling start time.

8.6 Close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.**

8.7 Disconnect the 2 micrometer particulate matter filter from the canister inlet.

8.8 If the canister does not have a vacuum/pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and then disconnect the gauge from the canister.

8.9 If a vacuum/pressure gauge is attached, open valve, read the gauge, and then close the valve.

8.10 In a field log book record the final canister pressure gauge reading and the meteorological conditions during the sampling event.

8.11 For each sample fill in the tag attached to the canister within the following information: Date Sampled & Pressure (psig), see Appendix A

8.12 Complete the chain-of-custody record form. See Section 14.5.

PART 2
Canister Sub-atmospheric Time-Integrated Sampling Procedures

9.0 Equipment and Supplies

See Figure 2 for a diagram of the canister sub-atmospheric time-integrated sampling system.

9.1 Sampling inlet line is made of chromatographic-grade stainless steel tubing to connect canister to sample inlet.

9.2 Sample canister is a stainless steel pressure vessel of desired volume (6-liter or 15-liter) with valve and either a SUMMA passivated or Silco lined interior surface. All canisters mush be certified clean, leak free and evacuated prior to sampling event. Canisters can be purchased from Scientific Instrumentation

Specialists (SIS), Andersen Instruments Inc., RESTEK, or equivalent. A vacuum/pressure gauge (0-30 in Hg and 0-30 psig) can be attached to canister as an option.

9.3 A separate vacuum/pressure gauge is used if not attached to the canister for taking vacuum/pressure readings before and after the sampling event.

9.4 A 2 micrometer stainless steel in-line particulate matter filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.

9.5 A mechanical flow controller made of stainless steel; having a flow range of 2- 4 ml/min (Restek Veriflow model 423XL or equivalent) is calibrated to 3.3 ml/min. using a 6-liter canister to collect a 24-hour integrated sample.

9.6 A mechanical flow controller made of stainless steel; having a flow range of 5-500 ml/min (Millaflow model 423SXVT/HT or equivalent) is calibrated to 10 ml/min. using a 6-liter canister to collect an 8-hour integrated sample.

9.7 An Aalborg Electronic Mass Flow Meter (Model GFMs-010020) is used to calibrate the flow controller. The mass flow meter measures flow rates between 0 - 20 ml/min.

10.0 Procedures

The standard operating procedure (SOP) described below outlines the procedures used for collecting a sub-atmospheric pressure integrated canister sample. Configure the sampler as shown in Figure 2 using the components described in Section 9.0.

10.1 In the laboratory, prior to the sampling event, calibrate the flow controller using the procedure outlined in Section 14.1. **Note: For this procedure use an evacuated dummy canister.**

10.2 Select the canister and flow controller to be used for the sampling event and bring it to the desired sampling location. If the canister does not have a vacuum/ pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and then disconnect the gauge from the canister. If the canister to be used for the sampling event does have a vacuum/pressure gauge attached, read the gauge and record value and canister number in field log book.

10.3 Connect the sample inlet line with particulate matter filter to the flow controller's high pressure inlet port (HP), if not already configured and the low pressure outlet

port (LP) to the canister inlet port as shown in Figure 2 using the components described in Section 9.0.

10.4 In a field log book record the project name, sampling event date, sampling location, canister number, flow controller number, and the initial canister pressure gauge reading.

10.5 After all of the samplers have been set-up at their desired sampling locations, go back to each location and open the canister valve to allow a sample to be drawn through the flow meter and into the canister. The canister pressure differential causes the sample to flow into the canister. In the field log book record the sampling event start time for each sampling location.

10.6 During the course of the sampling event, periodically check each sampling location to see if the sampler had been tampered with. In addition, if the canister has a vacuum/pressure gauge attached, observe and record the gauge reading to determine if the canister is being filled at a constant rate.

10.7 At the conclusion of the predetermined sampling period, return to each sampling location and close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.** If the canister does have a vacuum/pressure gauge attached, read the gauge, and record the value in the field log book. Disconnect the flow controller with attached sample inlet line with particulate matter filter from the canister. If the canister does not have a vacuum/ pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and then disconnect the gauge from the canister. **Note: The gauge reading obtained in this step and in step 10.2 should agree with the predetermined final canister pressure used in the calculations described in Section 14.1.2. This step will help determine if the sample had been collected at a constant rate over the sampling period.**

10.8 In a field log book record for each sampling location, the sampling event end time, final canister pressure, and meteorological conditions during the sampling event.

