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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

DATE: MAR 7 2007

SUBJECT: VIP Cleaners Site Final Report

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TO: Andrew Confortini, On-Scene Coordinator
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Attached please find the June and August 2006, vapor intrusion sampling report for the VIP Cleaners site in Morristown, Morris County, New Jersey. If you have any questions, please contact me at (732) 321-4423.

Attachment

SUPERFUND SUPPORT TEAM

SAMPLING REPORT

for the

VAPOR INTRUSION INVESTIGATION

at the

VIP CLEANERS SITE

in MORRISTOWN, MORRIS COUNTY, NEW JERSEY

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1.0 BACKGROUND

The VIP Cleaners site (site) is located at 89 Morris Street in Morristown, New Jersey. The site consists of a dry-cleaning facility and a plume of contaminated ground water. The facility was utilized for dry cleaning services by Caroline Laundry from the early 1940s until 1970, by VIP Cleaners from 1989 until 1996, by Milano French Cleaners from 1996 until 2000 and by New Image Cleaners and Tailoring from 2000 until the present. The former and current operators have used and continue to use chlorinated solvents, including tetrachloroethene (PCE) for dry cleaning operations at the facility. A map of the site location can be found as Appendix A.

The entire on-site building was occupied by the original owner, Caroline Laundry, whom performed common laundering as well as dry cleaning operations. Once they ceased operations, the building was divided for lease in 1970 to the aforementioned dry cleaners, a camera store, a lawnmower repair shop, auto repair shops, a computer store, hair salons, an auto detailing shop, a florist/garden center, a taxi and limousine service, an insurance sales office, a fish market, fitness facilities and a photography studio. The dry cleaning operations since 1989 have occupied the northern portion of the building only.

In February 1992, the property owner removed a 7000 gallon underground storage tank (UST) and its contents which was #6 heating oil. The tank had been located along the western side of the on-site building. The presence of a petroleum sheen on the ground water was found during the UST excavation. This prompted the New Jersey Department of Environmental Protection (NJDEP) to require the owner to install and sample a monitoring well at the location of the former UST. In September 1992, the property owner installed monitoring well, MW-1 adjacent to the former UST location.

Ground water samples were collected from MW-1 by the property owner in September 1992 and by NJDEP in June 1994. Both samples indicated the presence of PCE and some of its breakdown products, trichloroethene (TCE) and 1,2-dichloroethylene (DCE) at concentrations ranging from 58 to 300 μg/L. The depth to ground water in MW-1 was measured at 4 feet below ground surface in 1994 and the screen is located at 12 to 22 feet below ground surface.

There appears to be no further investigative work at the site between 1994 and 2005. In 2005, the U.S. Environmental Protection Agency (EPA)'s Region II Pre-Remedial Program requested a status update from NJDEP. EPA obtained permission from NJDEP to undertake an Expanded Site Inspection at the site. In November and December of 2005, EPA's Site Assessment Team (SAT) contractor employed a direct-push drilling method to collect soil and ground water samples at and in the vicinity of the site. This investigation revealed that contamination exists in the immediate vicinity of the on-site building and has migrated beneath at least one nearby property. The highest concentration of PCE was 18,000 μg/kg in the soil and 19,000 μg/L in the ground water. In addition,

the SAT contractor collected soil gas samples from the vicinity of the on-site building and beyond the site borders. Two of the eleven soil gas samples collected revealed PCE at 37.2 and 23.4 $\mu g/m^3$. The two soil gas samples were located in close proximity to the north end of the on-site building.

Based upon the unknown extent of the plume, the shallow depth to groundwater, the concentrations of chemicals in the groundwater and soil gas, and the location of residences in the vicinity of the site, the EPA has determined that a vapor intrusion investigation is necessary. The Division of Environmental Science and Assessment (DESA), Hazardous Waste Support Branch (HWSB), Superfund Support Team (SST) was requested by the Environmental Remedial and Response Division (ERRD) to conduct a vapor intrusion investigation at the VIP Cleaners site. The investigation included installation of sub-slab ports, sub-slab sample collection and indoor air collection from the main, on-site building only.

2.0 SAMPLING PROCEDURES

The sampling procedures were in accordance with the guidelines set forth in the Quality Assurance Project Plan (QAPP) which is located in Appendix B.

3.0 DESCRIPTION OF EVENTS

The vapor intrusion investigation began with the installation of sub-slab ports in the main, on-site building at 89 Morris Street, four residences and six businesses during the week of April 24 – 26, 2006. A sampling team consisted of three (3) members from the U.S. EPA, DESA, HWSB, SST began at 24 Pine Street in Morristown, New Jersey. The ports were installed according to REAC *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells* which can be found as Appendix D in the QAPP which is attached to this document as Appendix B. The ports were installed by inserting stainless steel tubing through a hole made into the lowest floor of the building. The port is placed approximately one inch below the concrete slab. The report is sealed with new concrete and left to set for twenty four hours. Table 1 on the following page describes the location of each port installed in April 2006. A sketch of each port location can be found as Appendix F.

Table 1 - Port Installations			
Building location		Type	Port Location(s)
24 Pine St.		Office (dentist)	NW side of basement
48 Pine St.		Residence	West/center side of basement (duplex)
50 Pine St.		Residence	Northwest corner of basement (duplex)
95 Morris St.		Auto Concepts	A - Lower level boiler room on NW side of building
			B - Southwest side of garage portion of building
105 Morris St.		Morristown Tire	A - Lower level boiler room on SE side of building
			B - Center of building, just south of front desk
73 Morris St.		Morristown Diner	East/Center of basement
44 Pine St.		Residence	Southeast side of basement
Main, on-site building	4A Wilmot St.	Former Kid Fit	1 – West side, front of former storefront
			2 - Southeast side, back of former storefront
	-------	Empty Office	1 – North side, left side of former storefront
			2 – Southeast side, right side of former storefront
	8 Wilmot St.	Former Florist	1 – Southwest corner of former storefront
			2 – Northeast corner of former storefront
	4E Wilmot St.	Curves	Southwestern side, front of store near lockers
	4C Wilmot St.	Cardio Care	Northeastern corner, back of the store
	89 Morris St.	Dry cleaners	1 – West side of store, center of storage room on lower level
			2 – Southeastern side of building, separate staging room
			3 – North of front of store, behind desk
	4D Wimot St.	Amici Hair Design	East, back of the store in the break room/storage area
	6 Wilmot St.	State Farm	Storage closet on the southeastern side of the store
	4B Wilmot St.	Elite Photography	Office, behind door, southern/center of the store
26 Pine St.		Residence	Center of basement
63 Morris St.		Asahi Sushi	Southeast corner of basement, near back door
40 Pine St.		Future Day Care Center	1 – Northwest corner of back room
			2 – Center of back room
			3 – South/center at entrance to back room
			4 – Northeast corner of front room

Over the twenty four hour period of May 01 – 02, 2006, sub-slab samples were collected from every location with a sample port. Initially, one six liter SUMMA™ canister was designated as the trip blank and remained unopened during the extent of the sampling event. One ambient air sample was collected behind or west of 40 Pine St. to eliminate the possibility of exterior air cross- contamination. The EPA staff began at 24 Pine Street

where they connected one SUMMA™ canister to the sub-slab port via Teflon tubing. The following table indicates the SUMMA™ canisters that were used for each sample as well as the sample types and dates. A duplicate sample was collected at the port in the northwest corner of 40 Pine St. For duplicate collection, two canisters are connected to the same port and opened simultaneously. A photograph log of the canister sample locations can be found as Appendix G.

TABLE 2 – SAMPLES COLLECTED MAY 01 – 02, 2006

Address	Sample Type	Sample #	Canister #	Begin Date	End Date
N/A	Trip Blank	TB-01	33965	5/01/06	5/02/06
24 Pine St.	Sub-slab	24Pine	04568	5/01/06	5/02/06
48/50 Pine St.	Sub-slab	48Pine	11882	5/01/06	5/02/06
	Sub-slab	50Pine	33571	5/01/06	5/02/06
95 Morris St. Auto Concepts	Sub-slab	95MorrisA	14885	5/01/06	5/02/06
	Sub-slab	95MorrisB	34730	5/01/06	5/02/06
105 Morris St. Morristown Tire Company	Sub-slab	105MorrisA	34440	5/01/06	5/02/06
	Sub-slab	105MorrisB	34028	5/01/06	5/03/06
73 Morris St. Morristown Diner	Sub-slab	73Morris	23886	5/01/06	5/02/06
44 Pine St.	Sub-slab	44Pine	4324	5/01/06	5/02/06
40 Pine St. Future Day Care Center	Sub-slab	40Pine1	32109	5/01/06	5/02/06
	Sub-slab	40Pine1B	05712	5/01/06	5/02/06
	Sub-slab	40Pine2	34328	5/01/06	5/02/06
	Sub-slab	40Pine3	13853	5/01/06	5/02/06
	Sub-slab	40Pine4	33568	5/01/06	5/02/06
	Ambient	40PineA	2387	5/01/06	5/02/06

At the conclusion of the day, the sub-slab canister samples were closed, the final pressures were recorded and the canisters were sent to Air Toxics laboratory for low level TO-15 analysis. During the twenty four hour period, May 02 – 03, 2006, the EPA sampling team continued to collect sub-slab samples from the remaining locations with a sample ports. In addition, indoor air samples were collected from the main building, except for the current dry cleaning storefront at 89 Morris Street. Initially, one six liter SUMMA™ canister was designated as the trip blank and remained unopened during the extent of the sampling event. One ambient air sample was collected south of the former florist at 8 Wilmot. The EPA staff began at 4B Wilmot of the main building which was formerly a Kid Fit. Table 2 on the following page indicates the SUMMA™ canisters that were used for each sample as well as the sample type and dates. . A photograph log of the canister sample locations can be found as Appendix G.

TABLE 3 – SAMPLES COLLECTED MAY 02 – 03, 2006					
Address	**Sample Type**	**Sample #**	**Canister #**	**Begin Date**	**End Date**
N/A	Trip Blank	TB-02	23887	5/02/06	5/03/06
Main Building: 4A Wilmot St. – Formerly Kid Fit	Sub-slab	4AWil1	34125	5/02/06	5/03/06
	Sub-slab	4AWil2	35172	5/02/06	5/03/06
	Duplicate of 4AWil2	4AWil2B	34475	5/02/06	5/03/06
	Indoor Air	4AWilIA	34453	5/02/06	5/03/06
	Duplicate of 4AWilIA	4AWilIA2	4084	5/02/06	5/03/06
Main Building: 4B Wilmot St. – Elite Photography	Sub-slab	4BWil	35154	5/02/06	5/03/06
	Indoor Air	4BWilIA	13999	5/02/06	5/03/06
Main Building: 4C Wilmot St. – Cardio-Care	Sub-slab	4CWil	33881	5/02/06	5/03/06
	Indoor Air	4CWilIA	02330	5/02/06	5/03/06
Main Building: 4D Wilmot St. – Amici Hair Design	Sub-slab	4DWil	4191	5/02/06	5/03/06
	Indoor Air	4DWilIA	9940	5/02/06	5/03/06
Main Building: 4E Wilmot St. – Curves	Sub-slab	4EWil	34399	5/02/06	5/03/06
	Indoor Air	4EWilIA	39426	5/02/06	5/03/06
Main Building: 8 Wilmot St. – Former florist	Sub-slab	8Wil1	05359	5/02/06	5/03/06
	Sub-slab	8Wil2	34318	5/02/06	5/03/06
	Indoor Air	8WilIA	21077	5/02/06	5/03/06
63 Morris St. – Asahi Sushi	Sub-slab	63Morris	13843	5/02/06	5/03/06
Main Building: 89 Morris St. – New Image Cleaners & Tailoring	Sub-slab	89Morris1	23997	5/02/06	5/03/06
	Sub-slab	89Morris2	915	5/02/06	5/03/06
	Sub-slab	89Morris3	912	5/02/06	5/03/06
Main Building: Empty storefront	Sub-slab	EO1	902	5/02/06	5/03/06
	Sub-slab	EO2	34746	5/02/06	5/03/06
	Indoor Air	EOIA	9403	5/02/06	5/03/06
8 Wilmot St.	Ambient	MorrisA	34373	5/02/06	5/03/06
Main Building: 6 Wilmot St.– State Farm	Sub-slab	6Wil	13655	5/02/06	5/03/06
	Indoor Air	6WilIA	14038	5/02/06	5/03/06
26 Pine St.	Sub-slab	26Pine	24484	5/02/06	5/03/06

The sub-slab duplicate sample was collected at 4A Wilmot St. An indoor air duplicate sample was also collected at 4A Wilmot St. by placing two canisters next to each other and opening them simultaneously. At the conclusion of the day, the canisters were closed and the final pressure was recorded. The sub-slab samples were sent to Air Toxics laboratory for low level TO-15 analysis, while the indoor air and ambient air samples were also sent to Air Toxics for selective ion mode (SIM) TO-15 analysis. The shipment information can also be found in the trip report in Appendix D.

Based on the elevated results in the sub-slab at three locations: 105 Morris St, 95 Morris St and 73 Morris St, indoor air sampling was required. The owners of 73 Morris St. denied the EPA access to additional sampling. During the twenty four hour period of August 09 – 10, 2006, indoor air samples were collected at 105 and 95 Morris St. An additional ambient air sample and trip blank sample were also collected during this sampling event. The indoor air samples were sent to Air Toxics laboratory for TO-15 SIM analysis and the trip report can be found as Appendix E.

All air samples were analyzed by the Air Toxics Ltd. laboratory for volatile organic compounds (VOCs) only, according to U.S. EPA Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* which can be found as Appendix C of the quality assurance project plan which can be found as Appendix B of this document.

4.0 RESULTS

As a part of the laboratory's Quality Assurance/ Quality Control (QA/QC) criteria, the laboratory conducted VOC analysis on SUMMA™ canisters known as trip blank samples. The blanks are used during data validation to assess the quality of the data. The trip blank canisters were not opened during the sampling event and they accompany the samples to the laboratory. The trip blank samples that accompanied samples from May 03, 2006 and August 10, 2006 did not detect any volatile organic compounds. The trip blank sample accompanying the samples from May 02, 2006, however, did have VOC contamination, specifically tetrachloroethene. This may have been caused by a leaking or unclosed canister.

Blind duplicate indoor air samples are collected by placing two canisters next to each other in the same location. Blind duplicate sub-slab samples are collected by connecting two canisters to the same sub-slab port. Several duplicate samples were collected throughout these sampling events. A sub-slab duplicate sample was collected from the northwest port at 40 Pine Street. Acetone was found outside of the EPA Region II duplicate criteria and should therefore be considered estimated. An indoor air duplicate was also collected at 40 Pine Street and were found to be within the criteria. Both sub-slab and indoor air duplicate samples were collected from 4A Wilmot, former Kid Fit. The results were found to be within EPA criteria for duplicate samples. Finally, an indoor

air duplicate sample was collected during the August 2006 indoor air sampling at 95 Morris St. These results were also found to be comparable. The only qualifier utilized during the validation procedure was a "J" which indicates the result is estimated. All air results are acceptable and usable. The Quality Assurance/ Quality Control sample data can be found in Table 4 on page10 and in the CLP Data Assessments in Appendix C.

Residences/Businesses

The volatile organic contaminant of concern at the VIP cleaners site is tetrachloroethene (PCE). PCE was found in the sub-slab samples collected at 26, 44, 48 and 50 Pine Street, the southern sub-slab of 95 Morris Street, 63, 73 and 105 Morris Street, 73 Morris Street and all but one sub-slab at 40 Pine Street. If the PCE result in the sub-slab is in excess of 300 $\mu g/m^3$, an indoor air sample is required. If the indoor air sample exceeds 30 $\mu g/m^3$, a treatment system is required. The only sub-slab samples results that were high enough to require indoor air sampling were from 73, 95 and 105 Morris Street, as previously mentioned. The sub-slab result at 105 Morris St. was actually 250 $\mu g/m^3$. In August 2006, the indoor air sampling at 95 and 105 Morris St. revealed that there is no need for a treatment system at either location. These results can be seen in Table 5 on page 11 and in Appendix C.

The additional contaminants of concern at the site are the breakdown products of PCE which include trichloroethene (TCE), cis1,2-dichloroethene . TCE was also found in the sub-slab samples at 105 and 73 Morris St. at relatively low levels. Cis-dichloroethene was not detected in any of the residence and business sub-slab samples. An ambient air sample was collected from the outside atmosphere during the same period of time as the sub-slab and indoor air samples were collected. Ambient air samples were collected during both the May and August 2006 sampling events. The May 2006 ambient air sample was collected from west of 40 Pine Street. The sample had a PCE result of 4.7 $\mu g/m^3$ which is relatively high for an ambient air sample, however, the current dry cleaner was operating during the same time period. The ambient air sample also showed levels of benzene, ethanol, Freon, toluene and xylene which may be from automobile exhaust. The ambient air sample collected in August also revealed levels of benzene, ethylbenzene, toluene and xylene. These results can be seen in Table 5 on page 11 and in Appendix C.

