

ATTACHMENT 2

USEPA's Industri-Plex Superfund Site Sub-Slab Sampling Guideline (November 3, 2003) and
Related E-mail Correspondence

Larry McTiernan

From: Rinaldi, Gerald M [gmrina@solutia.com]
Sent: Friday, July 16, 2004 5:47 PM
To: Larry McTiernan
Subject: FW: indoor air evaluation

-----Original Message-----

From: lemay.joe@epamail.epa.gov [mailto:lemay.joe@epamail.epa.gov]
Sent: Wednesday, June 18, 2003 12:35 PM
To: Light, D Michael
Subject: indoor air evaluation

Mike,

Regarding potential indoor air contaminant concentrations from underlying groundwater plumes at the Industri-Plex Superfund Site, EPA plans on modeling contaminant concentrations from underlying shallow groundwater plumes (e.g. benzene, toluene) through the soil vadose zone and existing building foundations to produce an indoor air contaminant concentration for calculating potential current risk to workers in the building via inhalation. Currently, we plan on applying the Johnson-Ettinger model to calculate the indoor air contaminant concentrations.

Alternatively, if soil gas data were collected from immediately below the foundation of buildings within the contaminant plumes at the site, then this data could be directly applied to the model, modeling the soil gas concentrations through the foundation and calculating indoor air concentrations. Soil gas data immediate below the existing building foundations would eliminate the need for modeling shallow groundwater concentrations through the vadose zone. Based upon the Final GSIP shallow groundwater data, benzene and/or toluene shallow groundwater concentrations appear to effect at least 4 building foundations (41 Atlantic, Vining at 20 Atlantic, France de graphic immediately east of Vining, and Spaulding and Sly at 36 Cabot Road) and possibly 2 other building foundations south Vining and France de graphic buildings (building immediately south of Vining and de graphics buildings, and large building at the western side of 110 Commerce Way). I'll fax you a map of the site identifying the location of the building foundations.

I would like to know if ISRT is willing to collect one soil gas samples under each building foundation above the groundwater plume (via drilling a hole through the foundation, and collecting the soil gas sample immediately below the foundation), analyze the samples for benzene and toluene, conduct tier 2 data validation, and submit the data to EPA (electronically), so we can evaluate an indoor air risk to individuals working in each buildings. It is estimated that up to 6 soil gas samples would be collected (one per foundation), plus any QA/QC samples. Otherwise, EPA will model an indoor air concentration from the shallow groundwater data.

I would like to discuss this request with you further, as well as potential schedule for data collection, analysis, validation and submission. I would like to have the data by the middle of August, or so.

Sincerely,

Joe LeMay

**INDUSTRI-PLEX SUPERFUND SITE
SUB-SLAB SAMPLING GUIDELINE
DRAFT - November 3, 2003**

Background

Industri-Plex Operable Unit 1 (OU-1) 1987 ROD and 1989 Consent Decree identified groundwater plume hotspots of toluene and benzene contamination at the Site, and established an interim groundwater remedy to address the hotspots. No other VOCs were identified as hotspot contaminants of concern at that time. The 1987 ROD described the Multiple Source Groundwater Response Plan (i.e. OU-2) as an RI/FS to establish a comprehensive/final groundwater solution for the Site, as well as address any metals migrating from the site (e.g. groundwater, surface water and sediments) posing an unacceptable risk. As EPA proceeds with the OU-2 risk assessment, the potential migration of vapors from the underlying toluene and benzene groundwater hotspots through the vadose zone and entering buildings needs to be evaluated for possible current and future human health risks.

In 2000 - 2002, the PRPs completed extensive groundwater sampling to evaluate extent of benzene and toluene groundwater contamination, as well as detailed investigations to locate the sources of contamination for these groundwater hotspots (e.g. magnetometer studies, soil gas sampling, and concentrations groundwater sampling). Refer to the attached Final GSIP groundwater transect figures and data tables prepared by Maverick Construction Management, Inc. The results indicate that the toluene and benzene hotspots remain on the site at relatively the same locations identified in the previous Remedial Investigation (1984) and GSIP Phase 1 and 2 investigations (1990 and 1991).

A majority of the groundwater contamination appears to be located within the deeper portions of the overburden aquifer. Generally, the locations of these groundwater hotspot source areas are as follows: 1) Benzene and to a lesser extent toluene plumes from the western half of Atlantic Avenue southwest to the northern portion of Halls Brook Holding Area (HBHA) Pond by 36 Cabot Road, including the Boston Edison ROW; 2) Toluene and to a lesser extent benzene plumes by the intersection of Atlantic Avenue and Commerce Way; and 3) Benzene plume by the West Hide Pile.

In the absence of sub-slab or indoor air sampling, EPA would typically conservatively estimate indoor air VOC concentrations by modeling VOC concentrations from shallow groundwater and soil (through the vadose zone) to the sub-slab, and from the sub-slab to the basement/ first floor. This modeling approach estimates indoor air VOC concentrations that can be applied to current and future human health risk assessment exposure scenarios.

Historically, EPA has collected indoor air samples and applied the analytical results to human health risk assessments. However, interferences can occur with this direct indoor air sampling approach from other potential VOC sources inside the building, making it very difficult to distinguish the subsurface groundwater/soil VOC contamination contribution from other VOC sources inside the building.

Considering the above, on June 18, 2003, I requested ISRT to collect sub-slab soil gas samples from existing buildings above the underlying shallow benzene and toluene groundwater plumes. See attached email and map. The sub-slab soil gas data would be applied to assess current and future indoor air human health risks. The data would be considered representative of VOC concentrations which could migrate from shallow groundwater, through the vadose zone, and potentially be present underneath the sub-slab/ foundation.

The following is a summary of the data necessary to evaluate current and future indoor risks. Note: this summary supplements the June 18, 2003, email.

Current Risks Inside Buildings: Collect sub-slab soil gas samples via summa canisters at buildings potentially impacted by VOCs from underlying shallow groundwater hotspots; collect sufficient QA/QC samples to appropriately validate the data. See below the "Summa Canister VOC Air Sampling and Analytical Methodology" for a description of QA/QC sampling. The sub-slab soil gas data from these buildings will be modeled to estimate indoor air concentrations and calculate current risks inside these structures.

Future Risks Inside Buildings: Presuming the data is of sufficient quality, utilize the soil gas data collected above the shallow groundwater hot spot plumes under the previous source areas investigation, in conjunction with sub-slab soil gas data, to estimate future indoor risks. The soil gas data from these areas will be modeled to estimate indoor air concentrations and calculate future risks inside structures potentially constructed in the future.

ISRT has responded in the affirmative to collect these sub-slab soil gas samples (i.e. one sample per building foundation at 6 buildings above the benzene and toluene plumes). This document serves as guidelines for sampling procedures for the sub-slab sampling. ISRT should follow this and other referenced EPA guidelines for soil gas sampling and summa canister sampling. This guideline incorporates sub-slab summa canister sampling procedures previously conducted by EPA at the Raymark Superfund Site. EPA's Office of Research and Development (ORD) is in the process of developing a standard QAPP for sub-slab floor air sampling. However, it is unknown when this QAPP will be completed and made publicly available. As a result, this SOP was prepared to help guide the sub-slab sampling effort. Should EPA ORD complete a final QAPP for sub-slab sampling, EPA will be forwarded a copy to ISRT.