10.9 For each sample fill in the tag attached to the canister within the following information: Date Sampled & Pressure (psig) see Appendix A.

10.10 Complete the chain-of-custody record form. See Section 14.5.

PART 3
Canister Pressurized Time-Integrated Sampling Procedures

11.0 Equipment and Supplies

See Figure 3 for a diagram of the canister pressurized time-integrated sampling system.

11.1 Sampling inlet line is made of chromatographic-grade stainless steel tubing to connect canister to sample inlet.

11.2 Sample canister is a stainless steel pressure vessel of desired volume (6-liter or 15-liter) with valve and either a SUMMA‘ passivated or Silco lined interior surface. All canisters mush be certified clean, leak free and evacuated prior to sampling event. Canisters can be purchased from Scientific Instrumentation Specialists (SIS), Andersen Instruments Inc., RESTEK, or equivalent. A vacuum/pressure gauge (0-30 in Hg and 0-30 psig) can be attached to canister as an option.

11.3 A separate vacuum/pressure gauge is used if not attached to the canister for taking vacuum/pressure readings before and after the sampling event.

11.4 A 2 micrometer stainless steel in-line particulate matter filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.

11.5 A mechanical flow controller made of stainless steel; having a flow range of 2- 4 ml/min (Restek Veriflow model 423XL or equivalent) is calibrated to 3.3 ml/min. using a 6-liter canister to collect a 24-hour integrated sample.

11.6 A mechanical flow controller made of stainless steel; having a flow range of 5-500 ml/min (Millaflow model 423SXVT/HT or equivalent) is calibrated to 10 ml/min. using a 6-liter canister to collect an 8-hour integrated sample.

11.7 An Aalborg Electronic Mass Flow Meter (Model GFMs-010020) is used to calibrate the flow controller. The mass flow meter measures flow rates between 0 - 20 ml/min.

11.8 When an electrical outlet is not available an SIS stainless steel/viton diaphragm vacuum pump/compressor, model NO5SV, with a current draw at max load of 1.1 amps can be used with the following components.

11.8.1 Two Technacell rechargeable solid-gel cell 6 volt batteries, rated for 12 ampere hours connected in series to produce 12 volts.

11.8.2 A Micronta regulated 12 volt power supply, converts 120VAC to 12VDC.

11.8.3 A Pelican Products, Inc. Pro Case houses and protects the sampling pump, batteries, and power supply.

11.9 When an electrical outlet is available, use a Xontech Model 911A sampler and follow the procedures outlined in the EPA SOP, EPA-Reg1-ESD/Xontech-Can-Sam-SOP, July 2005.

12.0 Procedures

The standard operating procedure (SOP) described below outlines the procedures used for collecting a pressurized integrated canister sample. Configure the sampler as shown in Figure 3 using the components described in Section 11.1 – 11.8.

Follow the procedures outlined in the EPA SOP, EPA-Reg1-ESD/Xontech-Can-Sam-SOP, July 2005 when using the Xontech Model 911A sampler and available electrical outlet.

12.1 In the laboratory, prior to the sampling event, calibrate the flow controller using the procedure outlined in Section 14.1. **Note: For this procedure use an evacuated dummy canister.**

12.2 Select the canister and flow controller to be used for the sampling event and bring it to the desired sampling location. If the canister does not have a vacuum/ pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and then disconnect the gauge from the canister. If the canister to be used for the sampling event does have a vacuum/pressure gauge attached, read the gauge and record value and canister number in field log book.

12.3 Connect the sample inlet line with particulate matter filter to the inlet/vacuum side of the pump. Connect the outlet/pressure side of the pump to the high pressure inlet port (HP) of the flow controller. Connect the low pressure outlet port (LP) side of the flow controller to the canister inlet port. Refer to Figure 3 for a diagram of the sampler.

12.4 In a field log book record the project name, sampling event date, sampling location, canister number, sampler number, and the initial canister pressure gauge reading.

12.5 After all of the samplers have been set-up at their desired sampling locations, go back to each location and first turn on the sampling pump then open the canister valve. In the field log book record the sampling event start time for each sampling location.

12.6 During the course of the sampling event, periodically check each sampling location to see if the sampler had been tampered with or that the pump is running. In addition, if the canister has a vacuum/pressure gauge attached, observe and record the gauge reading to determine if the canister is being filled at a constant rate.