Main, On-site Building

PCE was detected in every sample collected at 89 Morris Street which includes both sub-slab samples and indoor air samples. Since the PCE result in the sub-slab was in excess of 300 $\mu g/m^3$, an indoor air sample was required. Since the indoor air sample exceeded 30 $\mu g/m^3$, a treatment system was required. As can be seen from the data in Table 6 on page 19, the results from 4A Wilmot St. are in excess of these numbers. A treatment system has already bee installed at the main, on-site building.

TCE, the first breakdown product was found at high levels in the sub-slab of 4A Wilmot St., 4B Wilmot St., 89 Morris St., 6 Wilmot St. and the empty storefront. It was also detected at low levels in the sub-slab of 4D Wilmot St. and 8 Wilmot St. TCE was found in the indoor air sample only at 4C Wilmot St. and 4E Wilmot St. When this occurs, it is determined that the contamination is originating from an interior source and not from the sub-slab vapors. Cis-1,2-dichloroethene was also found at elevated levels in the sub-slab and indoor air samples collected from 4A Wilmot St. The compounds detected in the ambient air sample from May 02 – 03, 2006, were benzene, ethylbenzene, toluene, xylene and tetrachloroethene. Benzene, ethylbenzene, toluene and xylene tend to originated from automobiles that are run in the vicinity of the ambient air sample. Tetrachloroethene may have originated from the current practices of the dry cleaner are 89 Morris St. and the level was not high enough to compromise the samples.

5.0 CONCLUSION:

As can be seen from Tables 5 and 6, tetrachloroethene was found in the sub-slab samples in the main, on-site building, and 73, 95 and 105 Morris St. at levels that required indoor air sampling. The PCE found in the indoor air samples at the main, on-site building only required a treatment system to be installed.

TABLE 4
QA/QC SAMPLE DATA

TYPE OF SAMPLE	SAMPLE DATES	CANISTER NUMBERS	SAMPLE NUMBERS	SAMPLE LOCATION
TRIP BLANK	5/1/06 – 5/2/06	33965	TB-01	-----
	5/2/06 – 5/3/06	23887	TB-02	-----
	8/9/06 – 8/10/06	34414	TB-01	-----
SUB-SLAB DUPLICATE	5/1/06 – 5/2/06	05712 is a duplicate of 32109	40Pine1B is a duplicate of 40Pine1	Northwest sub-slab port at 40 Pine St.
	5/2/06 – 5/3/06	34457 is a duplicate of 35172	4AWil2B is a duplicate of 4AWil2	East sub-slab port at 4A Wilmot
INDOOR AIR DUPLICATE	5/2/06 – 5/3/06	4084 is a duplicate of 34453	4AwilIA2 is a duplicate of 4AWilIA	Indoor air sample at 4A Wilmot
	8/9/06 – 8/10/06	33863 is a duplicate of 24229	95Morris2IA is a duplicate of 95MorrisIA	Indoor air sample at 95 Morris St.
AMBIENT	5/1/06 – 5/2/06	2387	40PineA	West of 40 Pine St.
	5/2/06 – 5/3/06	34373	MorrisA	South of 8 Wilmot
	8/9/06 – 8/10/06	33914	AA-01	Southeast of 105 Morris St.

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3)

	24 Pine St.	48 Pine St.	50 Pine St.	95 Morris St.			
	Sub-slab	Sub-slab	Sub-slab	West Sub-slab	South Sub-slab	Indoor Air	Indoor Air
Canister Number	4568	11882	33571	14885	34730	24229	33863
							Duplicate
Acetone	26	3.6	12	270	16		
Benzene	1.5	ND	ND	1.6	ND	2.3 J	1.6 J
Bromodichloromethane	ND	ND	ND	ND	ND		
Bromoform	ND	ND	ND	ND	ND		
Bromomethane	ND	ND	ND	ND	ND		
1,3-Butadiene	ND	ND	ND	ND	ND		
2-Butanone	ND	ND	ND	11	ND		
Carbon disulfide	ND	0.55 J	ND	ND	ND		
Carbon tetrachloride	ND	ND	ND	ND	ND		
Chlorobenzene	ND	ND	ND	ND	ND		
Chlororethane	ND	ND	ND	ND	ND		
Chloroform	ND	ND	ND	ND	ND		
Chloromethane	2.4	ND	ND	1.2	ND		
alpha-Chlorotoluene	ND	ND	ND	ND	ND		
Cyclohexane	ND	ND	ND	ND	ND		
Cumene	ND	ND	ND	ND	ND		
Dibromochloromethane	ND	ND	ND	ND	ND		
1,2-Dibromoethane	ND	ND	ND	ND	ND		
1,2-Dichlorobenzene	ND	ND	ND	ND	ND		
1,3-Dichlorobenzene	ND	ND	ND	ND	ND		
1,4-Dichlorobenzene	ND	0.25 J	ND	ND	ND		
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.18 J	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND		
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND		
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND		
1,4-Dioxane	ND	ND	ND	ND	ND		
Ethanol	110	ND	ND	9.2	ND		
J= Estimated value							
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	24 Pine St.	48 Pine St.	50 Pine St.	95 Morris St.			
	Sub-slab	Sub-slab	Sub-slab	West Sub-slab	South Sub-slab	Indoor Air	Indoor Air
Canister Number	4568	11882	33571	14885	34730	24229	3863
							Duplicate
Ethyl benzene	ND	ND	ND	2.7	2.9	6.1	4.3
4-Ethyltoluene	ND	ND	ND	ND	ND		
Freon 11	1.9	1.7	2.6	1.7	1.8		
Freon 12	3	4.1	4.5	3.1	2.9		
Freon 113	ND	0.58 J	ND	ND	ND		
Freon 114	ND	ND	ND	ND	ND		
Heptane	ND	ND	ND	ND	ND		
Hexachlorobenzene	ND	ND	ND	ND	ND		
Hexane	ND	ND	ND	ND	ND		
2-Hexanone	ND	ND	ND	ND	ND		
Methylene chloride	ND	ND	ND	3.8	ND		
4-Methyl-2-pentanone	ND	ND	ND	20	ND		
Methyl tert-butyl ether	ND	ND	ND	ND	ND	3.3	2.3
2-Propanol	240	ND	ND	4.7	ND		
Propylbenzene	ND	ND	ND	ND	ND		
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	16	13	ND	510	8.8	6.2
Tetrahydrofuran	11	ND	ND	ND	ND		
Toluene	2.8	0.23	ND	96	32	29	21
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND		
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	3.4	2.6
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	0.71	0.54
1,2,4-Trimethylbenzene	ND	ND	ND	2.1	ND		
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND		
Styrene	ND	ND	ND	ND	ND		
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	3	ND	ND	8.2	3.3	17	12
o-Xylene	ND	ND	ND	2.6	1.7	5.3	3.7
J= Estimated value							
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	105 Morris St.			S of 105 Morris St.	Trip Blank	73 Morris St.	44 Pine St.
	East Sub-slab	West Sub-slab	Indoor Air	Ambient Air	8/10/2006	Sub-slab	Sub-slab
Canister Number	34440	34028	33329	33914	34414	23886	4324
Acetone	12	500 J				ND	4.4
Benzene	ND	30	6 J	0.49 J	ND	ND	ND
Bromodichloromethane	ND	ND				ND	ND
Bromoform	ND	ND				ND	ND
Bromomethane	ND	ND				ND	ND
1,3-Butadiene	ND	ND				ND	ND
2-Butanone	ND	ND				ND	ND
Carbon disulfide	ND	ND				ND	ND
Carbon tetrachloride	ND	ND				ND	ND
Chlorobenzene	ND	ND				ND	ND
Chlororethane	ND	ND				ND	ND
Chloroform	ND	ND				ND	ND
Chloromethane	0.3 J	0.73				ND	ND
alpha-Chlorotoluene	ND	ND				ND	ND
Cyclohexane	ND	32				ND	ND
Cumene	ND	ND				ND	ND
Dibromochloromethane	ND	ND				ND	ND
1,2-Dibromoethane	ND	ND				ND	ND
1,2-Dichlorobenzene	ND	ND				ND	ND
1,3-Dichlorobenzene	ND	ND				ND	ND
1,4-Dichlorobenzene	ND	ND				ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	0.21 J	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND				ND	ND
cis-1,3-Dichloropropene	ND	ND				ND	ND
trans-1,3-Dichloropropene	ND	ND				ND	ND
1,4-Dioxane	ND	ND				ND	ND
Ethanol	3.1	120				ND	ND
J= Estimated value							
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	105 Morris St.			S of 105 MorrisSt.	Trip Blank	73 Morris St.	44 Pine St.
	East Sub-slab	West Sub-slab	Indoor Air	Ambient Air	8/10/2006	Sub-slab	Sub-slab
Canister Number	34440	34028	33329	33914	34414	23886	4324
Ethyl benzene	ND	44	29	0.46	ND	ND	ND
4-Ethyltoluene	ND	17				ND	ND
Freon 11	1.6	1.9 J				ND	2.2
Freon 12	39	630				ND	4
Freon 113	ND	ND				ND	ND
Freon 114	ND	ND				ND	ND
Heptane	ND	120				ND	ND
Hexachlorobenzene	ND	ND				ND	ND
Hexane	ND	100				ND	ND
2-Hexanone	ND	ND				ND	ND
Methylene chloride	ND	19				ND	ND
4-Methyl-2-pentanone	ND	11				ND	ND
Methyl tert-butyl ether	ND	140	10	ND	ND	ND	ND
2-Propanol	ND	ND				ND	ND
Propylbenzene	ND	ND				ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	8	250	4.5	ND	ND	6800	10
Tetrahydrofuran	ND	ND				ND	ND
Toluene	2.2	170	75	2.6	ND	42	0.57
1,2,4-Trichlorobenzene	ND	ND				ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	4.8	23	20	ND	ND	170	ND
1,2,4-Trimethylbenzene	ND	16				ND	ND
1,3,5-Trimethylbenzene	ND	6				ND	ND
Styrene	ND	ND				ND	1.1
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	1	160	96	1.4	ND	41	ND
o-Xylene	ND	59	29	0.43	ND	17 J	ND
J= Estimated value							
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	40 Pine St.					63 Morris St.	26 Pine St.
	NW Sub-slab	NW Sub-slab	Center/W Sub-slab	South Sub-slab	NE Sub-slab	Sub-slab	Sub-slab
Canister Number	32109	5712	34328	13853	33568	13843	24484
		Duplicate					
Acetone	26	86	32	17	ND	3.5	23
Benzene	1.5	1.7	1.6	1.6	ND	ND	1.4
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND
1,3-Butadiene	ND	ND	ND	ND	ND	ND	ND
2-Butanone	3.4	ND	3.5	ND	ND	ND	2.7
Carbon disulfide	ND	3.7	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND
Chlororethane	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	1.8
Chloromethane	2.1	1.9	2.1	2.1	ND	ND	1.8
alpha-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	ND	ND	ND	ND	ND	ND	ND
Cumene	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane	ND	ND	ND	ND	ND	ND	ND
Ethanol	7.7	8.4	8.2	6.9	ND	ND	380 E
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	40 Pine St.					63 Morris St.	26 Pine St.
	NW Sub-slab	NW Sub-slab	Center/W Sub-slab	South Sub-slab	NE Sub-slab	Sub-slab	Sub-slab
Canister Number	32109	5712	34328	13853	33568	13843	24484
		Duplicate					
Ethyl benzene	1.2	1.3	1.3	1.2	ND	ND	0.92
4-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND
Freon 11	1.6	1.8	1.7	1.8	ND	3.6	1.8
Freon 12	3.1	2.9	3.2	3.5	ND	3.2	2.9
Freon 113	ND	ND	ND	ND	ND	ND	ND
Freon 114	ND	ND	ND	ND	ND	ND	ND
Heptane	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND
Hexane	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	ND
Methyl tert-butyl ether	5.7	4.5	6.2	5.9	ND	ND	ND
2-Propanol	ND	4.3	2.3	ND	ND	ND	16
Propylbenzene	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	2.6	4.2	2.6	2.5	ND	17	10
Tetrahydrofuran	ND	ND	ND	ND	ND	ND	ND
Toluene	7.7	17	8.9	7.3	ND	ND	4.6
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	2.2	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.4	2	2.2	1.8	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	0.93	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	3.6	3.5	3.9	3.6	ND	ND	2.2
o-Xylene	1.2	1.5	1.8	1.4	ND	ND	0.8
ND = Non-detect							

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	W of 40 Pine St.	Trip Blank
	Ambient Air	5/2/2006
Canister Number	2387	33965
Acetone	13	
Benzene	0.88	0.3 J
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
1,3-Butadiene	ND	
2-Butanone	ND	
Carbon disulfide	ND	
Carbon tetrachloride	ND	
Chlorobenzene	ND	
Chlororethane	ND	
Chloroform	ND	
Chloromethane	1.6	
alpha-Chlorotoluene	ND	
Cyclohexane	ND	
Cumene	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane	ND	ND
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
1,4-Dioxane	ND	
Ethanol	8	
J= Estimated value		
ND = Non-detect		

TABLE 5 - RESIDENCE/BUSINESS AIR SAMPLE RESULTS (ug/m^3) - CONTINUED

	W of 40 Pine St.	Trip Blank
	Ambient Air	5/2/2006
Canister Number	2387	33965
Ethyl benzene	ND	ND
4-Ethyltoluene	ND	
Freon 11	1.8	
Freon 12	3.3	
Freon 113	ND	
Freon 114	ND	
Heptane	ND	
Hexachlorobenzene	ND	
Hexane	ND	
2-Hexanone	ND	
Methylene chloride	ND	
4-Methyl-2-pentanone	ND	
Methyl tert-butyl ether	ND	ND
2-Propanol	ND	
Propylbenzene	ND	
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	4.7	40
Tetrahydrofuran	ND	
Toluene	2.1	0.57 J
1,2,4-Trichlorobenzene	ND	
1,1,1-Trichloroethane	ND	0.28 J
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
1,2,4-Trimethylbenzene	ND	
1,3,5-Trimethylbenzene	ND	
Styrene	ND	
Vinyl Chloride	ND	ND
m,p-Xylene	1	ND
o-Xylene	ND	ND
J= Estimated value		
ND = Non-detect		

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3)

	4A Wilmot - Former Kid Fit					4B Wilmot - Elite Photography	
	West Sub-slab	East Sub-slab	East Sub-slab	Indoor Air	Indoor Air	Sub-slab	Indoor Air
Canister Number:	34125	35172	34475	34453	4084	35154	13999
			Duplicate		Duplicate		
Acetone	ND	ND	ND			ND	
Benzene	ND	ND	ND	1.2	1.2	ND	1.4
Bromodichloromethane	ND	ND	ND			ND	
Bromoform	ND	ND	ND			ND	
Bromomethane	ND	ND	ND			ND	
1,3-Butadiene	ND	ND	ND			ND	
2-Butanone	ND	ND	ND			ND	
Carbon disulfide	ND	ND	ND			ND	
Carbon tetrachloride	ND	ND	ND			ND	
Chlorobenzene	ND	ND	ND			ND	
Chlororethane	ND	ND	ND			ND	
Chloroform	ND	ND	ND			ND	
Chloromethane	ND	ND	ND			ND	
alpha-Chlorotoluene	ND	ND	ND			ND	
Cyclohexane	ND	ND	ND			ND	
Cumene	ND	ND	ND			ND	
Dibromochloromethane	ND	ND	ND			ND	
1,2-Dibromoethane	ND	ND	ND			ND	
1,2-Dichlorobenzene	ND	ND	ND			ND	
1,3-Dichlorobenzene	ND	ND	ND			ND	
1,4-Dichlorobenzene	ND	ND	ND			ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	31	12,000	12,000	8.6	7.4	160	16
trans-1,2-Dichloroethene	ND	160	160	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND			ND	
cis-1,3-Dichloropropene	ND	ND	ND			ND	
trans-1,3-Dichloropropene	ND	ND	ND			ND	
1,4-Dioxane	ND	ND	ND			ND	
Ethanol	ND	ND	ND			300	
ND = Non-detect							