Currently, EPA's contractor, Metcalf & Eddy (M&E), is in the process of preparing a baseline

risk assessment for the area north of Route 128, known as the Industri-Plex Study Area. The sub-slab soil gas samples should be collected as soon as possible to support the baseline risk assessment. A specific sample location within each building shall be approved by EPA prior to sampling. Considerations for selecting the sample locations shall include proximity to prior soil gas and groundwater sample locations conducted under previous investigations, location of sub-slab utilities, and potential interference with building tenant operations. In addition, ISRT should also consider adding 130 Commerce Way building foundation (northwest corner of Commerce Way and Atlantic Avenue Intersection) as an additional sub-slab sampling location. Note: the foundation has a long 1 inch wide crack in the foundation located on the east side of the building.

* **Objective**

Collect sub-slab soil gas grab samples via summa canister from buildings situated above toluene and/or benzene groundwater hot spots at/adjacent to the Industri-Plex Superfund Site, analyze the samples for VOCs at qualified laboratory, and validate the analytical results so the data can be applied the human health risk assessment. The purpose of the samples is to evaluate the current and future human health risks from the volatilization and migration of groundwater contamination through the vadose zone and into the buildings.

* **Reporting**

A summary report shall be prepared describing the location, collection procedures of each sample, and summarize the analytical results in tabular form. The laboratory shall prepare the analytical results in a spreadsheet format (e.g. excel), which shall be electronically provided as soon as possible. The analytical data shall undergo Tier III data validation so it can be applied to the human health risk assessment. The summary report, electronic analytical results, and data validation reports shall be submitted to EPA and DEP as soon as possible (copies should also be submitted to EPA's contractor's Sean Czarniecki, Metcalf & Eddy and Gordon Bullard, TtNUS).

Sub-Slab Vapor Probe Construction

A hammer drill should be used to drill a 1.2 inch diameter hole through the concrete slab for installation of sub-slab vapor probes. Once through the concrete slab, a annular space shall be created approximately 3 inches into sub-slab materials so a vapor sample probe can be installed. There are two options for creating this annular space: 1) Drill bits could be advanced approximately 3 inches into sub-slab materials to create open cavities; or 2) a slam bar could be used to drive a solid rod into the soil and withdrawn to create an annular space.

If drilling is selected, care should be taken to avoid bring drill cuttings from the sub-slab materials to the surface of the slab. Otherwise, these cuttings will need to be appropriately managed and disposed. The sample probe is then installed in the hole and the top of the hole is properly sealed (e.g. modeling clay) around the sample probe. It is very important to establish a tight seal around the hole and probe so that ambient/indoor air will not be introduced into the sample. Otherwise, the sample may not be representative.

Summa Canister VOC Air Sampling and Analytical Methodologies

1.0 Description

EPA Region I Standard Operating Procedure for the Sampling of Trace Volatile Organic Compounds using SUMMA Polished Stainless Steel Canisters, EPA-REG1-ESD/CAN-SAM-SOP, March 2001, Revision 2, may used to collect air samples. Soil gas grab samples shall be collected in evacuated 6 liter canisters using the procedure described in Part 1 of the Region I SOP, referenced above. Detailed descriptions of the quality assurance procedures are outlined below in Section 3.0.

The soil gas sample should be collected as grab for approximately two minutes. A particulate filter should be used to prevent solid material from entering the canister. The canister is initially at a vacuum of approximately minus 30 inches of mercury (-30" Hg). After the canister valve is opened, the sampled air is drawn into the canister until the canister pressure reaches atmospheric pressure. The laboratory should document the canister's pressure prior to leaving the laboratory. Prior to the sampling, the contractor should record the pressure of the canister in the field. If the canister has a significant difference in pressure (within -5" Hg), suggesting canister leakage, the canister should not be used for sampling. At the conclusion of the sampling, the contractor should document the pressure of the canister in the field. Upon the laboratory's receipt of the canister, the laboratory shall measure and record the pressure of the canister. These pressure measurements will help evaluate the integrity of the canister/sample, and provide assurance that no leakage has occurred to the canister during transit.

The soil gas canister grab samples should be submitted to an experienced air-laboratory for analysis, properly logged in, and analyzed using a GC/MS following EPA Method TO15 - The Determination of Volatile Organic Compounds in Ambient Air using SUMMA Passivated Canister Sampling and Gas Chromatographic Analysis, from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA-600/4-84-041. This analytical procedure shall be used to identify and quantify the VOCs .

Prior to analyzing the canisters, each one will be pressurized with humidified nitrogen to 30 psig. Indoor air and soil gas concentrations are typically higher than outside ambient air, therefore, 50

milliliters are initially withdrawn from the canisters for analysis to determine if concentrations are within the calibration range. If the data shows the levels to be within the calibration range, the normal 500 milliliters will be withdrawn from the canisters for the second round of analysis. A 500-milliliter calibration standard is used to produce the calibration curve and with the 500-milliliter sample size from the canisters, a more accurate concentration and lower reporting limit can be reported. There may be cases where levels are extremely high, such as soil gas, therefore, smaller volumes are withdrawn from the canister or a series of dilutions made to bring concentrations within the calibration range

2.0 Canister Cleaning and Leak Certification Procedures

2.1 Laboratory Clean and Lead Free Canister Certification

The canisters must be obtained from an experienced-air laboratory. A 100 percent certification (or individual certification) should be requested from the laboratory providing clean and leak-free Summa canisters. The certificate documentations must demonstrate that **ALL** the canisters are free of VOC target compounds by EPA Method TO-15, down to the project reporting limits.

The canisters must have been checked for mechanical integrity. However, every canister must be checked at the site and the initial vacuum recorded. The initial vacuum must be greater than 25" Hg. If vacuum is below 25" Hg, the canister should not be used.

The canisters must be used within 30 days of cleaning.

* 2.2 Canister Cleaning and Leak Certification Procedures

2.2.1 Canister Cleaning Procedure

Prior to the sampling event, all the canisters will be cleaned by placing them in ovens maintained at 150°C, evacuated to at least 10^{-3} Torr, and then pressurized with humidified nitrogen to approximately 30 psig. This process will be repeated three times. Detailed descriptions of these procedures are provided in the document entitled, "Canister Cleaning Standard Operating Procedures, EPA-REG1-OEME/CANISTER-CLEANING-SOP, April 1998, Revision 2."

2.2.2 Canister Leak Certification Procedure

At the end of the cleaning process described above, the canisters will be evacuated to less than 10^{-3} Torr, with a Pirani sensor the vacuum in each canister will be measured. The canisters will then be placed on a shelf for at least 24 hours. At the conclusion of this period, the Pirani sensor will be used again to measure the final canister vacuum which will then be compared to the initial reading to determine if the canisters show signs of leaking. Detailed descriptions of these

procedures are provided in the document entitled, "Canister Leak Certification Standard Operating Procedures, EPA-REG1-OEME/ CANISTER-LEAK-CERT-SOP, April 1998, Revision 2."