12.7 At the conclusion of the predetermined sampling period, return to each sampling location and first close the canister valve then turn off the sampling pump. **DO NOT OVER-TIGHTEN THE VALVE.** Disconnect the sampler from the canister. If the canister does not have a vacuum/ pressure gauge attached, connect a gauge to the canister inlet, open the valve, read the gauge, close the valve, and then disconnect the gauge from the canister. If the canister does have a vacuum/pressure gauge attached, read the gauge and record the value and in the field log book. **Note: The gauge reading obtained in this step and in step 12.2 should agree with the predetermined final canister pressure used in the calculations described in Section 14.1.2. This step will help determine if the sample had been collected at a constant rate over the sampling period.**

12.8 In a field log book record for each sampling location, the sampling event end time, final canister pressure, and meteorological conditions during the sampling event.

12.9 For each sample fill in the tag attached to the canister within the following information: Date Sampled & Pressure (psig) see Appendix A.

12.10 Complete the chain-of-custody record form. See Section 14.5.

13.0 Data and Records Management

All data and information pertaining to this SOP are recorded by hand in a permanently bound notebook in black or blue ink and on the canister tag.

14.0 Quality Control and Quality Assurance

The following describes the QA/QC procedures and performance criteria used to collect canister air samples.

14.1 Flow Controller Calibration

The canister sampling system uses either a Millaflow model SC423SXFT/B or Restek Veriflow model 423XL flow controller to regulate the flow of sample entering the canister over the desired sample period. The flow controller is calibrated using an Aalborg Electronic Mass Flow Meter (Model GFMs-010020) capable of measuring flow rates between 0 - 20 ml/min. Pre-sampling event flow

controller calibration procedures for sub-atmospheric and pressurized canister samples are described in Sections 14.1.3 and 14.1.4, respectively.

14.1.2 Flow Rate Determination

Flow rates are determined based on the duration of the sampling event and whether sub-atmospheric or pressurized samples will be collected. Flow rates can be calculated using the following formula:

$$F = \frac{P \times V}{T \times 60}$$

F = flow rate (ml/min)
P = final canister pressure, atmospheres absolute

$$= \frac{\text{gauge pressure (psig)} + 14.7 \text{ psig}}{14.7 \text{ psia}}$$

V = volume of canister (ml)
T = sampling period (hours)

For example, if a 6 liter canister is to be pressurized to 26 psig in 8 hours, the flow rate should be calculated as follows:

$$\text{Flow Rate (ml/min)} = \frac{(26 \text{ psig} + 14.7 \text{ psig})}{14.7 \text{ psia}} \times \frac{6{,}000 \text{ ml}}{8 \text{ hours} \times 60}$$

$$= \frac{2.8 \text{ atmospheres absolute} \times 6{,}000 \text{ ml}}{480 \text{ min}}$$

$$= 35 \text{ ml/min}$$

For example, using a 6 liter canister to collect a sub-atmospheric pressure sample to -6 inches of mercury vacuum in 8 hours, the flow rate should be calculated as follows:

$$\text{Flow Rate (ml/min)} = \frac{(-6 \text{ inches of Hg} + 29.92 \text{ inches of Hg})}{29.92 \text{ inches of Hg}} \times \frac{6{,}000 \text{ ml}}{8 \text{ hours} \times 60 \text{ min}}$$

$$= \frac{0.80 \text{ atmospheres absolute} \times 6{,}000 \text{ ml}}{480 \text{ min}}$$

$$= 10 \text{ ml/min}$$

14.1.3 Sub-atmospheric Canister Laboratory Flow Controller Calibration Procedures

14.1.3.1 On the inlet side of the Aalborg Electronic Mass Flow Meter (Model GFMs-010020) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flow meter.

14.1.3.2 Power up the Aalborg Electronic Mass Flow Meter (Model GFMs-010020) by connecting it to the power supply. **Note: The meter must be warmed up for a minimum of 10 minutes prior to taking readings.**

14.1.3.3 Using an insulated screwdriver, through the ZERO (lower) access window adjust the trim potentiometer until the display reads zero.

14.1.3.4 Configure the sampler as shown in Figure 2 using the components described in Section 9.0. Connect the sample inlet line with particulate matter filter to the flow controller's high pressure inlet port (HP), if not already configured and the low pressure outlet port (LP) to the canister inlet port. **Note: This canister will serve as a dummy canister for calibrating all the flow controllers to be used during the sampling event.**

14.1.3.5 Connect the flow meter to the sample inlet making sure the "FLOW ARROW" marked on the flow meter is pointing in the right direction.