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	4A Wilmot - Former Kid Fit					4B Wilmot - Elite Photography	
	West Sub-slab	East Sub-slab	East Sub-slab	Indoor Air	Indoor Air	Sub-slab	Indoor Air
Canister Number:	34125	35172	34475	34453	4084	35154	13999
			Duplicate		Duplicate		
Ethyl benzene	ND	ND	ND	1.2	1	ND	2.7
4-Ethyltoluene	ND	ND	ND			ND	
Freon 11	ND	ND	ND			ND	
Freon 12	ND	ND	ND			ND	
Freon 113	ND	ND	ND			ND	
Freon 114	ND	ND	ND			ND	
Heptane	ND	ND	ND			ND	
Hexachlorobenzene	ND	ND	ND			ND	
Hexane	ND	ND	ND			ND	
2-Hexanone	ND	ND	ND			ND	
Methylene chloride	ND	ND	ND			ND	
4-Methyl-2-pentanone	ND	ND	ND			ND	
Methyl tert-butyl ether	ND	ND	ND	0.7 J	ND	ND	0.62 J
2-Propanol	ND	ND	ND			ND	
Propylbenzene	ND	ND	ND			ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	13,000	45,000	44,000	220	200	45,000	170
Tetrahydrofuran	ND	ND	ND			ND	
Toluene	ND	ND	ND	100	91	ND	26
1,2,4-Trichlorobenzene	ND	ND	ND			ND	
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	220	2700	2700	3	2.8	1100	4.4
1,2,4-Trimethylbenzene	ND	ND	ND			ND	
1,3,5-Trimethylbenzene	ND	ND	ND			ND	
Styrene	ND	ND	ND			ND	
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	ND	ND	ND	2.8	2.4	ND	6.2
o-Xylene	ND	ND	ND	1.4	1.1	ND	2.6
J = Estimated value							
ND = Non-detect							

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	4C Wilmot - CardioCare		4D Wilmot - Amici Hair Design		4E Wilmot - Curves	
	Sub-slab	Indoor Air	Sub-slab	Indoor Air	Sub-slab	Indoor Air
Canister Number	33881	2330	4191	9940	34399	39426
Acetone	330		13		32	
Benzene	ND	0.75	ND	0.97	ND	0.96
Bromodichloromethane	ND		ND		ND	
Bromoform	ND		ND		ND	
Bromomethane	ND		ND		ND	
1,3-Butadiene	ND		ND		ND	
2-Butanone	ND		ND		ND	
Carbon disulfide	ND		ND		ND	
Carbon tetrachloride	ND		ND		ND	
Chlorobenzene	ND		ND		ND	
Chlororethane	ND		ND		ND	
Chloroform	ND		ND		ND	
Chloromethane	ND		ND		0.36	
alpha-Chlorotoluene	ND		ND		ND	
Cyclohexane	ND		ND		ND	
Cumene	ND		ND		ND	
Dibromochloromethane	ND		ND		ND	
1,2-Dibromoethane	ND		ND		ND	
1,2-Dichlorobenzene	ND		ND		ND	
1,3-Dichlorobenzene	ND		ND		ND	
1,4-Dichlorobenzene	ND		ND		ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	0.56	ND	0.18 J	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND		ND		ND	
cis-1,3-Dichloropropene	ND		ND		ND	
trans-1,3-Dichloropropene	ND		ND		ND	
1,4-Dioxane	ND		ND		ND	
Ethanol	860		13		46	
J = Estimated value						
ND = Non-detect						

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	4C Wilmot - CardioCare		4D Wilmot - Amici Hair Design		4E Wilmot - Curves	
	Sub-slab	Indoor Air	Sub-slab	Indoor Air	Sub-slab	Indoor Air
Canister Number	33881	2330	4191	9940	34399	39426
Ethyl benzene	ND	2.2	ND	3.1	ND	0.55
4-Ethyltoluene	ND		ND		ND	
Freon 11	ND		ND		2	
Freon 12	ND		ND		3.4	
Freon 113	ND		ND		ND	
Freon 114	ND		ND		ND	
Heptane	ND		ND		ND	
Hexachlorobenzene	ND		ND		ND	
Hexane	ND		ND		ND	
2-Hexanone	ND		ND		ND	
Methylene chloride	ND		ND		ND	
4-Methyl-2-pentanone	ND		ND		ND	
Methyl tert-butyl ether	ND	ND	ND	0.63 J*	ND	0.72
2-Propanol	3800		ND		2.9	
Propylbenzene	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND
Tetrachloroethene	42	36	1,700	19	52	8.6
Tetrahydrofuran	ND		ND		ND	
Toluene	ND	10	ND	18	ND	3.9
1,2,4-Trichlorobenzene	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND	10	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	0.66	58	0.36 J	ND	0.18
1,2,4-Trimethylbenzene	ND		ND		ND	
1,3,5-Trimethylbenzene	ND		ND		ND	
Styrene	ND		ND		ND	
Vinyl Chloride	ND	ND	ND	ND	ND	ND
m,p-Xylene	ND	3.9	ND	13	ND	1.5
o-Xylene	ND	2.2	ND	2.9	ND	0.55
J = Estimated value						
ND = Non-detect						

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	8 Wilmot - Former Florist			89 Morris St. - New Image Cleaners & Tailoring		
	West Sub-slab	East Sub-slab	Indoor Air	West Sub-slab	East Sub-slab	North Sub-slab
Canister Number	5359	34318	21077	23997	915	912
Acetone	15	ND		ND	9.2	ND
Benzene	1.6	ND	1.4	ND	ND	ND
Bromodichloromethane	ND	ND		ND	ND	ND
Bromoform	ND	ND		ND	ND	ND
Bromomethane	ND	ND		ND	ND	ND
1,3-Butadiene	ND	ND		ND	ND	ND
2-Butanone	12	ND		ND	ND	ND
Carbon disulfide	6.9	ND		ND	ND	ND
Carbon tetrachloride	ND	ND		ND	68	ND
Chlorobenzene	ND	ND		ND	ND	ND
Chlororethane	ND	ND		ND	ND	ND
Chloroform	ND	ND		ND	3.1	ND
Chloromethane	1.6	ND		ND	ND	ND
alpha-Chlorotoluene	ND	ND		ND	ND	ND
Cyclohexane	ND	ND		ND	ND	ND
Cumene	ND	ND		ND	ND	ND
Dibromochloromethane	ND	ND		ND	ND	ND
1,2-Dibromoethane	ND	ND		ND	ND	ND
1,2-Dichlorobenzene	ND	ND		ND	ND	ND
1,3-Dichlorobenzene	ND	ND		ND	ND	ND
1,4-Dichlorobenzene	ND	ND		ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	79 J	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND		ND	ND	ND
cis-1,3-Dichloropropene	ND	ND		ND	ND	ND
trans-1,3-Dichloropropene	ND	ND		ND	ND	ND
1,4-Dioxane	ND	ND		ND	ND	ND
Ethanol	30	ND		ND	2.8	ND
J = Estimated value						
ND = Non-detect						

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	8 Wilmot - Former Florist			89 Morris St. - New Image Cleaners & Tailoring		
	West Sub-slab	East Sub-slab	Indoor Air	West Sub-slab	East Sub-slab	North Sub-slab
Canister Number	5359	34318	21077	23997	915	912
Ethyl benzene	1	ND	0.61	ND	ND	ND
4-Ethyltoluene	ND	ND		ND	ND	ND
Freon 11	2	ND		ND	1.9	ND
Freon 12	3.4	ND		ND	3.3	3.1 J
Freon 113	ND	ND		ND	ND	ND
Freon 114	ND	ND		ND	ND	ND
Heptane	ND	ND		ND	ND	ND
Hexachlorobenzene	ND	ND		ND	ND	ND
Hexane	6	ND		ND	ND	ND
2-Hexanone	ND	ND		ND	ND	ND
Methylene chloride	ND	ND		ND	ND	ND
4-Methyl-2-pentanone	8.7	ND		ND	ND	ND
Methyl tert-butyl ether	ND	ND	ND	ND	ND	ND
2-Propanol	2.9	ND		ND	ND	ND
Propylbenzene	ND	ND		ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND
Tetrachloroethene	6	8,300	7.2	42,000	470	690
Tetrahydrofuran	ND	ND		ND	ND	ND
Toluene	13	ND	2.5	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND		ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	57	ND	730	14	4.1
1,2,4-Trimethylbenzene	2	ND		ND	ND	ND
1,3,5-Trimethylbenzene	0.8 J	ND		ND	ND	ND
Styrene	ND	ND		ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND
m,p-Xylene	2.9	ND	2.5	ND	ND	ND
o-Xylene	1.2	ND	1.1	ND	ND	ND
J = Estimated value						
ND = Non-detect						

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

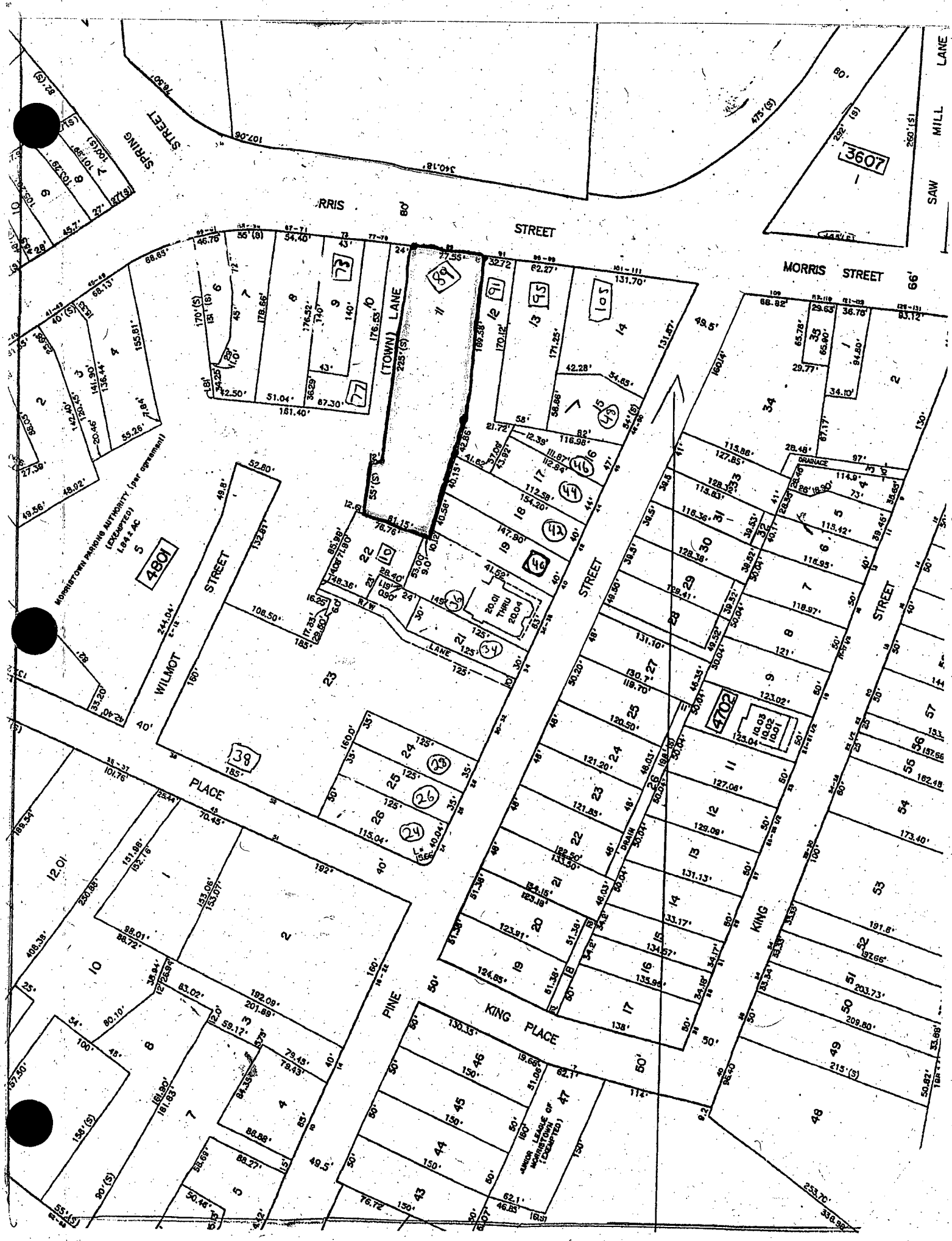
	Empty Storefront			6 Wilmot - State Farm		NW of 8 Wilmot	Trip Blank
	North Sub-slab	South Sub-slab	Indoor Air	Sub-slab	Indoor Air	Ambient Air	5/3/2006
Canister Number	902	34746	9403	13655	14038	34373	23887
Acetone	ND	36	ND	ND			
Benzene	ND	ND	0.98	ND	1.2	0.93	ND
Bromodichloromethane	ND	ND		ND			
Bromoform	ND	ND		ND			
Bromomethane	ND	ND		ND			
1,3-Butadiene	ND	ND		ND			
2-Butanone	ND	ND		ND			
Carbon disulfide	ND	ND		ND			
Carbon tetrachloride	ND	ND		ND			
Chlorobenzene	ND	ND		ND			
Chlororethane	ND	ND		ND			
Chloroform	ND	ND		ND			
Chloromethane	ND	1.7 J		ND			
alpha-Chlorotoluene	ND	ND		ND			
Cyclohexane	ND	ND		ND			
Cumene	ND	ND		ND			
Dibromochloromethane	ND	ND		ND			
1,2-Dibromoethane	ND	ND		ND			
1,2-Dichlorobenzene	ND	ND		ND			
1,3-Dichlorobenzene	ND	ND		ND			
1,4-Dichlorobenzene	ND	ND		ND			
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	10	ND	410	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND		ND			
cis-1,3-Dichloropropene	ND	ND		ND			
trans-1,3-Dichloropropene	ND	ND		ND			
1,4-Dioxane	ND	ND		ND			
Ethanol	ND	15		ND			
J= Estimated value							
ND = Non-detect							

TABLE 6 - AIR SAMPLE RESULTS FROM THE MAIN BUILDING (ug/m^3) - CONTINUED

	Empty Storefront			6 Wilmot - State Farm		NW of 8 Wilmot	Trip Blank
	North Sub-slab	South Sub-slab	Indoor Air	Sub-slab	Indoor Air	Ambient Air	5/3/2006
Canister Number	902	34746	9403	13655	14038	34373	23887
Ethyl benzene	ND	ND	0.67	ND	1.2	0.39	ND
4-Ethyltoluene	ND	ND		ND			
Freon 11	ND	ND		ND			
Freon 12	ND	ND		ND			
Freon 113	ND	ND		ND			
Freon 114	ND	ND		ND			
Heptane	ND	ND		ND			
Hexachlorobenzene	ND	ND		ND			
Hexane	ND	ND		ND			
2-Hexanone	ND	ND		ND			
Methylene chloride	ND	ND		ND			
4-Methyl-2-pentanone	ND	ND		ND			
Methyl tert-butyl ether	ND	ND	0.69	ND	0.61	ND	ND
2-Propanol	ND	ND		ND			
Propylbenzene	ND	ND		ND			
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	3,000	3,400	59	29,000	13	1.9	ND
Tetrahydrofuran	ND	ND		ND			
Toluene	ND	7	6.6	ND	11	2.5	ND
1,2,4-Trichlorobenzene	ND	ND		ND			
1,1,1-Trichloroethane	ND	ND	ND	ND	0.8	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	8.7 J	120	0.4	830	0.26	ND	ND
1,2,4-Trimethylbenzene	ND	6.8		ND			
1,3,5-Trimethylbenzene	ND	ND		ND			
Styrene	ND	ND		ND			
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	ND	ND	2.1	ND	3.9	1	ND
o-Xylene	ND	ND	1.1	ND	1.2	0.35	ND
J = Estimated value							
ND = Non-detect							

APPENDIX A

SITE MAP



SPRING STREET
RRIS STREET
MORRIS STREET
SAW MILL LANE
(TOWN) LANE
WILMOT STREET
PINE STREET
KING STREET
KING PLACE
MORRISTOWN PARKING AUTHORITY (per agreement) (EXEMPTED) 1.84 ± AC
JUNIOR LEAGUE OF MORRISTOWN (EXEMPTED)
DRAINAGE
DRAIN
R/W
LANE
3607
4801
4702

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

FOR THE

VIP CLEAERS SITE

AMENDMENT TO:

QUALITY ASSURANCE PROJECT PLAN (QAPP)

FOR THE

VAPOR INTRUSION INVESTIGATION

AT THE

VIP CLEANERS SITE

MORRISTOWN, MORRIS COUNTY, NEW JERSEY

Date: April 19, 2006

Project Officer's Signature: _____ Date: 8/7/06

Project Officer's Name: Diane Salkie, Environmental Scientist

Project Quality Assurance Officer's Signature: _____ Date: 8/8/06

Project Quality Assurance Officer's Name: Pat Sheridan, QA Officer

Based on the results from the sub-slab samples collected at the VIP Cleaners site in Morristown, New Jersey, it is necessary to follow up with the collection of indoor air samples at three locations. The samples will be collected in 6 liter SUMMA canisters and analyzed for VOCs according to TO-15 as stated in the original QAPP. One location denied access, therefore, indoor air samples will be collected from 2 businesses. Two canister will be collected from one location due to the potential for the owner to lease out a portion of the building. In addition, one field duplicate, one ambient air sample and one trip blank will be collected during this portion of the sampling event.