2.2.3 Canister Cleanliness Certification Procedure

After all the canisters are certified leak free, each canister will be pressurized with humidified nitrogen and then analyzed for contamination using the same GC/MS used for the sample analysis. Detailed descriptions of these procedures are provided in the document entitled, "Pressurized Canisters for Clean Certification Standard Operating Procedures, EPA-REG1-OEME/CANISTER-PREP-SOP, April 1998, Revision 2."

Canisters are stored under pressure until a few days before the sampling event, when they will be re-evacuated to less than 10^{-3} Torr. Detailed descriptions of these procedures are provided in the document entitled, "Canister Evacuation Standard Operating Procedures, EPA-REG1-OEME/CAN-VACUATION-SOP, May 1996."

3.0 VOC Canister Analysis Quality Control/Quality Assurance

3.1 Canister Sampling and Analysis Performance Criteria

The canisters shall be analyzed for volatile organic compounds (VOC). The primary VOC of interest for this particular project are benzene and toluene. The reporting limit for these primary compounds must be provided by the laboratory prior to sampling. These reporting limits must be within acceptable levels to accomplish the data quality objectives. Table 1 illustrates some of the VOC target compound list, including benzene and toluene.

3.2 Laboratory Blank Results

Humidified nitrogen shall be introduced into the analytical instrument inlet line prior to analyzing the canisters to serve as a laboratory blank. A laboratory blank shall be analyzed to determine the background contamination present in the analytical instrumentation before sample analysis. The laboratory blank must not contain any target VOC compound at concentrations equal or above the quantitation limits. Acceptable blank criteria must be met before sample analysis.

The laboratory blank results shall be submitted in the Laboratory Analytical Report.

* 3.3 Data Reproducibility/ Precision Procedures

For each batch of canisters analyzed (up to 10 canisters/ batch), one canister shall be analyzed a second time for assessing analytical precision. The same sample aliquot shall be withdrawn from the canister and analyzed in a similar manner. Those compounds having values above their reporting limits shall be reported in tables at the end of the Laboratory Analytical Report. The relative percent differences (RPD) shall also be calculated and reported in the Laboratory Analytical Report. The RPD should be less than the 30% acceptance criterion for precision.

3.4 Laboratory Fortified Canister

A quality control canister sample containing selected VOCs at known concentrations shall be analyzed with the canister samples to determine analytical accuracy. The results of the observed concentrations shall be reported in a table at the end of the Laboratory Analytical Report. The percent difference must be within 90 percent for the VOC compounds except for the polar compounds that may be within 40 percent.

3.5 Canister Surrogate Spike Results

Prior to analyzing each canister sample, surrogate compounds (e.g. 1,2 dichloroethane,d4, toluene d8, and p-bromofluoro-benzene) shall be added to the analytical system. The percent recovery data for the surrogate compounds shall be reported with the sample data. The percent recovery must be within 70-130 percent.

3.6 Chain of Custody

Chain of custody documentation shall be completed by the contractor.

3.7 Data Validation and Usability

A complete data package deliverables is required (including summary forms and raw data) in order to perform data validation. The analytical reports shall be validated by the independent contractor who is experienced and routinely performs data validation work consistent with Tier III data validation level according to EPA Region 1- validation procedures. The data reported by the laboratory shall be compared to the data quality performance criteria to evaluate data usability. The independent contractor shall prepare a data validation and usability report for all the data collected under this project.

TABLE 1

PROJECT TARGET COMPOUND LIST

COMPOUND	EPA METHOD TO-15 REPORTING LIMITS (Approximate)	
	(ug/m ³)	(ppb)
Benzene	0.15	0.05
Toluene	0.18	0.05
1,1-Dichloroethene	0.19	0.05
Vinyl Chloride	0.12	0.05
Trichloroethene	0.24	0.05
Chlorobenzene	0.21	0.05
1,1,1-Trichloroethane	0.26	0.05

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

STANDARD OPERATING PROCEDURE
SAMPLING VOLATILE ORGANIC COMPOUNDS USING
SUMMA® POLISHED STAINLESS STEEL CANISTERS

U.S. ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGIONAL LABORATORY
OFFICE OF ENVIRONMENTAL MEASUREMENT & EVALUATION
11 TECHNOLOGY DRIVE
NORTH CHELMSFORD, MASSACHUSETTS 01863

CONTENTS

SCOPE AND APPLICATION.....	1
TABLE 1 - SELECTED VOCs USING THE CANISTER METHOD.....	2
PART 1 - CANISTER GRAB SAMPLING PROCEDURES	
1.1 CANISTER GRAB SAMPLING EQUIPMENT.....	3
1.2 CANISTER GRAB SAMPLING PROCEDURES.....	3
FIGURE 1 - GRAB AIR SAMPLER CONFIGURATION.....	4
PART 2 - CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING PROCEDURES	
2.1 CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING EQUIPMENT.....	6
FIGURE 2 - SUBATMOSPHERIC TIME-INTEGRATED AIR SAMPLER CONFIGURATION.....	7
2.2 CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING PROCEDURES.....	8
PART 3 - CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING PROCEDURES	
3.1 CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING EQUIPMENT.....	10
FIGURE 3 - PRESSURIZED TIME-INTEGRATED AIR SAMPLER CONFIGURATION.....	12
3.2 CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING PROCEDURES.....	13

CONTENTS

PART 4 - QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES AND PERFORMANCE CRITERIA

4.1	FLOW CONTROLLER CALIBRATION.....	15
4.1.1	Flow Rate Determination.....	16
4.1.2	Subatmospheric Canister Laboratory and Field Flow Controller Calibration Procedures.....	17
4.1.3	Subatmospheric Canister Field Flow Controller Post Sampling Flow Check Procedures.....	18
4.1.4	Pressurized Canister Laboratory and Field Flow Controller Calibration Procedures.....	19
4.1.5	Pressurized Canister Field Flow Controller Post Sampling Flow Check Procedures.....	20
4.2	FIELD/TRIP BLANK.....	21
4.3	CANISTER STORAGE.....	21
4.4	CANISTER TRANSPORT.....	22
4.5	CHAIN-OF-CUSTODY.....	22
4.5.1	Chain-of-Custody Record Form.....	22
4.6	DATA REPORTING.....	22

APPENDIX

Appendix A - Chain-Of-Custody Forms.....	23
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SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures utilized by EPA Region I ESD for sampling of 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 ESD Laboratory. The ESD Laboratory analytical operating procedures for the GC/MS are described under separate cover in SOP document, AIRCAN6.SOP.

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 subatmospheric 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 subatmospheric pressure canisters. The organic compounds that have been successfully collected in canisters by this method are listed on table 1. These compounds have been measured at the parts per billion by volume (ppbv) level.

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 work plan is prepared for each project. The sampling work plan will incorporate the procedures specified in the following SOP document.

This document is divided into four parts. Part 1 describes the grab sampler configuration and sampling procedures, Part 2 the subatmospheric time-integrated sampler configuration and sampling procedures, Part 3 the pressurized time-integrated sampler configuration and sampling procedures, and Part 4 describes the quality assurance/quality control procedures and performance criteria.