14.1.3.6 In a field log book record the project name, calibration date, and flow controller number.

14.1.3.7 Open the canister valve to allow a sample of room air or clean/background ambient air to be drawn through the flow meter and into the canister. The canister pressure differential causes the sample to flow into the canister.

14.1.3.8 Observe the mass flow meter reading and adjust the micro metering valve on the flow controller until the predetermined flow rate registers on the meter. In the field log book record the flow rate reading. Refer to Section 14.1.2 for the procedure to calculate flow rates. **Note: With the mechanical flow controller, the difference between the inlet and outlet pressure must be 10 psi to maintain a constant flow rate. As the internal canister pressure approaches atmospheric**

pressure, there will be a decrease in the flow rate. Therefore, a 6 liter canister will only be able to collect a 2 - 3 liter sample.

14.1.3.9 Close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.**

14.1.3.10 Turn off (unless it will be used for further calibrations) and disconnect the Aalborg Electronic Mass Flow Meter from the sample inlet.

14.1.3.11 Disconnect the flow controller with sample inlet line and particulate matter filter from the canister.

14.1.3.12 Place the flow controller in its carrying case.

14.1.4 Pressurized Canister Laboratory Flow Controller Calibration Procedures

14.1.4.1 On the inlet side of the Aalborg Electronic Mass Flow Meter (Model GFMs-010020) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flow meter.

14.1.4.2 Power up the Aalborg Electronic Mass Flow Meter (Model GFMs-010020) by connecting it to the power supply. **Note: The meter must be warmed up for a minimum of 10 minutes prior to taking readings.**

14.1.4.2 Using an insulated screwdriver, through the ZERO (lower) access window adjust the trim potentiometer until the display reads zero.

14.1.4.4 Configure the sampler as shown in Figure 3 using the components described in Section 11.0. Connect the sample inlet line with particulate matter filter to the flow controller's high pressure inlet port (HP), if not already configured and the low pressure outlet port (LP) to the canister inlet port. **Note: This canister will serve as a dummy canister for calibrating all the flow controllers to be used during the sampling event.**

14.1.4.5 Connect the flow meter to the sample inlet making sure the "FLOW ARROW" marked on the flow meter is pointing in the right direction.

14.1.4.6 Power up the pump, open the canister valve to allow a sample of room air or clean/background ambient air to be drawn into the canister.

14.1.4.7 Observe the mass flow meter reading and adjust the micro metering valve on the flow controller until the predetermined flow rate registers on the meter. In the field log book record the flow rate reading. Refer to Section 14.1.2 for the procedure to calculate flow rates.

14.1.4.8 Close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.**

14.1.4.9 Turn off the pump and flow meter (unless it will be used for further calibrations).

14.1.4.10 Disconnect the flow meter from the sample inlet.

14.1.4.11 Disconnect the sampler from the canister.

14.1.4.12 Place the flow controller and sampler in their appropriate carrying cases.

14.1.4.13 After all the flow controllers are calibrated, clean them according to the procedures described in the Flow Controller Cleaning SOP, Revision #0, 09/13/07.

14.2 Field/Trip Blank

There will be no canister field/trip blanks brought back to the laboratory for analyses. All the canisters and samplers designated for a specific project are certified clean and leak free by the Region I OEME Laboratory prior to sample collection. The cleaning and leak certification procedures are described under separate cover in SOP documents, EPASOP-CanisterClenaing.SOP.Rev3 and ECASOP-CanisterLeak.SOP.Rev3. This process eliminates the need to have field/trip blanks analyzed with canister samples.

14.3 Duplicate Samples

Every sampling event, at one sampling location two canisters are collected in parallel over the same period of time. In the final report compounds having values above their reporting limits are reported in a summary table along with the RPD . The RPD must agree within $\pm$ 25%, if not, the concentration of the

identified compound will be reported as an estimated value. This criterion will only apply if concentrations are 10 times the reporting limit.

14.4 Canister Storage

Canisters that have been certified clean and leak free are stored in the EPA Region I OEME Laboratory on the shelves located in the hallway outside Room 173. Several days prior to the sampling event canisters are evacuated to their final canister pressure. After the sampling event and after being logged into the laboratory, the canister samples are stored in the EPA Region I OEME Laboratory on the shelves located in the hallway outside Room 173.