QUALITY ASSURANCE PROJECT PLAN (QAPP)

FOR THE

VAPOR INTRUSION INVESTIGATION

AT THE

VIP CLEANERS SITE

MORRISTOWN, MORRIS COUNTY, NEW JERSEY

Project Officer's Signature: _____ Date: 4/19/06

Project Officer's Name: Diane Salkie, Environmental Scientist

Project Quality Assurance Officer's Signature: _____ ~~Date:~~ 4/25/06

Project Quality Assurance Officer's Name: Pat Sheridan, QA Officer

Date Prepared: April 19, 2006

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Appendix B U.S. Environmental Protection Agency (EPA). January 1999. *Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS) from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*. Second Edition

Appendix C - U.S. EPA (Environmental Protection Agency). July 1995. Environmental Response Team (ERT) Standard Operating Procedure (SOP) *#1704: SUMMA Canister Sampling*. Office of Emergency and Remedial Response (OERR), Washington, DC

Appendix D - Response Engineering and Analytical Contract (REAC). Standard Operating Procedure *2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells*. March 2004.

Appendix E - Example *Questionnaire*, Example *Canister Field Data Sheet*, Example *Chain of Custody* record, *Resident Instructions*, Example *Access Agreement*

1.0 Project Description

1.1 Problem Definition/Background

The VIP Cleaners site (site) is located at 89 Morris Street in Morristown, New Jersey. The site consists of a dry-cleaning facility and a plume of contaminated ground water. The facility was utilized for dry cleaning services by Caroline Laundry from the early 1940s until 1970, by VIP Cleaners from 1989 until 1996, by Milano French Cleaners from 1996 until 2000 and by New Image Cleaners and Tailoring from 2000 until the present. The former and current operators have used and continue to use chlorinated solvents, including tetrachloroethylene (PCE) for dry cleaning operations at the facility.

The original owner, Caroline Laundry, performed common laundering as well as dry cleaning operations in which they occupied the entire on-site building. Once they ceased operations, the building was divided for lease in 1970 to the aforementioned dry cleaners, a camera store, a lawnmower repair shop, auto repair shops, a computer store, hair salons, an auto detailing shop, a florist/garden center, a taxi and limousine service, an insurance sales office, a fish market, fitness facilities and a photography studio. The dry cleaning operations since 1989 have occupied the northern portion of the building only.

In February 1992, the property owner removed a 7000 gallon underground storage tank (UST) and its contents which was #6 heating oil. The tank had been located along the western side of the on-site building. The presence of a petroleum sheen on the ground water was found during the UST excavation. This prompted the New Jersey Department of Environmental Protection (NJDEP) to require the owner to install and sample a monitoring well at the location of the former UST. In September 1992, the property owner installed monitoring well, MW-1 adjacent to the former UST location.

Ground water samples were collected from MW-1 by the property owner in September 1992 and by NJDEP in June 1994. Both samples indicated the presence of PCE and some of its breakdown products, trichloroethylene (TCE) and 1,2-dichloroethylene (DCE) at concentrations ranging from 58 to 300 μg/L. The depth to ground water in MW-1 was measured at 4 feet below ground surface in 1994 and the screen is located at 12 to 22 feet below ground surface.

There appears to be no further investigative work at the site between 1994 and 2005. In 2005, the U.S. Environmental Protection Agency (EPA)'s Region II Pre-Remedial Program requested a status update from NJDEP. EPA obtained permission from NJDEP to undertake an Expanded Site Inspection at the site. In November and December of 2005, EPA's Site Assessment Team (SAT) contractor employed a direct-push drilling method to collect soil and ground water samples at and in the vicinity of the site. This investigation revealed that contamination exists in the immediate vicinity of the on-site building and has migrated beneath at least one nearby property. The highest concentration of PCE was 18,000 μg/kg in the soil and 19,000 μg/L in the ground water. In addition, the SAT contractor collected soil gas samples from the vicinity of the on-site building and beyond the site borders. Two of the eleven soil gas samples collected

revealed PCE at 37.2 and 23.4 $\mu g/m^3$. The two soil gas samples were located in close proximity to the north end of the on-site building.

Based upon the unknown extent of the plume, the shallow depth to groundwater, the concentrations of chemicals in the groundwater and soil gas, and the location of residences in the vicinity of the site, the EPA has determined that a vapor intrusion investigation is necessary. To initiate the investigation, the U.S. EPA personnel will install sub-slab ports in the on-site building and the basements or lowest floor of several homes and businesses in the vicinity of the site and then collected sub-slab air samples. In addition, indoor air samples will be collected from the on-site building.

The Division of Environmental Science and Assessment (DESA), Hazardous Waste Support Branch (HWSB), Superfund Contract Support Team (SCST) has been requested by the Environmental Remedial and Response Division (ERRD) to conduct a vapor intrusion investigation at the VIP Cleaners site.

1.2 Project/Task Description:

The purpose of this vapor intrusion investigation is to collect valid data which are necessary and efficient to identify the levels of volatile organic contaminants (VOCs) in the indoor air and sub-slab in businesses and residences in the vicinity of the site.

The purpose and scope of this QAPP is to specify the details related to the collection, analysis and validation of the air samples collected by the USEPA Region 2, Division of Environmental Science and Assessment (DESA), Hazardous Waste Support Branch (HWSB), Superfund Contract Support Team (SCST) on April 24 – May 12, 2006.

The objective of this study is to assess the current status of and potential for residential/occupational indoor air exposure to VOCs in homes and businesses at and adjacent to the VIP Cleaners site by comparing sample results to health based levels of concern. The air samples will be analyzed according to Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B. The contaminant of concern at the site is PCE and its breakdown products like TCE and 1,2-DCE. The sub-slab samples will be used to determine whether there is a potential for indoor air contamination originated from the ground. If, for example, the trichloroethylene (TCE) results exceeded 2.7 $\mu g/m^3$ or 0.5 ppbv, then it became necessary to sample the indoor air space.

Additional indoor air samples will be collected simultaneously with the sub-slab at the main on-site building to demonstrate the attenuation factor of the vapors from the soil into the indoor air and to evaluate the possible health threats from the former and current dry cleaning operations. The levels of concern for this project are in the tables below. The values are from EPA's Integrated Risk Information System(IRIS), National Center for Environmental Assessment (NCEA), and/or EPA Region 9 preliminary remediation goals (PRGs). Levels of concern for carcinogens represent a 10-6 (one in one million) to 10-4(one in ten thousand) excess individual lifetime cancer risk. Non-cancer levels of concern represent a hazard quotient (HQ) of 0.1 and 1.0. The following table shows the reporting limit for the indoor air samples, which should

be the lowest risk value, unless the reporting limit is higher.

Compound of Concern	Cancer Risk Levels (ug/m3) for Indoor Air				Non-Cancer Risk Levels (ug/m^3)		Reporting Limit for Indoor Air (ug/m^3)
	10^{-6}	10^{-5}	10^{-4}	Source	HQ = 1	Source	
TCE	0.017	0.17	1.7	NCEA			0.38
PCE	0.3	3.0	30	NCEA			0.47

The following table shows the reporting limit for the sub-slab samples, which should be the lowest risk value presented, unless the reporting limit is higher.

Compound of Concern	Cancer Risk Levels (ug/m3) adjusted for Attenuation Factor				Non-Cancer Risk Levels (ug/m^3) Adjusted for Attenuation Factor		Reporting Limit for Sub-slab (ug/m^3)
	10^{-6}	10^{-5}	10^{-4}	Source	HQ = 0.1	Source	
TCE	0.17	1.7	17	NCEA			2.15
PCE	3	30	300	NCEA			2.71

The activity schedule is as follows:

ACTIVITY	DATE
Date of the request which initiates the project.	March 10, 2006
Review and Background information	April 13, 2006
Date by which the project plan will be submitted to all interested parties.	April 19, 2006
Obtain site access	Prearranged by ERRD
Date by which comments on the plan are to be received by the project officer.	April 26, 2006
Date(s) of the field reconnaissance and removing possible sources of cross-contamination	April 03, 2006
Date(s) of the field sampling activities.	April 24 – 28, 2006 – Install Sub-slab ports May 01 – 12, 2006 - Sampling
Date(s) the samples will be submitted to the laboratory for analysis.	All samples will be shipped to a Laboratory within 24 hours of collection
Date(s) by which all analyses are to be completed and the data submitted to the project officer.	Samples analyzed via TO-15 with a 14 day turnaround time
Date of the completion of the draft interim/final project report. (Sampling Trip Report)	Within one week of the end of the sampling event
Date for the issuance of the final project report.	Contract Laboratory Program (CLP) protocol dictates within two weeks of receipt of validated analytical data.

The primary use of the data collected will be to identify the levels of VOCs in the sub-slab of residences and business. In addition, indoor air contamination will be investigated in the main building to determine if the contaminants have infiltrated into breathing space of the building. The samples results will be evaluated to determine whether the contamination is significant enough to require further action (e.g., additional sampling, removal/remedial action).

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

2.1 Project/Task Organization

The following list of key personnel and their corresponding responsibilities. Due to the work breakdown structure of the project, an organization list is provided instead of a concise organization chart.

PROJECT PERSONNEL	RESPONSIBILITY
Diane Salkie, Project Officer DESA/HWSB Superfund Contract Support Team	Project Management/ Sampling Operations/ Field Support
Robert Finke, Environmental Scientist DESA/HWSB Superfund Contract Support Team	Sampling Operations/ Field Support
Pat Sheridan, Project Quality Assurance Officer DESA/HWSB/HWSS	Report QA
National Non-Routine Analytical Service (RAS) Air Program	Laboratory Analysis
	Laboratory QC
	Data Processing Activities
DESA/HWSB Hazardous Waste Support Section	Data Quality Review
Not Applicable	Performance Auditing
Not Applicable	Systems Auditing
DESA/Hazardous Waste Support Branch	Overall QA
Andrew Confortini, On-Scene Coordinator ERRD/RAB	Overall Project Coordination

2.2 Documentation and Records

The data collected for the sampling activities will be organized, analyzed, and summarized in a final project report that will be submitted to the OSC according to the Project Schedule. The report will be prepared by the project officer and include appropriate data quality assessment. Standard methods and references will be used as guidelines for data reduction and reporting. All data generated by the laboratory will be reported in standard electronic data deliverable format. A copy of the complete data package will be maintained with the project files at the Federal Records Center in Kansas City, Missouri for a period of thirty years.

3.0 QUALITY ASSURANCE (QA) OBJECTIVES FOR MEASUREMENT DATA (PARCC)

3.1 Quality Objectives and Criteria for Measurement Data

To assess data quality, PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability) parameters will be utilized. This is an integral part of the overall monitoring network design. Precision and accuracy are expressed in purely quantitative terms. The other parameters are only expressed using a mixture of quantitative and qualitative terms. All of these parameters are interrelated in terms of overall data quality and they may be difficult to evaluate separately due to these interrelationships. The relative significance of each of the parameters depends on the type and intended use of the data being collected. Therefore, these essential data quality elements are delineated as follows.

3.1.1 Analytical and sample collection precision

The measure of replicate precision is the absolute value of the difference between replicate measurements of the sample divided by the average value and expressed as a percentage as follows:

$$\text{Percent difference} = \frac{|X_1 - X_2|}{X} \times 100$$

where: X_1 - First measurement value
X_2 - Second Measurement value
X - Average of the two values

Factors that affected the precision of the measurement are: molecular weight, water solubility, polarizability, etc. A primary influence is the concentration level of the compound. A replicate precision value of 25 percent can be achieved for each of the target compounds. For more information, refer to Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B.

3.1.2 Analytical and sample collection accuracy

A measurement of analytical accuracy is the degree of agreement with audit standards. It is defined as the difference between the nominal concentration of the audit compound and the measured value divided by the audit value and expressed as a percentage as follows:

$$\text{Audit Accuracy, \%} = \frac{\text{Spiked Value - Observed Value}}{\text{Spiked Value}} \times 100$$

For more information, refer to Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B. As per Method TO-15, the performance criteria for audit accuracy should be within 30 percent for concentrations normally expected within contaminated ambient air.

3.1.3 Data representativeness

As previously discussed, data representativeness will be assessed by collecting field co-located samples. The field co-located samples are by definition equally representative of a given point and space and time. The laboratory also collects two samples from one canister; the sample and a duplicate. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that:

The sampling program is followed according to:

> U.S. EPA (Environmental Protection Agency). October 1989. *Region II CERCLA Quality Assurance Manual.* Final Copy, Revision 1. Division of Environmental Services and Assessment, Edison, NJ.; and
>
> U.S. EPA. December 1995. *Superfund Program Representative Sampling Guidance.* OSWER Directive 9360.4-10. Interim Final. EPA/540/R-95/141. Office of Emergency and Remedial Response (OERR). Washington, D.C.

Proper sampling techniques for indoor air are used in accordance with:

> U.S. EPA. Environmental Response Team (ERT) *Standard Operating Procedure (SOP) #1704: Summa Canister Sampling;* revised July 1995. The SOP is enclosed in Appendix C.

Proper sampling techniques for sub-slab sampling are used in accordance with:

> Response Engineering and Analytical Contract (REAC) *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells*. March 2004 which can be found as Appendix D.

Proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory according to:

U.S. EPA. January 1999. Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.* Second Edition. Center for Environmental Research Information. Office of Research and Development. Cincinnati, OH which can be found as Appendix B.

3.1.4 Data completeness

Data completeness will be expressed as the percentage of valid data obtained from measurement system. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by USEPA Region II DESA/HWSB/ Hazardous Waste Support Section (HWSS) according to the appropriate and current US EPA Region 2 Data Validation SOPs. With 100% validation, the rationale for considering data points non-critical is not required.

3.1.5 Data comparability

To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

4.0 Sampling Procedures

4.1 Pre-Sampling Investigation

A qualitative assessment of the factors influencing indoor air contamination will be evaluated by conducting a simple "walk through" assessment prior to indoor air sampling at the main building. During this assessment observations about potential indoor sources of the particular compounds noted in Table 1 should be made. Any other influencing factors will be noted and logged. A photo-ionization meter will be utilized to screen the interior air for possible sources of cross contamination. A *Questionnaire* (see Appendix E) will be completed with the assistance of the business owner.

4.2 Sampling Process Design

Sub-slab and indoor air samples are to be collected in evacuated 6 liter SUMMA canisters, and analyzed in accordance with U.S. EPA. January 1999, Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* which can be found as Appendix B.

The sampling objectives of this study are as follows. The first objective is to collect air samples which will be representative of conditions related to potential chronic levels of environmental exposure in the respective structures. Sampling for chronic exposures to indoor air indicates that multiple sampling sites be used. In addition, a chronic exposure scenario indicates that air sampling should be performed for a twenty-four hour period.

For the purposes of this sampling event, sample locations were determined by the OSC based on previous ground water and soil gas results. The owner/occupant will be notified prior to the sampling day by a telephone call or in-person visit and a letter through the mail. A copy of this page can be found as Appendix E. The owner/occupant will also be required to sign an access agreement, allowing the field personnel to enter the building and to sample the indoor air. An example of this can be found as Appendix E. A map of the area can be found in Appendix A. A detailed description of sample collection methodology is presented in Section 4, Sub-section 3, Part 2: Sample Collection Methodology.

At each location one sub-slab soil gas well or port will be installed in the lowest floor or basement according to REAC *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells* which can be found as Appendix D. The location will vary depending on whether or not the basement is finished, the willingness of the owner and any other obstacles. Ideally, the port will be installed in the center of the room. After at least twenty four hours has passed and the concrete has hardened, a sub-slab soil gas will be collected with a SUMMA canister.

At the main building, two samples will be collected from each of the business fronts. One sub-slab sample will be taken from the previously installed sample port. Simultaneously, one indoor air samples will be collected from the interior or main floor of the business. For buildings that contain sump pumps, the indoor air sample will be taken in or as close as possible to the sump pump. If the structure does not have a sump, the canister will be located next to a crack in the slab, pipes coming from the ground or any other biased location. The indoor air sample will be located in a lived-in space in the breathing space which is considered 3 feet from the floor.