TABLE 1 - EPA METHOD TO15 TARGET VOC LIST

Propylene
Dichlorodifluoromethane (F12)
Chloromethane (Methyl Chloride)
1,2-Dichloro-1,1,2,2-Tetrafluoroethane (F114)
Vinyl Chloride
1,3-Butadiene
Methyl Bromide (Bromomethane)
Chloroethane
Acetone
Trichlorofluoromethane
Isopropyl Alcohol
1,1-Dichloroethylene
Methylene Chloride
Carbon Disulfide
1,1,2-Trichloro-1,2,2-Trifluoroethane (F113)
trans-1,2-Dichloroethene
1,1-Dichloroethane
Methyl-t-butyl ether
Methyl Ethyl Ketone
cis-1,2-Dichloroethene
Hexane
Chloroform
Ethyl Acetate
Tetrahydrofuran
1,2-Dichloroethane
1,1,1-Trichloroethane
Benzene
Carbon Tetrachloride
Cyclohexane
1,2-Dichloropropane
Bromodichloromethane
Trichloroethene
Heptane
cis-1,3-Dichloropropene
Methyl Isobutyl Ketone
trans-1,3-Dichloropropene
1,1,2-Trichloroethane
Toluene
2-Hexanone
Dibromochloromethane
1,2-Dibromoethane
Tetrachloroethene
Chlorobenzene
Ethyl Benzene
m,p-Xylene
Styrene
1,1,2,2-Tetrachloroethane
o-Xylene
4-Ethyl Toluene
1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
Chloromethylbenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
1,2,4-Trichlorobenzene
Hexachlorobutadiene

PART 1

CANISTER GRAB SAMPLING PROCEDURES

1.1 CANISTER GRAB SAMPLING EQUIPMENT

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

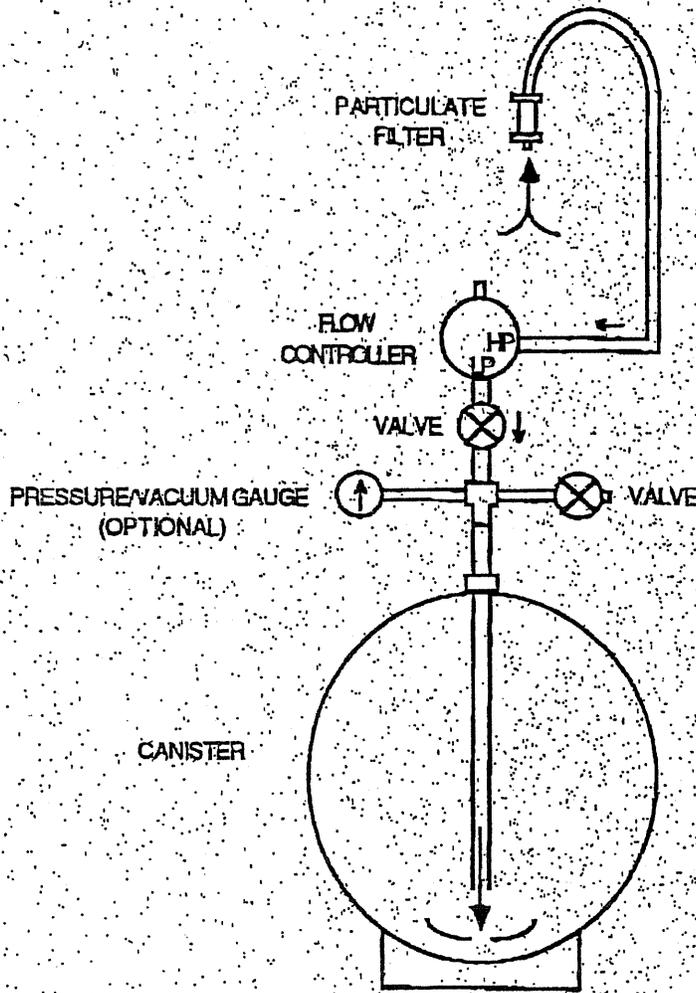
- Sampling Inlet Line - chromatographic-grade stainless steel tubing to connect canister to sample inlet.
- Sample Canister - certified clean and leak free stainless steel pressure vessels of desired volume with valve and SUMMA_ passivated or Silco lined interior surfaces (Scientific Instrumentation 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.
- Vacuum/Pressure Gauge - if a vacuum/pressure gauge is not attached to canister, a separate gauge is connected to check vacuum/pressure readings before and after sampling event.
- Particulate Matter Filter - 2 micrometer stainless steel in-line filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.
- Chromatographic-grade Stainless Steel Tubing and Fittings for Interconnections - all material in contact with sample, analyte, and support gases should be chromatographic-grade stainless steel.
- Canister Shipping Containers - Sheet metal container holds two 15 liter canisters to protect canisters and valves from becoming damaged during shipment.

1.2 CANISTER GRAB SAMPLING PROCEDURES

1. Configure the sampler as shown in Figure 1 using the components described in Section 1.1.
2. 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.
3. If a vacuum/pressure gauge is attached, open valve, read the gauge, and then close the valve.
4. Connect the 2 micrometer particulate matter filter and sampling line to the canister inlet as shown in Figure 1.

FIGURE 1

GRAB AIR SAMPLER CONFIGURATION



EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

5. 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.
6. 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.
7. Close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.**
8. Disconnect the 2 micrometer particulate matter filter from the canister inlet.
9. 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.
10. If a vacuum/pressure gauge is attached, open valve, read the gauge, and then close the valve.
 11. In a field log book record the final canister pressure gauge reading and the meteorological conditions during the sampling event.
 13. Place canister into shipping container.
 14. Complete chain-of-custody record form. See Part 4.

PART 2

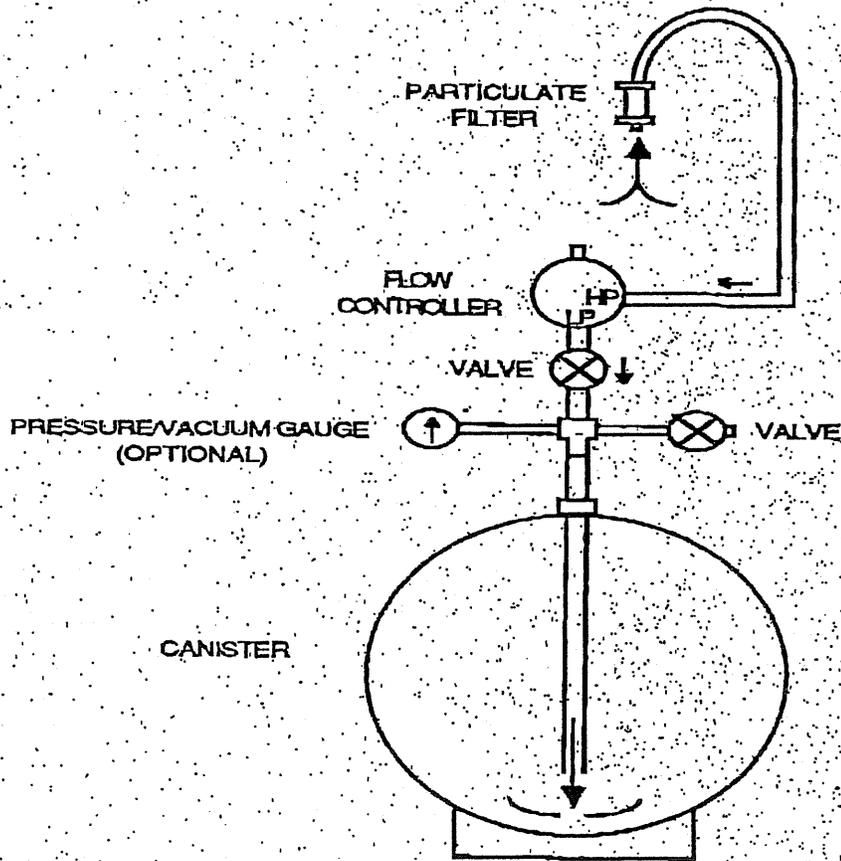
CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING PROCEDURES

2.1 CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING EQUIPMENT

See Figure 2 for a diagram of the subatmospheric time-integrated sampling system.