14.5 Canister Transport

Canisters are transported to the field and back to the laboratory in either metal carrying cases or cardboard boxes designed to handle 6-liter or 15-liter canisters. The carrying case helps eliminate valves on the canisters from being inadvertently opened and/or damaged.

14.6 Chain-of-Custody

A chain-of-custody record form accompanies the samples from the point of sample collection to the point of analyses. The field engineer enters the following information on the chain-of-custody record form (copy provided in Appendix B) at the completion of the sampling event:

- Project/Site Name
- Samplers Signature
- Station Numbers
- Date
- Station Location Description
- Remarks: canister number and any other pertinent information

The field engineer returns to the laboratory, stores the canisters on the shelves located in the hallway outside Room 173 and contacts Doris Guzman or another authorized person to transfer sample custody. At that time, the engineer signs and enters the date/time on the chain-of-custody record form, relinquishing the samples to the authorized login person, who also signs and enters the date/time on the form.

15.0 Waste Management and Pollution Prevention

No hazardous waste will be generated as a result of following this SOP.

16.0 Preventative Maintenance

Maintenance will be needed if the parameters described in the SOP are outside the stated limits. Contact Peter Kahn for any maintenance related questions.

17.0 References

NA

TABLE 1

EPA REGION I METHOD TO15 TARGET VOC LIST

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Dibromoethane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Butadiene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2-Hexanone
4-Ethyl Toluene
Acetone
Acrylonitrile
Allyl Chloride
Benzene
Benzylchloride
Bromodichloromethane
Bromoform
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Cyclohexane
Dibromochloromethane
Dichlorodifluoromethane (F12)
Dichlorotetrafluoroethane
Ethyl Benzene
Heptane
Hexachloro-1,3-butadiene
Hexane
Isopropyl Alcohol
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Methyl-t-butyl ether
Methyl Bromide (Bromomethane)
Methyl Chloride (Chloromethane)
Methylene Chloride
Styrene
Tetrachloroethene
Tetrahydrofuran
Toluene
Trichloroethene
Trichlorofluoromethane
Trichlorotrifluoroethane
Vinyl Bromide
Vinyl Chloride
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
m,p-Xylene
o-Xylene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene

FIGURE 1

CANISTER GRAB AIR SAMPLER CONFIGURATION

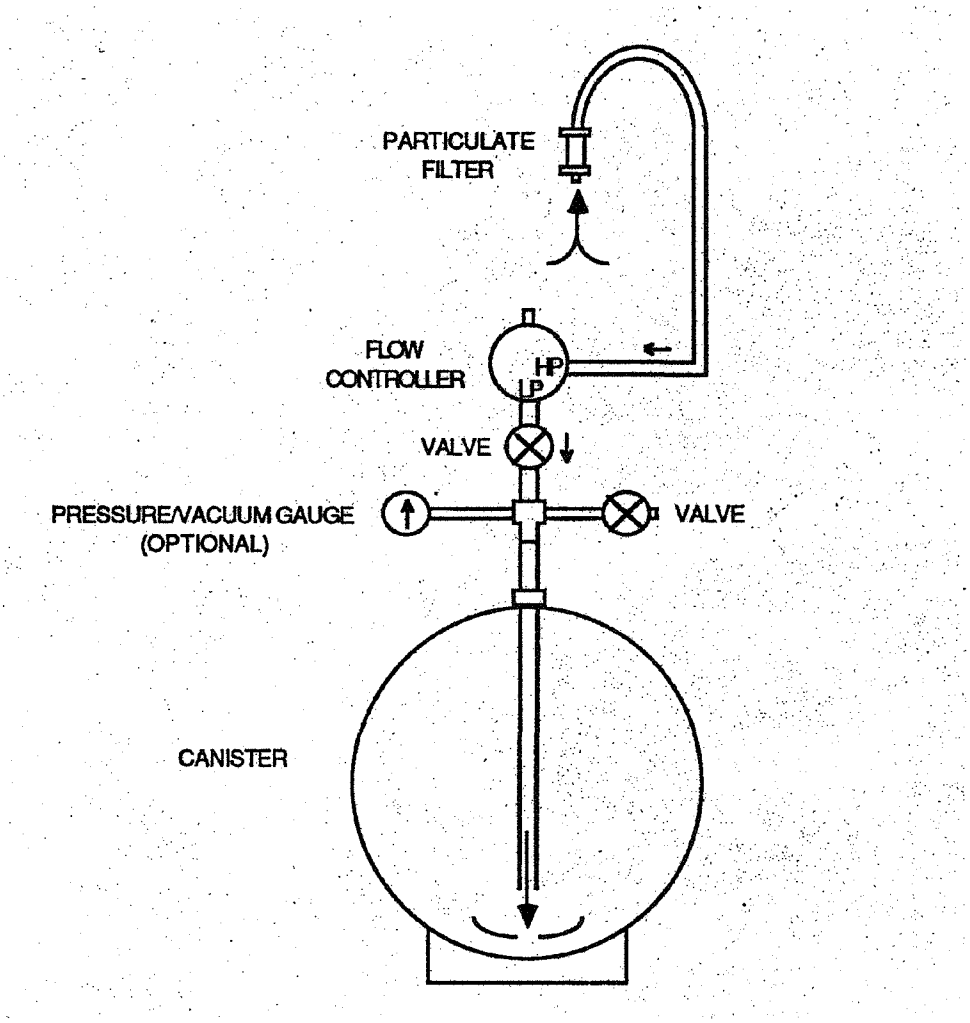


FIGURE 2

CANISTER SUBATMOSPHERIC TIME-INTERGRATED AIR SAMPLER CONFIGURATION

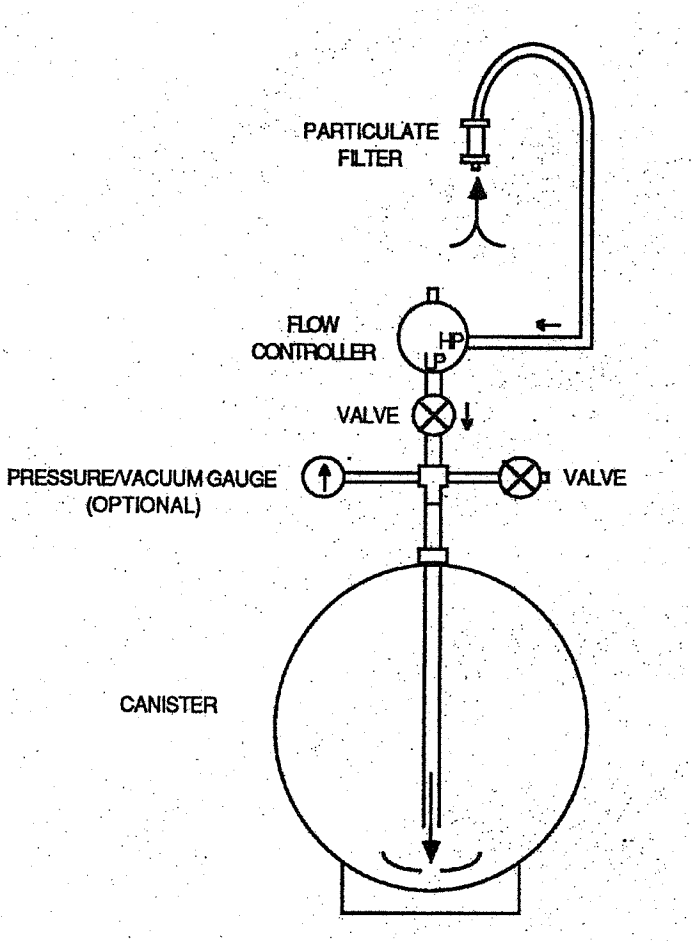
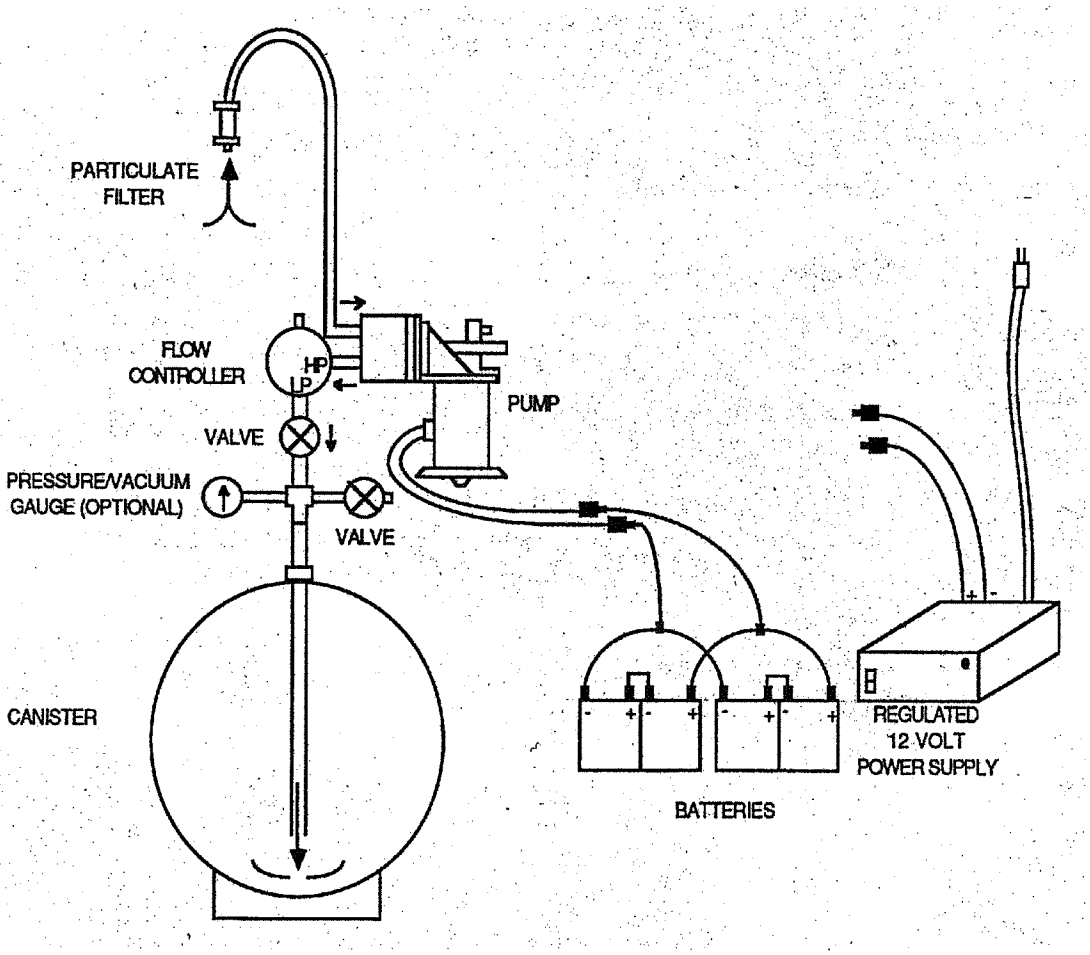