The purpose for collecting sub-slab samples congruent with indoor air samples will be to determine the attenuation factor of the vapor from the sub-surface to indoor air and to prove attribution between the sub-surface and the indoor air space.

Along with the collection of indoor air and sub-slab samples, one ambient air samples will be collected within the area adjacent to the residences and businesses per day. These samples will be used to assess the ambient outdoor air concentrations of VOCs that could impact indoor air. Ambient samples will be collected over the same 24-hour period as the indoor air samples are collected and analyzed to the same reporting limits as the indoor air samples. Outdoor samples will also be collected in between the current dry cleaner operations and the resident or business to be sampled.

In addition, field duplicate samples will be collected for indoor air by placing two canisters side by side and opening the valves simultaneously. Sample frequency should be one duplicate sample for every 20 field samples. Co-located samples for sub-slab sampling will be collected from the school which contains two sub-slab ports. The canisters will be connected to each port and opened simultaneously. Finally, one of the canisters will be designated as a trip blank sample. The canister will arrive evacuated, accompany the sampling canisters to the site and will be returned to the laboratory in the evacuated state. The Chain of Custody and datasheet will distinguish this sample from the remaining samples. The laboratory will fill the blank canister with zero air and then analyze it along with the remaining air samples. The blank will be used to evaluate errors arising from potential cross-contamination due to: improper handling of samples by collectors and lab personnel; improper shipment and storage; and/or on-site atmospheric contaminants. The sampling and analysis protocol is listed in Table 2.

TABLE 2
Sampling and Analysis Protocols

Sample Type	Number of Samples	Matrix	Parameter/Fraction	Sample Container	Analytical Method[1]	Reporting Limit (ppbv)	Reporting Limit (ug/m^3)	Holding Time
Indoor Air	20	Air	VOCs	(1) 6 lt. SUMMA Canister	TO-15	0.07	0.32 – 0.47	30 days
Sub-slab	35	Air	VOCs	(1) 6 lt. SUMMA Canister	TO-15	0.4	1.82 – 2.71	30 days
Ambient	Up to 10	Air	VOCs	(1) 6 lt. SUMMA Canister	TO-15	0.07	0.32 – 0.47	30 days
Trip Blank	Up to 10	Air	VOCs	(1) 6 lt. SUMMA Canister	TO-15	0.07	0.32 – 0.47	30 days

Legend:
[1] U.S. EPA. January 1999. Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.* Second Edition.

4.3 Sampling Methods Requirements

4.3.1 Standard operating procedures

As previously stated, all sampling will be in accordance with the U.S. EPA Region II *CERCLA Quality Assurance Manual*; and *U.S. EPA Superfund Program Representative Sampling Guidance* OSWER Directive 9360.4-10, Interim Final, EPA/540/R-95/141, Office of Emergency and Remedial Response (OERR), Washington, D.C. Furthermore, the specific Standard Operating Procedure (SOP) utilized for air sampling, as presented in Appendix C, is the U.S. EPA ERT *SOP #1704: Summa Canister Sampling* and the REAC *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells* which can be found as Appendix D.

4.3.2 Sample collection methodology

All air samples including QA/QC samples will be collected by USEPA Region II DESA/HWSB/SCST from the residences and businesses in the vicinity of the VIP Cleaners site. The total number of samples includes: 35 sub-slab samples; 5 field co-located sub-slab sample; 10 indoor air samples; 1 field duplicate indoor air sample ; up to 10 trip blank samples and up to 10 ambient air and outdoor air samples. Sub-slab samples will be collected by connecting the canister to the sub-slab port via Teflon tubing according to REAC *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil*

Gas Wells which can be found as Appendix D. Indoor air samples will be collected by placing a SUMMA™ canister in the appropriate location with a pre-set valve for twenty-four hour sampling as can be seen from the U.S. EPA ERT *SOP #1704: Summa Canister Sampling* which can be found as Appendix C.. The sampler will open the canister, ask the resident questions from the *Questionnaire* and survey the chemicals found in the basement. The canisters will then be closed and retrieved after twenty-four hours passes.

4.3.3 Sample Containers, Volume, Preservation, and Holding Times

Sample container type, volume, preservation, and holding times are dependent upon analytical parameter and fraction and are matrix specific. The following table outlines the sample container type, volume, preservation, and holding times for samples to be collected on-site.

Analytical Parameter/Fraction	Sample Container	Required Sample Volume	Sample Preservation	Holding Time
VOC	(1) SUMMA™ canister	6 lts.	None	30 days to analyze

4.3.4 Field measurement data collection

Air monitoring will be conducted at this site with a photo-ionization detect in an effort to locate any possible source of cross-contamination.

Canister Sample Data Sheets, *Questionnaires*, *Chain of Custody* and the field notebook will be completed for each sample collected. The *Questionnaire* will record sample location; residential information; time of sample drop off and pick up; conditions in the room; laboratory sample number; laboratory sample analysis and sample collection notes and/or observations. An example of the *Questionnaire* is presented in Appendix E. The *Canister Sample Data Sheet* will be provided by the laboratory and records the sample location, sampling period, initial and final sample time and comments. An example of this data sheet can also be found in Appendix E. The *Chain of Custody* is a record of the sample location, sample canister and valve numbers and time and date of the sample. An example of the *Chain of Custody* can be found in Appendix E. The field notebook will be completed as provided for in Section 8.4: Data Quality Management of the QAPP.

4.3.5 Sampling Equipment Decontamination

Air samples will be collected using 6 liter SUMMA™ canisters. The laboratory will perform decontamination of every canister and sample valve prior to sending them to U.S. EPA and will provide EPA with documentation certifying them as clean. This documentation should be included on the data sheets as well. The SUMMA™ canisters will be cleaned according to:

- *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*; and

- *U.S. EPA Region II CERCLA Quality Assurance Manual.*

4.3.6 Management of Investigative-Derived Wastes (IDW)

There will be minimum waste due to the nature of the sampling event. There will be no personnel protective equipment to be disposed.

5.0 SAMPLE CUSTODY

5.1 Special Training Requirements/Certification

To perform the operations of this sampling event, SCST will be dealing with the remedial activities on-site. This can imminently expose SCST personnel to potential occupational environmental hazards. As a result, it is important for SCST field personnel to be familiar with:

- Identifying methods and procedures for recognizing, evaluating and controlling hazardous substances.
- Identifying concepts, principles, and guidelines to properly protect SCST field personnel.
- Discussing regulations and action levels to ensure the health and safety of SCST field oversight personnel.
- Discussing the fundamentals needed to develop organizational structures and standard operating procedures to mitigate potential environmental hazards.
- Demonstrating the selection and use of dermal and respiratory protective equipment.
- Demonstrating the selection and use of direct-reading air monitoring instrumentation

In practice, not all of the potential environmental hazards which may be inherent to a site can be readily anticipated. To mitigate these circumstances, SCST field personnel must learn, follow, and enforce the published rules governing occupational health and safety. In addition, they must maintain awareness and exercise common sense and good judgment when confronting possible unsafe situations. Consequently, all divisions and offices at the Edison facility are required to provide their staff with the necessary safety training and equipment to perform their assigned duties.

For SCST personnel, all training and certification requirements are to be undertaken in accordance with the protocols set forth in the 1995 "Edison Health and Safety Manual." Specifically, this requires completion of the forty (40) hour "Hazardous Materials Incident Response Operations" training pursuant to Occupational Safety and Health Administration

(OSHA) regulation 29 CFR 1910.120 and U.S. EPA Order 1440.2. This is to be supplemented by completing the twenty four (24) hour OSHA sanctioned supervised on-site operations certification training. In conjunction, SCST personnel are also to maintain certifications for:

- The supplemental eight (8) hour annual health and safety refresher training.
- Fit testing for atmosphere supplying respirators (Level B) and air purifying respirators (Level C).
- Enrollment in a physician authorized medical monitoring program.

5.2 Sample Handling and Custody Requirements

5.2.1 Sample handling and shipment

Canister Sample Data Sheets, *Chain of Custody* and the field notebook will be completed for each sample collected. All field and sample documents will be legibly written in indelible ink. Any corrections or revisions will be made by lining through the original entry and initialing the change. The *Canister Sample Data Sheet* will be provided by the laboratory and records the sample location, sampling period, initial and final sample time and comments. An example of this data sheet can also be found in Appendix E. The *Chain of Custody* is a record of the sample location, sample canister and valve numbers and time and date of the sample. An example of the *Chain of Custody* can be found in Appendix E. The field notebook will be used by field personnel to record all aspects of sample collection and handling, visual observations, and field measurements. The field notebook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. The sample team or individuals performing a particular sampling activity are required to maintain a field notebook. This field notebook will be a bound weatherproof logbook that shall be filled out at the location of sample collection immediately after sampling. All entries will be signed by the individuals making them. At a minimum, the notebook will contain sample particulars including sample number, collection time, location, descriptions, methods used, daily weather conditions, field measurements, name of sampler(s), sample preservation, names of contractor/ subcontractor personnel, and other site-specific observations including any deviations from protocol.

Samples will be packaged and shipped in accordance with USEPA, Department of Transportation (DOT), and International Air Transport Association (IATA) procedures. All samples will be shipped within 24 hours of collection to the laboratory

5.2.2 Sample custody procedures

Standard U.S.EPA Chain-of-Custody Procedures will be followed for all samples and be in accordance with the U.S.EPA Region II *CERCLA Quality Assurance Manual.* The *Chain of Custody* records will be maintained from the time of sample collection until final disposition. Every transfer of custody will be noted and signed for and a copy of the record will be kept for each individual who has signed it. The *Chain of Custody* records will include, at a minimum, sample identification number, number of samples collected, sample collection date and time, sample type, sample matrix, sample container type, sample analysis requested, sample

preservation, and the name(s) and signature(s) of samplers and all individuals who have had custody. An example can be found in Appendix E. Custody seals will demonstrate that a sample container or cooler has not been opened or tampered with. The sampler will sign and date the custody seal and affix it to the container and/or cooler in such a manner that it cannot be opened without breaking the seal.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

6.1 Instrument Calibration and Frequency

Laboratory analytical equipment calibration will follow procedures as specified under U.S. EPA, Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, which can be found as Appendix B. The photo-ionization detector will be calibrated prior to sample commencement.

7.0 ANALYTICAL PROCEDURES

7.1 Analytical Methods Requirements

The analytical method, equipment and method performance requirements for analysis will be according to *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, which can be found as Appendix B.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 Data Review, Validation and Verification Requirements:

Standard methods and references will be used as guidelines for data reduction and reporting. All data generated by the laboratory will be reported in standard deliverable format as indicated in *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS)* from the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, which can be found as Appendix B.

8.2 Validation and Verification Methods

All data will be validated by USEPA Region II DESA/HWSB/HWSS in accordance with U.S. EPA Region II SOP *HW-31: Volatile Organic Analysis of Ambient Air in Canister by Method TO-15*, April 2006.

8.3 Data Acquisition Requirements

Data acquisition from non-direct measurements such as data from databases or literature is not anticipated at this time. Therefore, this is not applicable.

8.4 Data Quality Management

All project data and information must be documented in a format that is usable by project personnel. This section of the QAPP describes how project data and information will be documented, tracked, and managed from their generation in the field to final use and storage in a manner that ensures data integrity and defensibility. All field and sample documents will be legibly written in indelible ink. Any correction or revisions will be made by lining through the original entry and initialing the change.

The following field and sample documentation will be maintained.

- The field notebook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. The sample team or individuals performing a particular sampling activity are required to maintain a field notebook. This field notebook will be a bound weatherproof logbook that shall be filled out at the location of sample collection immediately after sampling. All entries will be signed by the individuals making them. At a minimum, the notebook will contain sample particulars including sample number, collection time, location, descriptions, methods used, daily weather conditions, field measurements, name of sampler(s), sample preservation, and other site-specific observations including any deviations from protocol.

- Field data sheets, i.e., *Questionnaire, Canister Field Data Sheet*, and corresponding sample labels are used to identify samples and document field sampling conditions and activities. The field data sheets will be completed at the time of sample collection and will include the following: sample location; residential information; drop off and pick up time; sample environment description; laboratory sample number; laboratory sample analysis; and sample collection notes and/or observations. An example of the *Questionnaire* and the *Canister Field Data Sheet* are presented in Appendix E. Sample labels will be securely affixed to the sample container and include only the sample identification number as per Protocol.

- The *Chain of Custody* records will be maintained from the time of sample collection until final disposition. Every transfer of custody will be noted and signed for and a copy of the record will be kept for each individual who has signed it. The chain-of-custody records will include, at a minimum, sample identification number, number of samples collected, sample collection date and time, sample type, sample matrix, sample container type, sample analysis requested, sample preservation, and the name(s) and signature(s) of samplers and all individuals who have had custody. An example of the chain of custody that will be used at this site can be found in Appendix E.

- Custody seals will demonstrate that a sample canister or box has not been opened or tampered with. The sampler will sign and date the custody seal and affix it to the box in such a manner that it cannot be opened without breaking the seal. An example can be found as Appendix E.

- Procedures are provided for project personnel to make changes, take corrective actions and document the process through Corrective Action Request Forms. Corrective action can occur during field activities, laboratory analysis, data validation, and data assessment. For further information, refer to Section 13.0: Corrective Action.

9.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 Quality Control Requirements

As previously stated, to assess data quality, PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability) parameters will be utilized. These essential data quality elements are delineated as follows.

9.1.1 Data precision

Precision is defined as a measure of the reproducibility of individual measurements of the same property under a given set of conditions. The overall precision of measurement data is a mixture of sampling and analytical factors.

9.1.1.1 Analytical precision

The measure of replicate precision is the absolute value of the difference between replicate measurements of the sample divided by the average value and expressed as a percentage as follows:

$$\text{Percent difference} = \frac{|X_1 - X_2|}{X} \times 100$$

where: X_1 - First measurement value
X_2 - Second Measurement value
X - Average of the two values

Factors that affected the precision of the measurement are: molecular weight, water solubility, polarizability, etc. A primary influence is the concentration level of the compound. A replicate precision value of 25 percent can be achieved for each of the target compounds. For more information, refer to Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B.

Table 4 located on page 22 of this QAPP depicts the analytical precision for the analytical methods chosen in terms of estimated relative percent difference (RPD).

9.1.1.2 Sample collection precision

Sample collection precision will be assessed by collecting field co-located samples. The field co-located samples will be used to evaluate errors associated with sample heterogeneity, sampling methodology and analytical procedures. The analytical results from these samples will provide data on the overall measurement precision.

9.1.2 Data accuracy

Accuracy is defined as the degree of difference between measured or calculated values and the true value. The closer the numerical value of the measurement comes to the true value, or actual concentration, the more accurate the measurement is. It is difficult to measure accuracy for the entire data collection activity. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation and analysis techniques.

9.1.2.1 Analytical accuracy

A measurement of analytical accuracy is the degree of agreement with audit standards. It is defined as the difference between the nominal concentration of the audit compound and the measured value divided by the audit value and expressed as a percentage as follows:

$$\text{Audit Accuracy, \%} = \frac{\text{Spiked Value - Observed Value}}{\text{Spiked Value}} \times 100$$

A performance criteria cannot exceed 30% for analytical accuracy. For more information, refer to Compendium Method *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B.

Table 4 on page 22 located in this QAPP depicts both the analytical precision and accuracy for the analytical methods chosen in terms of estimated percent recovery.

9.1.2.2 Sample collection accuracy

Method blanks will be used to monitor possible laboratory contamination. The laboratory shall provide results for the method blanks or the blank analysis for the canisters prior to use. The trip blank will be used to evaluate errors arising from potential cross-contamination due to: improper handling of samples by collectors and lab personnel; improper shipment and storage; and/or on-site atmospheric contaminants. The trip blank canister will arrive evacuated , accompany the sampling canisters to the site and will be returned to the laboratory in the evacuated state. The Chain of Custody and datasheet will distinguish the sample from the remaining samples. The laboratory will fill the blank canister with zero air and then analyze it along with the remaining samples.

9.1.3 Data Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or and environmental condition. For the purposes of this QAPP, data representativeness is the minimum number of samples that are needed to evaluate the indoor air environment. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program and proper laboratory protocol. The representativeness criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected. Therefore, data representativeness will be assessed by collecting field replicate samples. The co-located samples are by definition equally representative of a given point in space and time. The laboratory also collects two samples from one canister; the sample and a duplicate. In addition, as previously stated, data representativeness will be satisfied by ensuring that the sampling program is followed according to the *U.S. EPA Region II CERCLA Quality Assurance Manual*; and the *U.S. EPA Superfund Program Representative Sampling Guidance* for soil, Volume 1. Also, proper sampling techniques will be used in accordance with the U.S. EPA. *Environmental Response Team (ERT) Standard Operating Procedure (SOP) #1704: Summa Canister Sampling* which is enclosed in Appendix C and REAC *Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells* which can be found as Appendix D.