- Sampling Inlet Line - chromatographic-grade stainless steel tubing to connect canister to sample inlet.
- Sample Canister - certified clean and leak free stainless steel pressure vessels of desired volume with valve and SUMMA passivated or Silco Lined interior surfaces (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.
- Vacuum/Pressure Gauge - if a vacuum/pressure gauge is not attached to canister, a separate gauge is connected to check vacuum/pressure readings before and after sampling event.
- Particulate Matter Filter - 2 micrometer stainless steel in-line filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.
- Chromatographic-grade Stainless Steel Tubing and Fittings for Interconnections - all material in contact with sample, analyte, and support gases should be chromatographic-grade stainless steel.
- Flow Controller - Millaflow Controller, model SC423SXFT/B or equivalent; a mechanical flow controller made of stainless steel, having a flow range of 5 - 500 ml/min.
- Mass Flowmeter - An Aalborg Electronic Mass Flowmeter (Model GFM-1700) is used to calibrate the flow controller. The mass flowmeter measures flow rates between 0 - 500 ml/min. within $\pm 1.5\%$ full scale.
- Canister Shipping Containers - Sheet metal container holds two 15 liter canisters to protect canisters and valves from becoming damaged during shipment.

FIGURE 2
SUBATMOSPHERIC TIME-INTEGRATED AIR SAMPLER
CONFIGURATION



2.2 CANISTER SUBATMOSPHERIC TIME-INTEGRATED SAMPLING PROCEDURES

1. In the laboratory, prior to the sampling event, calibrate the flow controller using the procedure outlined in Section 4.1.2. **Note: For this procedure use an evacuated dummy canister.**
2. In the field, before placing the sampler at the desired sampling location, check the calibration of the flow controller using the procedure outlined in Section 4.1.2. **Note: For this procedure use an evacuated dummy canister.**
3. 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.
4. Connect the sample inlet line with particulate matter filter to the flow controller's high pressure inlet port (HP) and the low pressure outlet port (LP) to the canister inlet port as shown in Figure 2 using the components described in Section 2.1.
5. 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.
6. 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.
7. 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. If the no vacuum/pressure gauge is being used, connect the Aalborg Electronic Mass Flowmeter and check the flow rate, adjust if necessary.
8. 45 to 30 minutes before the end of the sampling period, visit each sampling location and obtain a flow rate reading using the procedure outlined in Section 4.1.3.

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

9. At the conclusion of the predetermined sampling period, return to each sampling location and close the canister valve. **DO NOT OVER-TIGHTEN THE VALVE.** Disconnect the sample inlet line with particulate matter filter from the flow controller and the flow controller 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 in the field log book. **Note: The gauge reading obtained in this step and in step 3 should agree with the predetermined final canister pressure used in the calculations described in Section 4.1.1. This step will help determine if the sample had been collected at a constant rate over the sampling period.**
10. Place canister into shipping container.
11. 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. Complete chain-of-custody record form. See Part 4.

PART 3

CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING PROCEDURES

3.1 CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING EQUIPMENT

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

- Sampling Inlet Line - chromatographic-grade stainless steel tubing to connect canister to sample inlet.
- Sample Canister - certified clean and leak free stainless steel pressure vessels of desired volume with valve and SUMMA_ passivated or Silco lined interior surfaces (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.
- Vacuum/Pressure Gauge - if a vacuum/pressure gauge is not attached to canister, a separate gauge is connected to check vacuum/pressure readings before and after sampling event.
- Particulate Matter Filter - 2 micrometer stainless steel in-line filter (Nupro Co., Model SS4F-2, or equivalent) is attached to sample inlet line.
- Chromatographic-grade Stainless Steel Tubing and Fittings for Interconnections - all material in contact with sample, analyte, and support gases should be chromatographic-grade stainless steel.
- Flow Controller - Millaflow Controller, model SC423SXFT/B, a mechanical flow controller made of stainless steel, having a flow range of 5 - 500 ml/min.
- Mass Flowmeter - An Aalborg Electronic Mass Flowmeter (Model GFM-1700) is used to calibrate the flow controller. The mass flowmeter can measure flow rates between 0 - 500 ml/min. within $\pm 1.5\%$ full scale.
- Sample Pump - SIS stainless steel/viton diaphragm vacuum pump/compressor, model NO5SV, with a current draw at max load of 1.1 amps.
- Batteries - 2 Technacell rechargeable solid-gel cell 6 volt, 12 ampere hour batteries connected in series to produce 12 volts.
- Power Supply - Micronta regulated 12 volt power supply, converts 120VAC to 12VDC