FIGURE 3

CANISTER PRESSURIZED TIME-INTERGRATED AIR SAMPLER CONFIGURATION



APPENDIX A

CANISTER TAG EXAMPLE

Tracking Information

Canister Numbers _____
Date Cleaned: _____
Date Vacuum Leak Certification: _____
Volume of Water Added (ul): _____
Date Pressurized to 45 psia: _____
Date Certified: _____
Date Final Pump down: _____
Date Sample and Pressure (psig): _____
Date Analyzed and Pressure (psig): _____

Mailing Address

US EPA
11 Technology Drive
N. Chelmsford, MA 01863

_____

Survey Name: _____

Toxics _____ **PAMS** _____

APPENDIX B

CHAIN-OF-CUSTODY FORM EXAMPLE

ENVIRONMENTAL PROTECTION AGENCY — EXAMPLE — REGION 1 -- ESD, 60 WESTVIEW STREET, LEXINGTON, MA 02173

CHAIN OF CUSTODY RECORD

PROJ. NO.: 07CS0014 | PROJECT NAME: Alexson's Cleaners

SAMPLERS: (Signature) Peter R Kahn

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	CANISTER NUMBER	REMARKS
	5/1/07				1 Bougie Lane	1	12570	Basement Indoor Air 24-hr — Air Toxics
	5/1/07				1 Bougie Lane	1	22153	Basement Indoor Air 24-hr Dup
	5/2/07				1 Bougie Lane	1	12567	Basement Indoor Air Grab
	5/1/07				1 Bougie Lane	1	50476	Ambient Air 24-hr
	5/1/07				37 High Street	1	13490	Basement Indoor Air 24-hr
	5/1/07				39 High Street	1	50555	Basement Indoor Air 24-hr

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Peter R Kahn	5/4/07 8:46				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
			5/4/07 8:46		

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

0095