9.1.4 Data Comparability

Comparability is defined as the confidence with which one data set can be compared to another. Field and laboratory procedures greatly affect comparability. Therefore, to optimize comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be compared.

9.1.5 Data Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data completeness will be expressed as the percentage of valid data obtained from measurement system. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by (USEPA Region II DESA/HWSB/HWSS in accordance with the US EPA Region 2 SOPs. For the purposes of this QAPP completeness is the successful collection of all samples specified in a particular structure. If a specified sample is not collected then that data set would not be considered complete.

10.0 Performance and Systems Audits

10.1 Assessments and Response Actions

No performance audit of field operations is anticipated at this time. If conducted, performance and systems audits will be in accordance with:

- U.S. EPA (Environmental Protection Agency) Region II. October 1994. *SOP No. HW-20: Standard Operation Procedure (SOP) for Conducting CERCLA Field Audits.* Revision 0. Division of Environmental Services and Assessment, Hazardous Waste Support Branch, Hazardous Waste Support Section, Edison, NJ.

11.0 PREVENTIVE MAINTENANCE

11.1 Instrument/Equipment Testing, Procedures & Scheduled Inspection and Maintenance Requirements

As previously stated, calibration and preventative maintenance of analytical laboratory equipment will be conducted by the laboratory according to *TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* which can be found as Appendix B.

11.2 Inspection/Acceptance Requirements for Supplies and Consumables

Canisters will be cleaned to the limit specified in the task order which is below the reporting limit. Every canister and valve will be certified clean.

12.0 SPECIFIC ROUTINE PROCEDURES/MEASUREMENT PARAMETERS INVOLVED

12.1 Reconciliation with Data Used to Assess PARCC for Quality Objectives Measurement

Sample collection precision will be evaluated by collecting and analyzing a co-located sample. The co-located samples will be used to evaluate errors associated with sample heterogeneity, sampling methodology and analytical procedures. The analytical results from the co-located sample will provide data on the overall measurement precision. Precision will be reported as the relative percent difference (RPD) for two measurements. The acceptance criteria for the co-located samples are located in Table 4 on page 22. The laboratory also collects two samples from one canister; the sample and a duplicate.

Data will be generated through the collection of air samples in appropriate locations (e.g., sub-slab, main floor) in the area of the VIP Cleaners Site. This data will be used to determine the location and concentration of contamination in the structure, the extent of contamination, evaluate potential health threats, and determine environmental impacts while identifying clean-up criteria.

TABLE 4: PRECISION AND ACCURACY								
Sample Parameter/ Fraction	**Sample Matrix**	**Analytical Method**	**Method Detection Limit**	**Units**	**Estimated Accuracy**	**Accuracy Protocol**	**Estimated Precision**	**Precision Protocol**
VOCs	Indoor Air	TO-15	0.32 – 0.47	$\mu g/m^3$	< or = 30%	Non-RAS	< or = 25%	Non-RAS
VOCs	Sub-slab	TO-15	1.82 – 2.71	$\mu g/m^3$	< or = 30%	Non-RAS	< or = 25%	Non-RAS
TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)								

13.0 CORRECTIVE ACTION

13.1 Assessments and Response Actions

Procedures are provided for project personnel to make changes, take corrective actions Procedures are provided for project personnel to make changes, take corrective actions and document the process through Corrective Action Request Forms. Corrective action can occur during field activities, laboratory analysis, data validation, and data assessment.

Corrective action in the field may be necessary when the monitoring network design is changed. A change in the field includes: increasing the number or type of samples or analyses; changing sampling locations; and/or modifying sampling protocol. When this occurs, the project officer or project QA officer will identify any suspected technical or QA deficiencies and note them in the field logbook. The project QA officer will be responsible for assessing the suspected deficiency and determining the impact on the quality of the data. Development of the appropriate corrective action will be the responsibility of the RPM.

Data validation and data assessment corrective action will be in accordance with the *U.S. EPA Region II CERCLA Quality Assurance Manual*.

14.0 QA REPORTS TO MANAGEMENT

14.1 Distribution List

The following project personnel will receive copies of the approved QAPP and any subsequent revisions.

Project Personnel	Title
Andrew Confortini ERRD/RAB	On-Scene Coordinator
Diane Salkie DESA/HWSB Superfund Contract Support Team (SCST)	Project Officer
Pat Sheridan DESA/HWSB Superfund Contract Support Team (SCST)	Quality Assurance Officer

14.2 Reports to Management

The data collected as a result of sampling activities; will be organized, analyzed and summarized in a final project report that will be submitted to the OSC according to the Project Schedule. The report will be prepared by the project officer or project quality assurance officer and include appropriate data quality assessment.

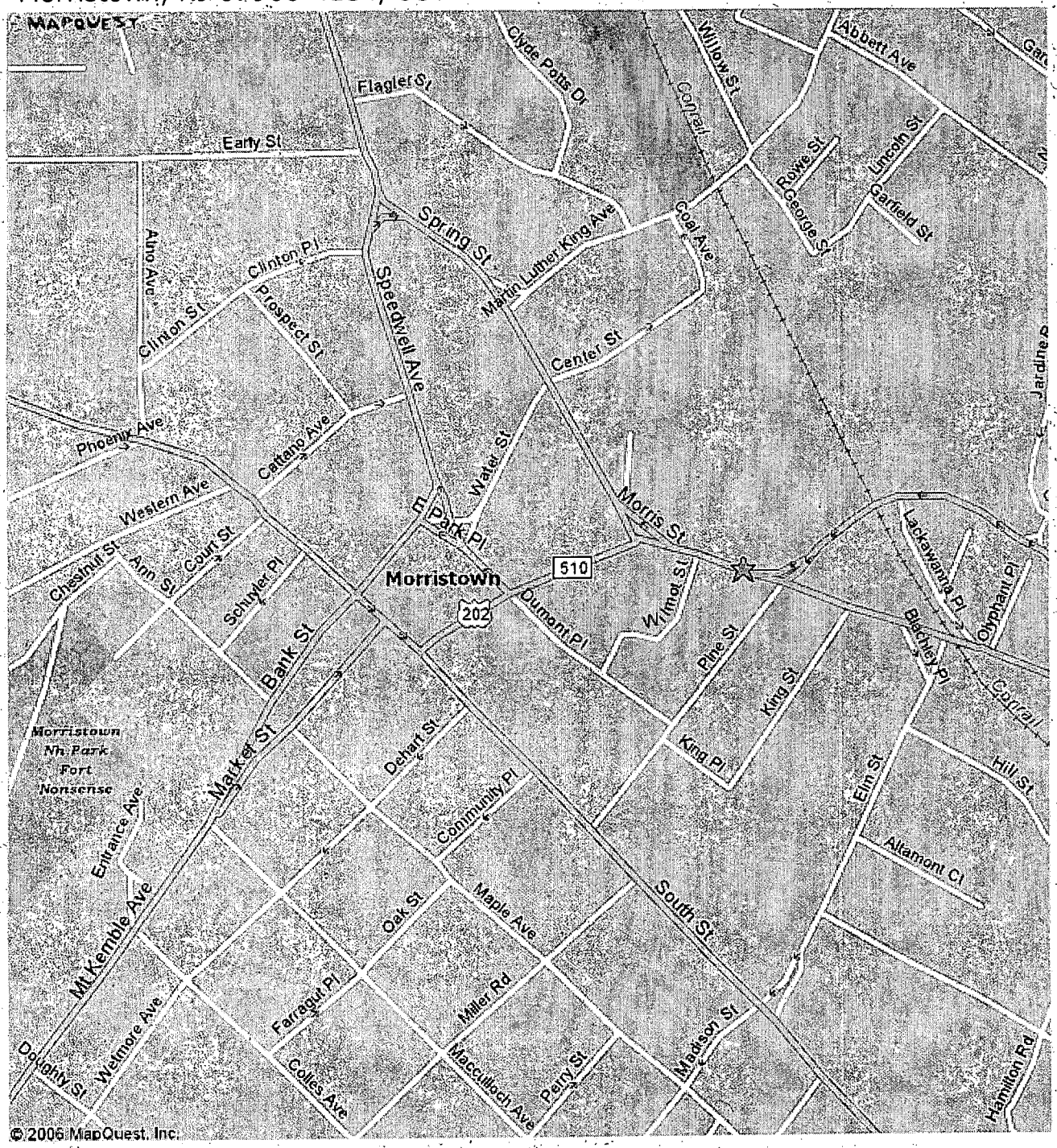
APPENDIX A

SITE MAPS

MAPQUEST

89 Morris St

Morristown, NJ 07960-4154, US



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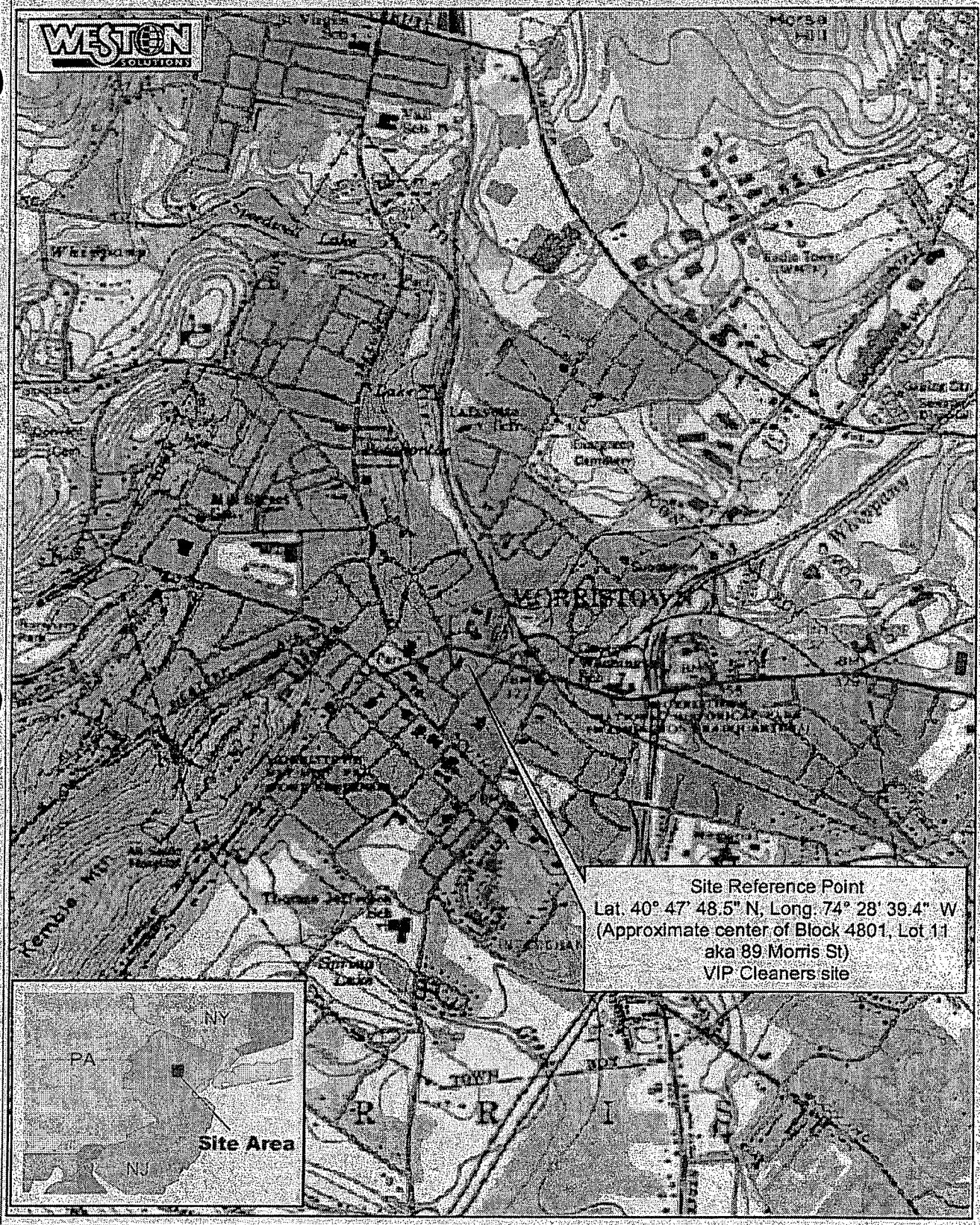

SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangles: Morristown NJ, 1954, photorevised 1981

DATE: 03/13/06

N W E S

750 0 750 1,500

Graphic Scale In Feet

Figure 1
Site Location Map
VIP Cleaners
Morristown, Morris County, New Jersey

L:\SAT 2\VIP Cleaners (013)\GIS\02914_VIP\Figure1.mxd

L:\SAT 2\VIP Cleaners (013)\GIS\02908_VIP_SG_Area_Air_Samples.mxd

Sources:
1. New Jersey 2002 High Resolution Orthophotography, State of New Jersey Office of Information Technology, Office of Geographic Information Systems.
2. Weston Solutions, Inc., Site Logbook, Region 2 Site Assessment Team, SAT 120.000 II Site Assessment Team 2, SAT2.2013.013.001.

LEGEND:
- Soil Gas Sample Locations
- Indoor Air/Ambient Air Sample Locations

Note: All sample numbers proceeded by "VIP-"

PROJECT: VIP Cleaners

CLIENT NAME: Environmental Protection Agency

TITLE: Figure 2 - Soil Gas And Air Sample Location Map

VIP Cleaners
89 Morris Street
Morristown, New Jersey

SCALE: 25 0 25 50 75 Feet

DRAWN BY: J. Lynes
REVIEWED BY: G. Gilliland
PROJECT MANAGER: G. Gilliland
DRAWING NUMBER: 02908
DATE: 03/09/08

N W E S

APPENDIX B

U.S. Environmental Protection Agency (EPA)

Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specialty-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)
from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition

January 1999

EPA/625/R-96/010b

Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air

Second Edition

Compendium Method TO-15

Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/ Mass Spectrometry (GC/MS)

Center for Environmental Research Information
Office of Research and Development
U.S. Environmental Protection Agency
Cincinnati, OH 45268

January 1999

Method TO-15
Acknowledgements

This Method was prepared for publication in the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition* (EPA/625/R-96/010b), which was prepared under Contract No. 68-C3-0315, WA No. 3-10, by Midwest Research Institute (MRI), as a subcontractor to Eastern Research Group, Inc. (ERG), and under the sponsorship of the U.S. Environmental Protection Agency (EPA). Justice A. Manning, John O. Burckle, and Scott Hedges, Center for Environmental Research Information (CERI), and Frank F. McElroy, National Exposure Research Laboratory (NERL), all in the EPA Office of Research and Development, were responsible for overseeing the preparation of this method. Additional support was provided by other members of the Compendia Workgroup, which include:

- John O. Burckle, EPA, ORD, Cincinnati, OH
- James L. Cheney, Corps of Engineers, Omaha, NB
- Michael Davis, U.S. EPA, Region 7, KC, KS
- Joseph B. Elkins Jr., U.S. EPA, OAQPS, RTP, NC
- Robert G. Lewis, U.S. EPA, NERL, RTP, NC
- Justice A. Manning, U.S. EPA, ORD, Cincinnati, OH
- William A. McClenny, U.S. EPA, NERL, RTP, NC
- Frank F. McElroy, U.S. EPA, NERL, RTP, NC
- Heidi Schultz, ERG, Lexington, MA
- William T. "Jerry" Winberry, Jr., EnviroTech Solutions, Cary, NC

This Method is the result of the efforts of many individuals. Gratitude goes to each person involved in the preparation and review of this methodology.

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- Bill Taylor, Graseby, Smyrna, GA
- Lauren Drees, U.S. EPA, NRMRL, Cincinnati, OH

Finally, recognition is given to Frances Beyer, Lynn Kaufman, Debbie Bond, Cathy Whitaker, and Kathy Johnson of Midwest Research Institute's Administrative Services staff whose dedication and persistence during the development of this manuscript has enabled it's production.