EPA-REG1-ESD/CAN-SAM-SOP

MARCH 2001

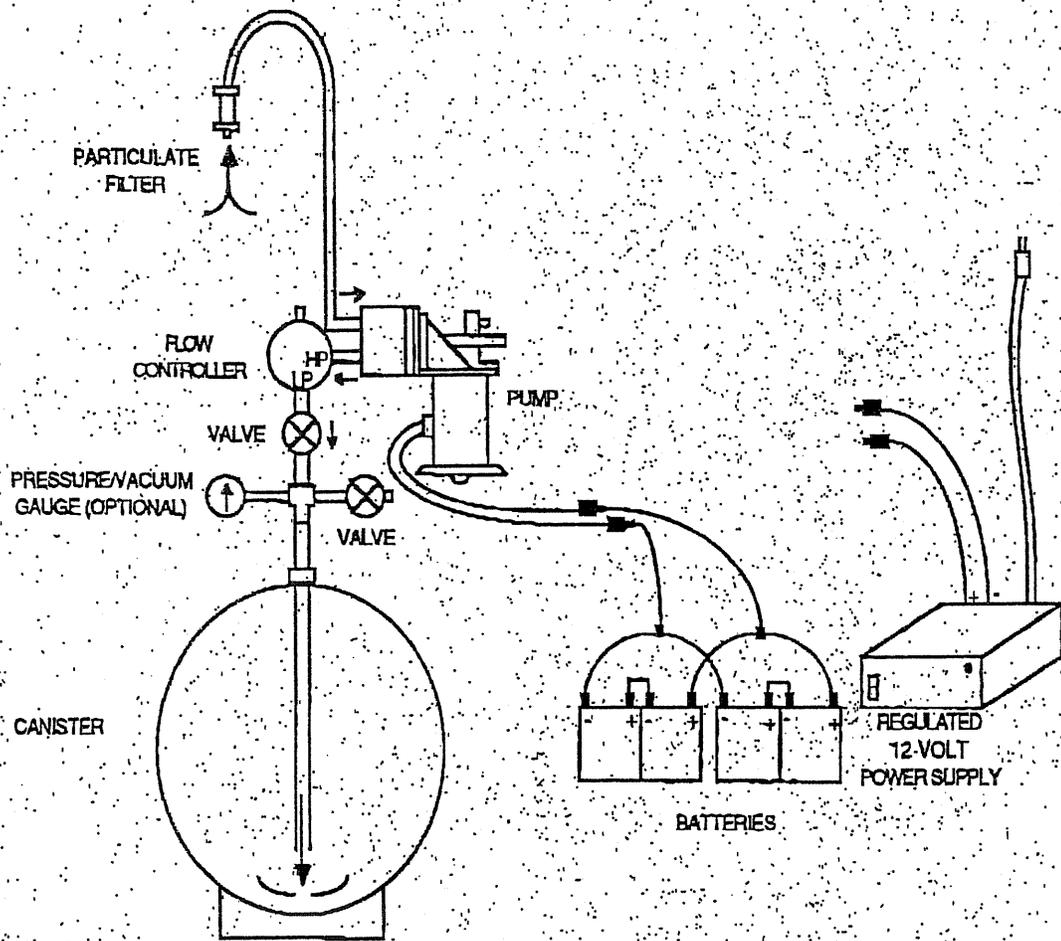
REVISION 2

- Sampler Carrying Case - Pelican Products, Inc. Pro Case houses and protects the sampling pump, batteries, and power supply.

- Canister Shipping Containers - Sheet metal container holds two 15 liter canisters to protect canisters and valves from becoming damaged during shipment.

FIGURE 3

PRESSURIZED TIME-INTERGRATED AIR SAMPLER CONFIGURATION



3.2 CANISTER PRESSURIZED TIME-INTEGRATED SAMPLING PROCEDURES

1. In the laboratory, prior to the sampling event, calibrate the flow controller using the procedure outlined in Section 4.1.4. **Note: For this procedure use an evacuated dummy canister.**
2. In the field, before placing the sampler at the desired sampling location, check the calibration of the flow controller using the procedure outlined in Section 4.1.4. **Note: For this procedure use an evacuated dummy canister.**
3. Select the canister and sampler 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 the value and canister number in a field log book.
4. 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.
5. 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.
6. 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.
7. 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. If the no vacuum/pressure gauge is being used, connect the Aalborg Electronic Mass Flowmeter and check the flow rate, adjust if necessary.
8. 45 to 30 minutes before the end of the sampling period, visit each sampling location and obtain a flow rate reading using the procedure outlined in Section 4.1.5.
9. 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

EPA-REGI-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

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 3 should agree with the predetermined final canister pressure used in the calculations described in Section 4.1.1. This step will help determine if the sample had been collected at a constant rate over the sampling period.**

10. Place canister into shipping container.
11. 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. Complete chain-of-custody record form. See Part 4.

PART 4

QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES
AND
PERFORMANCE CRITERIA

4.1 FLOW CONTROLLER CALIBRATION

The canister sampling system uses a Millaflow flow controller, model SC423SXFT/B or equivalent to regulate the flow of sample entering the canister over the desired sample period. The flow controller is calibrated using an Aalborg Electronic Mass Flowmeter (Model GFM-1700) capable of measuring flow rates between 0 - 500 ml/min. within $\pm 1.5\%$ full scale. Laboratory and field pre-sampling event calibration procedures for subatmospheric and pressurized canister samples are described in Sections 4.1.2 and 4.1.4, respectively. The post sampling event flow rate check procedures for subatmospheric and pressurized canister samples are described in Sections 4.1.3 and 4.1.5, respectively.

4.1.1 FLOW RATE DETERMINATION

Flow rates are determined based on the duration of the sampling event and whether subatmospheric 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
= $\frac{\text{gauge pressure (psig)} + 14.7 \text{ psi}}{14.7 \text{ psi}}$

V = volume of canister (ml)

T = sampling period (hours)

For example, if a 15 liter canister is to be pressurized to 26 psig in 8 hours, the flow rate should be calculated as follows:

$$\begin{aligned} \text{Flow Rate (ml/min)} &= \frac{(26 \text{ psig} + 14.7 \text{ psi}) \times 15,000 \text{ ml}}{14.7 \times 8 \text{ hours} \times 60 \text{ min}} \\ &= \frac{2.8 \text{ atmospheres absolute} \times 15,000 \text{ ml}}{480 \text{ min}} \\ &= 88 \text{ ml/min} \end{aligned}$$

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

If a subatmospheric sample is to be collected in a 15 liter canister over an 8 hour period the flow rate should be calculated as follows to achieve a final canister gauge pressure reading of 8 in. Hg vacuum:

$$\begin{aligned}\text{Flow Rate (ml/min)} &= \frac{(- 8 \text{ in. Hg} + 29.92 \text{ in. Hg}) \times 15,000 \text{ ml}}{29.92 \text{ in. Hg} \times 8 \text{ hours} \times 60 \text{ min}} \\ &= \frac{0.73 \text{ atmospheres absolute} \times 15,000 \text{ ml}}{480 \text{ min}} \\ &= 23 \text{ ml/min}\end{aligned}$$

4.1.2 Subatmospheric Canister Laboratory and Field Flow Controller Calibration Procedures

1. On the inlet side of the Aalborg Electronic Mass Flowmeter (Model GFM-1700) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flowmeter.
2. Power up the Aalborg Electronic Mass Flowmeter (Model GFM-1700) by connecting it to the power supply. Note: The meter must be warmed up for a minimum of 15 minutes prior to taking readings.
3. Using an insulated screwdriver through the ZERO (lower) access window adjust the trim potentiometer until the display reads zero.
4. Configure the sampler as shown in Figure 2 using the components described in Section 2.1. Connect the sample inlet line with particulate matter filter to the flow controller's high pressure inlet port (HP) and the low pressure outlet port (LP) to an evacuated canister. Note: This canister will serve as a dummy canister for calibrating all the flow controllers to be used during the sampling event.
5. Connect the flowmeter to the sample inlet making sure the "FLOW ARROW" marked on the flowmeter is pointing in the right direction.
6. In a field log book record the project name, calibration date, and flow controller number.
7. Open the canister valve to allow a sample of room air or

EPA-REG1-ESD/CAN-SAM-SOP

MARCH 2001

REVISION 2

clean/background ambient air to be drawn through the flowmeter and into the canister. The canister pressure differential causes the sample to flow into the canister.

8. Observe the mass flowmeter reading and adjust the micrometering 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 4.1.1 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.
9. Close the canister valve. DO NOT OVER-TIGHTEN THE VALVE.
10. Turn off (unless it will be used for further calibrations) and disconnect the Aalborg Electronic Mass Flowmeter from the sample inlet.
11. Disconnect the sample inlet line with particulate matter filter from the flow controller and the flow controller from the canister.
12. Place flow controller in appropriate carrying case.