DISCLAIMER

This Compendium has been subjected to the Agency's peer and administrative review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

METHOD TO-15

Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/ Mass Spectrometry (GC/MS)

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METHOD TO-15

Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/ Mass Spectrometry (GC/MS)

1. Scope

1.1 This method documents sampling and analytical procedures for the measurement of subsets of the 97 volatile organic compounds (VOCs) that are included in the 189 hazardous air pollutants (HAPs) listed in Title III of the Clean Air Act Amendments of 1990. VOCs are defined here as organic compounds having a vapor pressure greater than 10^{-1} Torr at 25°C and 760 mm Hg. Table 1 is the list of the target VOCs along with their CAS number, boiling point, vapor pressure and an indication of their membership in both the list of VOCs covered by Compendium Method TO-14A (1) and the list of VOCs in EPA's Contract Laboratory Program (CLP) document entitled: *Statement-of-Work (SOW) for the Analysis of Air Toxics from Superfund Sites (2).*

Many of these compounds have been tested for stability in concentration when stored in specially-prepared canisters (see Section 8) under conditions typical of those encountered in routine ambient air analysis. The stability of these compounds under all possible conditions is not known. However, a model to predict compound losses due to physical adsorption of VOCs on canister walls and to dissolution of VOCs in water condensed in the canisters has been developed (3). Losses due to physical adsorption require only the establishment of equilibrium between the condensed and gas phases and are generally considered short term losses, (i.e., losses occurring over minutes to hours). Losses due to chemical reactions of the VOCs with cocollected ozone or other gas phase species also account for some short term losses. Chemical reactions between VOCs and substances inside the canister are generally assumed to cause the gradual decrease of concentration over time (i.e., long term losses over days to weeks). Loss mechanisms such as aqueous hydrolysis and biological degradation (4) also exist. No models are currently known to be available to estimate and characterize all these potential losses, although a number of experimental observations are referenced in Section 8. Some of the VOCs listed in Title III have short atmospheric lifetimes and may not be present except near sources.

1.2 This method applies to ambient concentrations of VOCs above 0.5 ppbv and typically requires VOC enrichment by concentrating up to one liter of a sample volume. The VOC concentration range for ambient air in many cases includes the concentration at which continuous exposure over a lifetime is estimated to constitute a 10^{-6} or higher lifetime risk of developing cancer in humans. Under circumstances in which many hazardous VOCs are present at 10^{-6} risk concentrations, the total risk may be significantly greater.

1.3 This method applies under most conditions encountered in sampling of ambient air into canisters. However, the composition of a gas mixture in a canister, under unique or unusual conditions, will change so that the sample is known not to be a true representation of the ambient air from which it was taken. For example, low humidity conditions in the sample may lead to losses of certain VOCs on the canister walls, losses that would not happen if the humidity were higher. If the canister is pressurized, then condensation of water from high humidity samples may cause fractional losses of water-soluble compounds. Since the canister surface area is limited, all gases are in competition for the available active sites. Hence an absolute storage stability cannot be assigned to a specific gas. Fortunately, under conditions of normal usage for sampling ambient air, most VOCs can be recovered from canisters near their original concentrations after storage times of up to thirty days (see Section 8).

1.4 Use of the Compendium Method TO-15 for many of the VOCs listed in Table 1 is likely to present two difficulties: (1) what calibration standard to use for establishing a basis for testing and quantitation, and (2) how

to obtain an audit standard. In certain cases a chemical similarity exists between a thoroughly tested compound and others on the Title III list. In this case, what works for one is likely to work for the other in terms of making standards. However, this is not always the case and some compound standards will be troublesome. The reader is referred to the Section 9.2 on standards for guidance. Calibration of compounds such as formaldehyde, diazomethane, and many of the others represents a challenge.

1.5 Compendium Method TO-15 should be considered for use when a subset of the 97 Title III VOCs constitute the target list. Typical situations involve ambient air testing associated with the permitting procedures for emission sources. In this case sampling and analysis of VOCs is performed to determine the impact of dispersing source emissions in the surrounding areas. Other important applications are prevalence and trend monitoring for hazardous VOCs in urban areas and risk assessments downwind of industrialized or source-impacted areas.

1.6 Solid adsorbents can be used in lieu of canisters for sampling of VOCs, provided the solid adsorbent packings, usually multisorbent packings in metal or glass tubes, can meet the performance criteria specified in Compendium Method TO-17 which specifically addresses the use of multisorbent packings. The two sample collection techniques are different but become the same upon movement of the sample from the collection medium (canister or multisorbent tubes) onto the sample concentrator. Sample collection directly from the atmosphere by automated gas chromatographs can be used in lieu of collection in canisters or on solid adsorbents.

2. Summary of Method

2.1 The atmosphere is sampled by introduction of air into a specially-prepared stainless steel canister. Both subatmospheric pressure and pressurized sampling modes use an initially evacuated canister. A pump ventilated sampling line is used during sample collection with most commercially available samplers. Pressurized sampling requires an additional pump to provide positive pressure to the sample canister. A sample of air is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into the pre-evacuated and passivated canister.

2.2 After the air sample is collected, the canister valve is closed, an identification tag is attached to the canister, and the canister is transported to the laboratory for analysis.

2.3 Upon receipt at the laboratory, the canister tag data is recorded and the canister is stored until analysis. Storage times of up to thirty days have been demonstrated for many of the VOCs (5).

2.4 To analyze the sample, a known volume of sample is directed from the canister through a solid multisorbent concentrator. A portion of the water vapor in the sample breaks through the concentrator during sampling, to a degree depending on the multisorbent composition, duration of sampling, and other factors. Water content of the sample can be further reduced by dry purging the concentrator with helium while retaining target compounds. After the concentration and drying steps are completed, the VOCs are thermally desorbed, entrained in a carrier gas stream, and then focused in a small volume by trapping on a reduced temperature trap or small volume multisorbent trap. The sample is then released by thermal desorption and carried onto a gas chromatographic column for separation.

As a simple alternative to the multisorbent/dry purge water management technique, the amount of water vapor in the sample can be reduced below any threshold for affecting the proper operation of the analytical system by

reducing the sample size. For example, a small sample can be concentrated on a cold trap and released directly to the gas chromatographic column. The reduction in sample volume may require an enhancement of detector sensitivity.

Other water management approaches are also acceptable as long as their use does not compromise the attainment of the performance criteria listed in Section 11. A listing of some commercial water management systems is provided in Appendix A. One of the alternative ways to dry the sample is to separate VOCs from condensate on a low temperature trap by heating and purging the trap.

2.5 The analytical strategy for Compendium Method TO-15 involves using a high resolution gas chromatograph (GC) coupled to a mass spectrometer. If the mass spectrometer is a linear quadrupole system, it is operated either by continuously scanning a wide range of mass to charge ratios (SCAN mode) or by monitoring select ion monitoring mode (SIM) of compounds on the target list. If the mass spectrometer is based on a standard ion trap design, only a scanning mode is used (note however, that the Selected Ion Storage (SIS) mode for the ion trap has features of the SIM mode). Mass spectra for individual peaks in the total ion chromatogram are examined with respect to the fragmentation pattern of ions corresponding to various VOCs including the intensity of primary and secondary ions. The fragmentation pattern is compared with stored spectra taken under similar conditions, in order to identify the compound. For any given compound, the intensity of the primary fragment is compared with the system response to the primary fragment for known amounts of the compound. This establishes the compound concentration that exists in the sample.

Mass spectrometry is considered a more definitive identification technique than single specific detectors such as flame ionization detector (FID), electron capture detector (ECD), photoionization detector (PID), or a multidetector arrangement of these (see discussion in Compendium Method TO-14A). The use of both gas chromatographic retention time and the generally unique mass fragmentation patterns reduce the chances for misidentification. If the technique is supported by a comprehensive mass spectral database and a knowledgeable operator, then the correct identification and quantification of VOCs is further enhanced.

3. Significance

3.1 Compendium Method TO-15 is significant in that it extends the Compendium Method TO-14A description for using canister-based sampling and gas chromatographic analysis in the following ways:

- Compendium Method TO-15 incorporates a multisorbent/dry purge technique or equivalent (see Appendix A) for water management thereby addressing a more extensive set of compounds (the VOCs mentioned in Title III of the CAAA of 1990) than addressed by Compendium Method TO-14A. Compendium Method TO-14A approach to water management alters the structure or reduces the sample stream concentration of some VOCs, especially water-soluble VOCs.
- Compendium Method TO-15 uses the GC/MS technique as the only means to identify and quantitate target compounds. The GC/MS approach provides a more scientifically-defensible detection scheme which is generally more desirable than the use of single or even multiple specific detectors.
- In addition, Compendium Method TO-15 establishes method performance criteria for acceptance of data, allowing the use of alternate but equivalent sampling and analytical equipment. There are several new and viable commercial approaches for water management as noted in Appendix A of this method on which to base a VOC monitoring technique as well as other approaches to sampling (i.e., autoGCs and solid

adsorbents) that are often used. This method lists performance criteria that these alternatives must meet to be acceptable alternatives for monitoring ambient VOCs.

- Finally, Compendium Method TO-15 includes enhanced provisions for inherent quality control. The method uses internal analytical standards and frequent verification of analytical system performance to assure control of the analytical system. This more formal and better documented approach to quality control guarantees a higher percentage of good data.

3.2 With these features, Compendium Method TO-15 is a more general yet better defined method for VOCs than Compendium Method TO-14A. As such, the method can be applied with a higher confidence to reduce the uncertainty in risk assessments in environments where the hazardous volatile gases listed in the Title III of the Clean Air Act Amendments of 1990 are being monitored. An emphasis on risk assessments for human health and effects on the ecology is a current goal for the U.S. EPA.

4. Applicable Documents

4.1 ASTM Standards

- **Method D1356** *Definitions of Terms Relating to Atmospheric Sampling and Analysis.*
- **Method E260** *Recommended Practice for General Gas Chromatography Procedures.*
- **Method E355** *Practice for Gas Chromatography Terms and Relationships.*
- **Method D5466** *Standard Test Method of Determination of Volatile Organic Compounds in Atmospheres (Canister Sampling Methodology).*

4.2 EPA Documents

- *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II*, U. S. Environmental Protection Agency, EPA-600/R-94-038b, May 1994.
- *Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air*, U. S. Environmental Protection Agency, EPA-600/4-83-027, June 1983.
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-14, Second Supplement*, U. S. Environmental Protection Agency, EPA-600/4-89-018, March 1989.
- *Statement-of-Work (SOW) for the Analysis of Air Toxics from Superfund Sites*, U. S. Environmental Protection Agency, Office of Solid Waste, Washington, D.C., Draft Report, June 1990.
- *Clean Air Act Amendments of 1990*, U. S. Congress, Washington, D.C., November 1990.

5. Definitions

[Note: Definitions used in this document and any user-prepared standard operating procedures (SOPs) should be consistent with ASTM Methods D1356, E260, and E355. Aside from the definitions given below, all pertinent abbreviations and symbols are defined within this document at point of use.]

5.1 **Gauge** Pressure—pressure measured with reference to the surrounding atmospheric pressure, usually expressed in units of kPa or psi. Zero gauge pressure is equal to atmospheric (barometric) pressure.

5.2 **Absolute Pressure**—pressure measured with reference to absolute zero pressure, usually expressed in units of kPa, or psi.

5.3 **Cryogen**—a refrigerant used to obtain sub-ambient temperatures in the VOC concentrator and/or on front of the analytical column. Typical cryogens are liquid nitrogen (bp -195.8°C), liquid argon (bp -185.7°C), and liquid CO_2 (bp -79.5°C).

5.4 **Dynamic Calibration**—calibration of an analytical system using calibration gas standard concentrations in a form identical or very similar to the samples to be analyzed and by introducing such standards into the inlet of the sampling or analytical system from a manifold through which the gas standards are flowing.

5.5 **Dynamic Dilution**—means of preparing calibration mixtures in which standard gas(es) from pressurized cylinders are continuously blended with humidified zero air in a manifold so that a flowing stream of calibration mixture is available at the inlet of the analytical system.

5.6 **MS-SCAN**—mass spectrometric mode of operation in which the gas chromatograph (GC) is coupled to a mass spectrometer (MS) programmed to SCAN all ions repeatedly over a specified mass range.

5.7 **MS-SIM**—mass spectrometric mode of operation in which the GC is coupled to a MS that is programmed to scan a selected number of ions repeatedly [i.e., selected ion monitoring (SIM) mode].

5.8 **Qualitative Accuracy**—the degree of measurement accuracy required to correctly identify compounds with an analytical system.

5.9 **Quantitative Accuracy**—the degree of measurement accuracy required to correctly measure the concentration of an identified compound with an analytical system with known uncertainty.

5.10 **Replicate Precision**—precision determined from two canisters filled from the same air mass over the same time period and determined as the absolute value of the difference between the analyses of canisters divided by their average value and expressed as a percentage (see Section 11 for performance criteria for replicate precision).

5.11 **Duplicate Precision**—precision determined from the analysis of two samples taken from the same canister. The duplicate precision is determined as the absolute value of the difference between the canister analyses divided by their average value and expressed as a percentage.

5.12 **Audit Accuracy**—the difference between the analysis of a sample provided in an audit canister and the nominal value as determined by the audit authority, divided by the audit value and expressed as a percentage (see Section 11 for performance criteria for audit accuracy).

6. Interferences and Contamination

6.1 Very volatile compounds, such as chloromethane and vinyl chloride can display peak broadening and co-elution with other species if the compounds are not delivered to the GC column in a small volume of carrier gas. Refocusing of the sample after collection on the primary trap, either on a separate focusing trap or at the head of the gas chromatographic column, mitigates this problem.

6.2 Interferences in canister samples may result from improper use or from contamination of: (1) the canisters due to poor manufacturing practices, (2) the canister cleaning apparatus, and (3) the sampling or analytical system. Attention to the following details will help to minimize the possibility of contamination of canisters.

6.2.1 Canisters should be manufactured using high quality welding and cleaning techniques, and new canisters should be filled with humidified zero air and then analyzed, after "aging" for 24 hours, to determine cleanliness. The cleaning apparatus, sampling system, and analytical system should be assembled of clean, high quality components and each system should be shown to be free of contamination.

6.2.2 Canisters should be stored in a contaminant-free location and should be capped tightly during shipment to prevent leakage and minimize any compromise of the sample.

6.2.3 Impurities in the calibration dilution gas (if applicable) and carrier gas, organic compounds out-gassing from the system components ahead of the trap, and solvent vapors in the laboratory account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running humidified zero air blanks. The use of non-chromatographic grade stainless steel tubing, non-PTFE thread sealants, or flow controllers with Buna-N rubber components must be avoided.

6.2.4 Significant contamination of the analytical equipment can occur whenever samples containing high VOC concentrations are analyzed. This in turn can result in carryover contamination in subsequent analyses. Whenever a high concentration (>25 ppbv of a trace species) sample is encountered, it should be followed by an analysis of humid zero air to check for carry-over contamination.

6.2.5 In cases when solid sorbents are used to concentrate the sample prior to analysis, the sorbents should be tested to identify artifact formation (see Compendium Method TO-17 for more information on artifacts).

7. Apparatus and Reagents

[Note: Compendium Method To-14A list more specific requirements for sampling and analysis apparatus which may be of help in identifying options. The listings below are generic.]

7.1 Sampling Apparatus

[Note: Subatmospheric pressure and pressurized canister sampling systems are commercially available and have been used as part of U.S. Environmental Protection Agency's Toxic Air Monitoring Stations (TAMS), Urban Air Toxic Monitoring Program (UATMP), the non-methane organic compound (NMOC) sampling and analysis program, and the Photochemical Assessment Monitoring Stations (PAMS).]

7.1.1 **Subatmospheric Pressure (see Figure 1, without metal bellows type pump).**

7.1.1.1 **Sampling Inlet Line.** Stainless steel tubing to connect the sampler to the sample inlet.

7.1.1.2 **Sample Canister.** Leak-free stainless steel pressure vessels of desired volume (e.g., 6 L), with valve and specially prepared interior surfaces (see Appendix B for a listing of known manufacturers/resellers of canisters).

7.1.1.3 **Stainless Steel Vacuum/Pressure Gauges.** Two types are required, one capable of measuring vacuum (–100 to 0 kPa or 0 to - 30 in Hg) and pressure (0–206 kPa or 0–30 psig) in the sampling system and a second type (for checking the vacuum of canisters during cleaning) capable of measuring at 0.05 mm Hg (see Appendix B) within 20%. Gauges should be tested clean and leak tight.

7.1.1.4 **Electronic Mass Flow Controller.** Capable of maintaining a constant flow rate (± 10%) over a sampling period of up to 24 hours and under conditions of changing temperature (20–40°C) and humidity.

7.1.1.5 **Particulate Matter Filter.** 2-μm sintered stainless steel in-line filter.

7.1.1.6 **Electronic Timer**. For unattended sample collection.

7.1.1.7 **Solenoid Valve**. Electrically-operated, bi-stable solenoid valve with Viton® seat and O-rings. A Skinner Magnelatch valve is used for purposes of illustration in the text (see Figure 2).

7.1.1.8 **Chromatographic Grade Stainless Steel Tubing and Fittings**. For interconnections. All such materials in contact with sample, analyte, and support gases prior to analysis should be chromatographic grade stainless steel or equivalent.