4.1.3 Subatmospheric Canister Field Flow Controller Post and During Sampling Flow Check Procedures

1. On the inlet side of the Aalborg Electronic Mass Flowmeter (Model GFM-1700) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flowmeter.
2. Power up the Aalborg Electronic Mass Flowmeter by connecting it to the power supply. Note: The meter must be warmed up for a minimum of 15 minutes prior to taking readings.
3. Using an insulated screwdriver through the ZERO (lower) access window adjust the trim potentiometer until the display reads zero.
4. Connect the flowmeter to the sample inlet making sure the "FLOW ARROW" marked on the flowmeter is pointing in the right direction.

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

5. Observe the mass flowmeter reading. In a field log book record the date, sampling location, flow controller number, and flow rate reading.
6. Turn off (unless it will be used at another sampling location) and disconnect the Aalborg Electronic Mass Flowmeter from the sample inlet.
7. Place flow controller in appropriate carrying case.

4.1.4 Pressurized Canister Laboratory and Field Flow Controller Calibration Procedures

1. On the inlet side of the Aalborg Electronic Mass Flowmeter (Model GFM-1700) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flowmeter.
2. Power up the Aalborg Electronic Mass Flowmeter (Model GFM-1700) by connecting it to the power supply. Note: The meter must be warmed up for a minimum of 15 minutes prior to taking readings.
3. Using an insulated screwdriver through the ZERO (lower) access window adjust the trim potentiometer until the display reads zero.
4. Configure the sampler as shown in Figure 3 using the components described in Section 3.1. 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. Note: This canister will serve as a dummy canister for calibrating all the flow controllers to be used during the sampling event.
5. Connect the Aalborg Electronic Mass Flowmeter (Model GFM-1700) to the sampler inlet making sure the "FLOW ARROW" marked on the flowmeter is pointing in the right direction.
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.
7. Observe the mass flowmeter reading and adjust the

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

micrometering valve on the flow controller until the predetermined flow rate registers on the meter. In the field log book record the date, pump number, sampler number, and flow rate reading.

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

10. Turn off the pump and flowmeter (unless it will be used for further calibrations).

11. Disconnect the Aalborg Electronic Mass Flowmeter from the sample inlet.

12. Disconnect the sampler from the canister.

13. Place flow controller and sampler in their appropriate carrying case.

4.1.5 Pressurized Canister Field Flow Controller Post and During Sampling Flow Check Procedures

1. On the inlet side of the Aalborg Electronic Mass Flowmeter (Model GFM-1700) connect the 7 micrometer stainless steel Nupro Co. particulate filter supplied with the flowmeter.

2. Power up the Aalborg Electronic Mass Flowmeter (Model GFM-1700) by connecting it to the power supply. Note: The meter must be warmed up for a minimum of 15 minutes prior to taking readings.

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

4. Connect the Aalborg Electronic Mass Flowmeter (Model GFM-1700) to the sampler inlet making sure the "FLOW ARROW" marked on the flowmeter is pointing in the right direction.

5. Observe the mass flowmeter reading. In a field log book record the date, sampling location, sampler number (includes flow controller and pump number), and flow rate reading.

6. Turn off (unless it will be used at another sampling

location) and disconnect the Aalborg Electronic Mass Flowmeter from the sample inlet.

7. Place flow controller in appropriate carrying case.

4.2 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 ESD Laboratory prior to sample collection. The cleaning and leak certification procedures are described under separate cover in SOP document, EPA-REG1-OEME/CANISTER-CLEANING-SOP, Revision 2. This process eliminates the need to have field/trip blanks analyzed with canister samples.

4.3 CANISTER STORAGE

Canisters that have been certified clean and leak free by the ESD Laboratory are stored in a locked cabinet under pressure. Several days prior to the sampling event canisters are evacuated to their final canister pressure (10^{-3} TORR). After the sampling event and after being logged into the laboratory, the canister samples are stored in a locked cabinet. Two engineers from the Ambient Air and Emissions Monitoring Section responsible for collecting canister samples and a chemist from the Chemistry Section performing canister analyses have keys to the cabinet.

4.4 CANISTER TRANSPORT

Canisters are transported to the field and back to the laboratory in a SIS metal carrying case designed to carry two 15 liter canisters. The carrying case helps eliminate valves on the canisters from being inadvertently opened and/or damaged.

4.5 CHAIN-OF-CUSTODY

4.5.1 CHAIN-OF-CUSTODY RECORD FORM

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 A) at the completion of the sampling event:

Project/Site Name
Samplers Signature
Station Numbers
Date

EPA-REG1-ESD/CAN-SAM-SOP
MARCH 2001
REVISION 2

Station Location Description

Remarks: canister type (i.e. SIS, Andersen), canister size (i.e. 15, 6 liter), canister number, final canister gauge pressure reading, and any other pertinent information

The field engineer returns to the laboratory, stores the samples in the locked cabinet or on shelf in the hall outside the Air Calibration Room, and contacts a representative of the Chemistry Section 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 Chemistry representative, who also signs and enters the date/time on to the form.

4.6 DATA REPORTING

The field engineer prepares a final report after the laboratory has submitted its analytical report. The final report describes in detail the project's objective/purpose, the sampling and analytical procedures utilized, the quality/useability of the data generated, an interpretation of the results from an air quality impact perspective, and presents the air sampling data using a spread sheet.

APPENDIX A

CHAIN-OF-CUSTODY FORMS

Larry McTiernan

From: Rinaldi, Gerald M [gmrina@solutia.com]
Sent: Tuesday, November 18, 2003 10:34 AM
To: lemay.joe@epamail.epa.gov
Cc: Yare, Bruce S; Garcia, Jorge Y; carol.dickerson-env@astrazeneca.com; lmctiernan@rouxinc.com; rpentowski@stl-inc.com
Subject: RE: sub-slab guideline

As I promised in our 11/04/03 phone conversation, following are comments from the Industri-Plex Site Remedial Trust (ISRT) and its contractors re the subject final draft guideline, provided with your 11/03/03 e-mail (below) and reflecting changes to the preliminary draft which you provided during our 10/15/03 meeting at the Site.

Note: The ISRT intends to use Roux Associates for soil gas sampling and Severn Trent Laboratories (STL) for analytical support. An electronic version of STL's relevant Standard Operating Procedures (SOP) is attached for your information.

<<TO15 Volatile Org Cmpds in Ambient Air, rev3.pdf>>

Future Risks Inside Buildings, third paragraph, page 3: "A specific sample location within each building shall be approved by EPA prior to sampling." To satisfy this requirement, after receipt of EPA's response to these comments, the ISRT requests separate meetings at each building to be sampled among the owners, ISRT contractors (Roux and/or Maverick), and EPA's contractor (TTNUS) to reach agreement on precise locations before mobilization.

Sub-Slab Vapor Probe Construction, page 3: The ISRT's contractor Roux use a 1-inch drill as their standard procedure, versus 1.2 noted in this section.

Summa Canister VOC Air Sampling and Analytical Methodologies, pages 4 through 8:

1.0 Description, fourth paragraph: As their standard procedures, STL uses "Zero Air" instead of humidified nitrogen (this comment also applies to Sections 2.2.1 and 3.2) and calibration and sample volumes of 200 milliliters instead of 500 milliliters.

2.1 Laboratory Clean and Leak Free Canister Certification (note correction in section heading from "lead" to "leak"), first paragraph: In lieu of the 100 percent certification (or individual certification) as outlined, STL performs a batch certification on the canisters and provides certification in the final data packages. In addition, STL demonstrates that the canisters are free of VOC target compounds down to the lab reporting limits.

2.2.3 Canister Cleanliness Certification Procedure, second paragraph: STL evaluates whether the canister vacuum decreases below 30" Hg. If so, instead of being re-evacuated, the canisters are replaced.

3.1 Canister Sampling and Analysis Performance Criteria: Per this section, "the primary VOC [volatile organic compounds] of interest for this particular project are benzene and toluene." That is consistent with the Remedial and GSIP Investigations cited in the guideline and excerpts of which were included with your letter dated 11/04/03. Therefore, the soil gas sampling effort should target, and Table 1 should list, only benzene and toluene. In addition, TO-15 Reporting Limits in Table 1 are "off" by an order of magnitude; they should be: benzene: 1.59 ug/m³ and 0.5ppb; and toluene: 1.88 ug/m³ and 0.5 ppb.

3.4 Laboratory Fortified Canister: STL does not use "a quality control canister sample to determine analytical accuracy." Refer to Section 9.0 of STL's attached "SOP" for their quality control procedures for Method TO-15.

3.5 Canister Surrogate Spike Results: According to STL, no surrogates are included in TO-15 methodology.

Please let me know that these proposed modifications to your guideline are acceptable, after which we can proceed to schedule the sampling location meetings noted above.

G. M. (Jerry) Rinaldi - 1S
Solutia Inc.
575 Maryville Centre Drive
St. Louis, MO 63141
Phone 314-674-3312
Fax 314-674-8957
E-mail gmrina@solutia.com

-----Original Message-----

From: lemay.joe@epamail.epa.gov
Sent: Monday, November 03, 2003 4:35 PM
To: Rinaldi, Gerald M
Cc: Yare, Bruce S; bullardg@ttnus.com; anna.mayor@state.ma.us
Subject: sub-slab guideline

Jerry,

Since our October 15, 2003, meeting at the TOU Building, EPA has revised the draft Sub-Slab Sampling Guideline. Please find attached a final version dated November 3, 2003. In addition, I've attached EPA New England Laboratory's summa canister SOP, dated March 2001, which is referenced in the final guideline. I'll send you a hard copy of both documents in the mail.

I would also like George Garcia and/or your contractor conducting the work to coordinate with Gordon Bullard, TTNUS, at (978) 658-1245, regarding the sampling schedule. TTNUS may be providing some field oversight when they initiate the field work.

If you have any questions, please contact me at (617) 918-1323.

Joe-

(See attached file: sub-slab proposal WP. 11-03-03.wpd) (See attached file: Summa Cannister SOP 2. March 2001)

Larry McTiernan

From: lemaj.joe@epamail.epa.gov
Sent: Wednesday, November 26, 2003 3:53 PM
To: Rinaldi, Gerald M
Cc: Yare, Bruce S; carol.dickerson-env@astrazeneca.com; Garcia, Jorge Y; lmctiernan@rouxinc.com; rpentowski@stl-inc.com; bullardg@ttnus.com; diane.silverman@m-e.com; kahn.peter@epamail.epa.gov; anna.mayor@ttnus.com
Subject: RE: sub-slab guideline



TO15 Volatile Org
Cmpds in Amb...

Jerry,

Thank you for ISRT's detailed response to the sub-slab guideline. Your response has been reviewed by our personnel at EPA NE Laboratory and our contractors. I have also discussed the matter of 41 Atlantic further with the owner and our contractors. I have requested the owner research any records documenting the installation of a vapor/ moisture barrier under the foundation. Currently, I have not received a response from the landowner, however, the owner states they observed the installation of a barrier during construction.

An alternative approach to sub-slab drilling and sampling for 41 Atlantic may be as follows: Collecting soil gas samples adjacent to the building foundation below the slab at areas with high VOCs in groundwater. For 41 Atlantic, two soil gas samples should be collected at various locations along the southern side of the building (which has a eastern segment, closer to the East Central Hide Pile and Ganglani Property, and a western segment, closer to Atlantic Avenue). one sample should be collected along the center of the eastern segment by groundwater sample transect B3 # 6, which had shallow benzene at 87 ppb; and the other should be collected along the center/west of the western segment, closer to Atlantic Avenue and transect B5 #1, which had shallow benzene at 6,200 ppb. This approach would increase the number of samples from 1 to 2, but would avoid the drilling/ access issues and potential delays. I will fax you a drawing with approximate locations.

I have three responses to your 11/18 email below regarding the agency's sub-slab sampling guideline:

- 1) An EPA representative will go out with ISRT representatives and mark out all sampling locations prior to initiating the subslab sampling program.
- 2) In response to your request to only analyze the soil gas samples for benzene and toluene, I wanted to make sure you understand the approach for the risk assessment regarding indoor and outdoor air concentrations. For the risk assessment, we will be using shallow groundwater data (benzene, toluene and any other VOCs) that are not sampled for soil gas, to model indoor and outdoor air. Some of the groundwater data we have from the Final GSIP is comprehensive, including full VOC analysis. Where there is no soil gas data, we will use the shallow groundwater data (toluene, benzene and other VOCs) to model indoor and outdoor air concentrations for current and/or future risk evaluation. So absent the soil gas data, we will revert back to the shallow groundwater VOC data. Knowing the approach, ISRT's must determine the appropriate analysis for

the soil gas samples.

That being said, EPA's contractor has looked into the matter further. They have reviewed all the Final GSIP shallow groundwater VOC concentrations, and compared them to the MCP GW 2 groundwater standards. Excluding benzene and toluene, no shallow VOC concentrations are above the GW-2 standards. Hence, if EPA only had benzene and toluene soil gas data and had to model the other shallow VOC concentrations, then it is not believed that the modeled shallow VOC concentrations would promote an indoor/ outdoor air risk.

3) In response to your proposed reporting limit (RL), we have evaluated the proposed 0.5 ppbv RL further relative to risk calculations. The benzene 0.5 ppbv RL would be about 2-fold greater than the screening level EPA uses for selecting COPCs for indoor and outdoor air. This screening level corresponds to benzene cancer risk of $1E-06$. So non-detects at the 0.5 ppbv RL would correspond to a cancer risk of slightly greater than $2E-06$.

Considering this, EPA believes it can live with your proposed benzene RL at 0.5 ppbv.

EPA accepts all your other responses to the sub-slab guideline.

If you have any other questions, please contact me at (617) 918-1323. I will only need to know how you plan to analyze the soil gas samples under my response #2 (i.e benzene and toluene analysis, or full VOC analysis). Please coordinate directly with Gordon Bullard, TTNUS, (978) 678-1245 for marking out the sampling locations. Please move forward with the sampling, asap.

Thanks!

Joe-