7.1.1.9 **Thermostatically Controlled Heater**. To maintain above ambient temperature inside insulated sampler enclosure.

7.1.1.10 **Heater Thermostat**. Automatically regulates heater temperature.

7.1.1.11 **Fan**. For cooling sampling system.

7.1.1.12 **Fan Thermostat**. Automatically regulates fan operation.

7.1.1.13 **Maximum-Minimum Thermometer**. Records highest and lowest temperatures during sampling period.

7.1.1.14 **Stainless Steel Shut-off Valve**. Leak free, for vacuum/pressure gauge.

7.1.1.15 **Auxiliary Vacuum Pump**. Continuously draws air through the inlet manifold at 10 L/min. or higher flow rate. Sample is extracted from the manifold at a lower rate, and excess air is exhausted.

[Note: The use of higher inlet flow rates dilutes any contamination present in the inlet and reduces the possibility of sample contamination as a result of contact with active adsorption sites on inlet walls.]

7.1.1.16 **Elapsed Time Meter**. Measures duration of sampling.

7.1.1.17 **Optional Fixed Orifice, Capillary, or Adjustable Micrometering Valve**. May be used in lieu of the electronic flow controller for grab samples or short duration time-integrated samples. Usually appropriate only in situations where screening samples are taken to assess future sampling activity.

7.1.2 **Pressurized (see Figure 1 with metal bellows type pump and Figure 3).**

7.1.2.1 **Sample Pump**. Stainless steel, metal bellows type, capable of 2 atmospheres output pressure. Pump must be free of leaks, clean, and uncontaminated by oil or organic compounds.

[Note: An alternative sampling system has been developed by Dr. R. Rasmussen, The Oregon Graduate Institute of Science and Technology, 20000 N.W. Walker Rd., Beaverton, Oregon 97006, 503-690-1077, and is illustrated in Figure 3. This flow system uses, in order, a pump, a mechanical flow regulator, and a mechanical compensation flow restrictive device. In this configuration the pump is purged with a large sample flow, thereby eliminating the need for an auxiliary vacuum pump to flush the sample inlet.]

7.1.2.2 **Other Supporting Materials**. All other components of the pressurized sampling system are similar to components discussed in Sections 7.1.1.1 through 7.1.1.17.

7.2 Analytical Apparatus

7.2.1 **Sampling/Concentrator System (many commercial alternatives are available).**

7.2.1.1 **Electronic Mass Flow Controllers**. Used to maintain constant flow (for purge gas, carrier gas and sample gas) and to provide an analog output to monitor flow anomalies.

7.2.1.2 **Vacuum Pump**. General purpose laboratory pump, capable of reducing the downstream pressure of the flow controller to provide the pressure differential necessary to maintain controlled flow rates of sample air.

7.2.1.3 **Stainless Steel Tubing and Stainless Steel Fittings**. Coated with fused silica to minimize active adsorption sites.

7.2.1.4 **Stainless Steel Cylinder Pressure Regulators.** Standard, two-stage cylinder regulators with pressure gauges.

7.2.1.5 **Gas Purifiers.** Used to remove organic impurities and moisture from gas streams.

7.2.1.6 **Six-port Gas Chromatographic Valve.** For routing sample and carrier gas flows.

7.2.1.7 **Multisorbent Concentrator.** Solid adsorbent packing with various retentive properties for adsorbing trace gases are commercially available from several sources. The packing contains more than one type of adsorbent packed in series.

7.2.1.7.1A pre-packed adsorbent trap (Supelco 2-0321) containing 200 mg Carbopack B (60/80 mesh) and 50 mg Carbosieve S-III (60/80 mesh) has been found to retain VOCs and allow some water vapor to pass through (6). The addition of a dry purging step allows for further water removal from the adsorbent trap. The steps constituting the dry purge technique that are normally used with multisorbent traps are illustrated in Figure 4. The optimum trapping and dry purging procedure for the Supelco trap consists of a sample volume of 320 mL and a dry nitrogen purge of 1300 mL. Sample trapping and drying is carried out at 25°C. The trap is back-flushed with helium and heated to 220°C to transfer material onto the GC column. A trap bake-out at 260°C for 5 minutes is conducted after each run.

7.2.1.7.2An example of the effectiveness of dry purging is shown in Figure 5. The multisorbent used in this case is Tenax/Ambersorb 340/Charcoal (7). Approximately 20% of the initial water content in the sample remains after sampling 500 mL of air. The detector response to water vapor (hydrogen atoms detected by atomic emission detection) is plotted versus purge gas volume. Additional water reduction by a factor of 8 is indicated at temperatures of 45°C or higher. Still further water reduction is possible using a two-stage concentration/dryer system.

7.2.1.8 **Cryogenic Concentrator.** Complete units are commercially available from several vendor sources. The characteristics of the latest concentrators include a rapid, "ballistic" heating of the concentrator to release any trapped VOCs into a small carrier gas volume. This facilitates the separation of compounds on the gas chromatographic column.

7.2.2 **Gas Chromatographic/Mass Spectrometric (GC/MS) System.**

7.2.2.1 **Gas Chromatograph.** The gas chromatographic (GC) system must be capable of temperature programming. The column oven can be cooled to subambient temperature (e.g., -50°C) at the start of the gas chromatographic run to effect a resolution of the very volatile organic compounds. In other designs, the rate of release of compounds from the focusing trap in a two stage system obviates the need for retrapping of compounds on the column. The system must include or be interfaced to a concentrator and have all required accessories including analytical columns and gases. All GC carrier gas lines must be constructed from stainless steel or copper tubing. Non-polytetrafluoroethylene (PTFE) thread sealants or flow controllers with Buna-N rubber components must not be used.

7.2.2.2 **Chromatographic Columns.** 100% methyl silicone or 5% phenyl, 95% methyl silicone fused silica capillary columns of 0.25- to 0.53-mm I.D. of varying lengths are recommended for separation of many of the possible subsets of target compounds involving nonpolar compounds. However, considering the diversity of the target list, the choice is left to the operator subject to the performance standards given in Section 11.

7.2.2.3 **Mass Spectrometer.** Either a linear quadrupole or ion trap mass spectrometer can be used as long as it is capable of scanning from 35 to 300 amu every 1 second or less, utilizing 70 volts (nominal) electron energy in the electron impact ionization mode, and producing a mass spectrum which meets all the instrument performance acceptance criteria when 50 ng or less of p-bromofluorobenzene (BFB) is analyzed.

7.2.2.3.1**Linear Quadrupole Technology.** A simplified diagram of the heart of the quadrupole mass spectrometer is shown in Figure 6. The quadrupole consists of a parallel set of four rod electrodes mounted in a square configuration. The field within the analyzer is created by coupling opposite pairs of rods together and applying radiofrequency (RF) and direct current (DC) potentials between the pairs of rods. Ions created in the ion source from the reaction of column eluates with electrons from the electron source are moved through the

parallel array of rods under the influence of the generated field. Ions which are successfully transmitted through the quadrupole are said to possess stable trajectories and are subsequently recorded with the detection system. When the DC potential is zero, a wide band of m/z values is transmitted through the quadrupole. This "RF only" mode is referred to as the "total-ion" mode. In this mode, the quadrupole acts as a strong focusing lens analogous to a high pass filter. The amplitude of the RF determines the low mass cutoff. A mass spectrum is generated by scanning the DC and RF voltages using a fixed DC/RF ratio and a constant drive frequency or by scanning the frequency and holding the DC and RF constant. With the quadrupole system only 0.1 to 0.2 percent of the ions formed in the ion source actually reach the detector.

7.2.2.3.2**Ion Trap Technology**. An ion-trap mass spectrometer consists of a chamber formed between two metal surfaces in the shape of a hyperboloid of one sheet (ring electrode) and a hyperboloid of two sheets (the two end-cap electrodes). Ions are created within the chamber by electron impact from an electron beam admitted through a small aperture in one of the end caps. Radio frequency (RF) (and sometimes direct current voltage offsets) are applied between the ring electrode and the two end-cap electrodes establishing a quadrupole electric field. This field is uncoupled in three directions so that ion motion can be considered independently in each direction; the force acting upon an ion increases with the displacement of the ion from the center of the field but the direction of the force depends on the instantaneous voltage applied to the ring electrode. A restoring force along one coordinate (such as the distance, r, from the ion-trap's axis of radial symmetry) will exist concurrently with a repelling force along another coordinate (such as the distance, z, along the ion traps axis), and if the field were static the ions would eventually strike an electrode. However, in an RF field the force along each coordinate alternates direction so that a stable trajectory may be possible in which the ions do not strike a surface. In practice, ions of appropriate mass-to-charge ratios may be trapped within the device for periods of milliseconds to hours. A diagram of a typical ion trap is illustrated in Figure 7. Analysis of stored ions is performed by increasing the RF voltage, which makes the ions successively unstable. The effect of the RF voltage on the ring electrode is to "squeeze" the ions in the xy plane so that they move along the z axis. Half the ions are lost to the top cap (held at ground potential); the remaining ions exit the lower end cap to be detected by the electron multiplier. As the energy applied to the ring electrode is increased, the ions are collected in order of increasing mass to produce a conventional mass spectrum. With the ion trap, approximately 50 percent of the generated ions are detected. As a result, a significant increase in sensitivity can be achieved when compared to a full scan linear quadrupole system.

7.2.2.4 **GC/MS Interface**. Any gas chromatograph to mass spectrometer interface that gives acceptable calibration points for each of the analytes of interest and can be used to achieve all acceptable performance criteria may be used. Gas chromatograph to mass spectrometer interfaces constructed of all-glass, glass-lined, or fused silica-lined materials are recommended. Glass and fused silica should be deactivated.

7.2.2.5 **Data System**. The computer system that is interfaced to the mass spectrometer must allow the continuous acquisition and storage, on machine readable media, of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as a Selected Ion Current Profile (SICP). Software must also be available that allows integrating the abundance in any SICP between specified time or scan number limits. Also, software must be available that allows for the comparison of sample spectra with reference library spectra. The National Institute of Standards and Technology (NIST) or Wiley Libraries or equivalent are recommended as reference libraries.

7.2.2.6 **Off-line Data Storage Device**. Device must be capable of rapid recording and retrieval of data and must be suitable for long-term, off-line data storage.

7.3 Calibration System and Manifold Apparatus (see Figure 8)

7.3.1 Calibration Manifold. Stainless steel, glass, or high purity quartz manifold, (e.g., 1.25-cm I.D. x 66-cm) with sampling ports and internal baffles for flow disturbance to ensure proper mixing. The manifold should be heated to ~50°C.

7.3.2 Humidifier. 500-mL impinger flask containing HPLC grade deionized water.

7.3.3 Electronic Mass Flow Controllers. One 0 to 5 L/min unit and one or more 0 to 100 mL/min units for air, depending on number of cylinders in use for calibration.

7.3.4 Teflon Filter(s). 47-mm Teflon® filter for particulate collection.

7.4 Reagents

7.4.1 Neat Materials or Manufacturer-Certified Solutions/Mixtures. Best source (see Section 9).

7.4.2 Helium and Air. Ultra-high purity grade in gas cylinders. He is used as carrier gas in the GC.

7.4.3 Liquid Nitrogen or Liquid Carbon Dioxide. Used to cool secondary trap.

7.4.4 Deionized Water. High performance liquid chromatography (HPLC) grade, ultra-high purity (for humidifier).

8. Collection of Samples in Canisters

8.1 Introduction

8.1.1 Canister samplers, sampling procedures, and canister cleaning procedures have not changed very much from the description given in the original Compendium Method TO-14. Much of the material in this section is therefore simply a restatement of the material given in Compendium Method TO-14, repeated here in order to have all the relevant information in one place.

8.1.2 Recent notable additions to the canister technology has been in the application of canister-based systems for example, to microenvironmental monitoring (8), the capture of breath samples (9), and sector sampling to identify emission sources of VOCs (10).

8.1.3 EPA has also sponsored the development of a mathematical model to predict the storage stability of arbitrary mixtures of trace gases in humidified air (3), and the investigation of the SilcoSteel™ process of coating the canister interior with a film of fused silica to reduce surface activity (11). A recent summary of storage stability data for VOCs in canisters is given in the open literature (5).

8.2 Sampling System Description

8.2.1 Subatmospheric Pressure Sampling [see Figure 1 (without metal bellows type pump)].

8.2.1.1 In preparation for subatmospheric sample collection in a canister, the canister is evacuated to 0.05 mm Hg (see Appendix C for discussion of evacuation pressure). When the canister is opened to the atmosphere containing the VOCs to be sampled, the differential pressure causes the sample to flow into the canister. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-weighted-average (TWA) samples (duration of 1-24 hours) taken through a flow-restrictive inlet (e.g., mass flow controller, critical orifice).

8.2.1.2 With a critical orifice flow restrictor, there will be a decrease in the flow rate as the pressure approaches atmospheric. However, with a mass flow controller, the subatmospheric sampling system can maintain a constant flow rate from full vacuum to within about 7 kPa (1.0 psi) or less below ambient pressure.

8.2.2 **Pressurized Sampling [see Figure 1 (with metal bellows type pump)].**

8.2.2.1 Pressurized sampling is used when longer-term integrated samples or higher volume samples are required. The sample is collected in a canister using a pump and flow control arrangement to achieve a typical 101-202 kPa (15-30 psig) final canister pressure. For example, a 6-liter evacuated canister can be filled at 10 mL/min for 24 hours to achieve a final pressure of 144 kPa (21 psig).

8.2.2.2 In pressurized canister sampling, a metal bellows type pump draws in air from the sampling manifold to fill and pressurize the sample canister.

8.2.3 **All Samplers.**

8.2.3.1 A flow control device is chosen to maintain a constant flow into the canister over the desired sample period. This flow rate is determined so the canister is filled (to about 88.1 kPa for subatmospheric pressure sampling or to about one atmosphere above ambient pressure for pressurized sampling) over the desired sample period. The flow rate can be calculated by:

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

where:

F = flow rate, mL/min.
P = final canister pressure, atmospheres absolute. P is approximately equal to

$$\frac{\text{kPa gauge}}{101.2} + 1$$

V = volume of the canister, mL.
T = sample period, hours.

For example, if a 6-L canister is to be filled to 202 kPa (2 atmospheres) absolute pressure in 24 hours, the flow rate can be calculated by:

$$F = \frac{2 \times 6000}{24 \times 60} = 8.3 \text{ mL/min}$$

8.2.3.2 For automatic operation, the timer is designed to start and stop the pump at appropriate times for the desired sample period. The timer must also control the solenoid valve, to open the valve when starting the pump and to close the valve when stopping the pump.

8.2.3.3 The use of the Skinner Magnelatch valve (see Figure 2) avoids any substantial temperature rise that would occur with a conventional, normally closed solenoid valve that would have to be energized during the entire sample period. The temperature rise in the valve could cause outgassing of organic compounds from the Viton® valve seat material. The Skinner Magnelatch valve requires only a brief electrical pulse to open or close at the appropriate start and stop times and therefore experiences no temperature increase. The pulses may be obtained either with an electronic timer that can be programmed for short (5 to 60 seconds) ON periods, or with a conventional mechanical timer and a special pulse circuit. A simple electrical pulse circuit for operating the Skinner Magnelatch solenoid valve with a conventional mechanical timer is illustrated in Figure 2(a). However, with this simple circuit, the valve may operate unreliably during brief power interruptions or if the timer is manually switched on and off too fast. A better circuit incorporating a time-delay relay to provide more reliable valve operation is shown in Figure 2(b).

8.2.3.4 The connecting lines between the sample inlet and the canister should be as short as possible to minimize their volume. The flow rate into the canister should remain relatively constant over the entire sampling period.

8.2.3.5 As an option, a second electronic timer may be used to start the auxiliary pump several hours prior to the sampling period to flush and condition the inlet line.

8.2.3.6 Prior to field use, each sampling system must pass a humid zero air certification (see Section 8.4.3). All plumbing should be checked carefully for leaks. The canisters must also pass a humid zero air certification before use (see Section 8.4.1).

8.3 Sampling Procedure

8.3.1 The sample canister should be cleaned and tested according to the procedure in Section 8.4.1.

8.3.2 A sample collection system is assembled as shown in Figures 1 and 3 and must be cleaned according to the procedure outlined in Sections 8.4.2 and 8.4.4.

[Note: The sampling system should be contained in an appropriate enclosure.]

8.3.3 Prior to locating the sampling system, the user may want to perform "screening analyses" using a portable GC system, as outlined in Appendix B of Compendium Method TO-14A, to determine potential volatile organics present and potential "hot spots." The information gathered from the portable GC screening analysis would be used in developing a monitoring protocol, which includes the sampling system location, based upon the "screening analysis" results.

8.3.4 After "screening analysis," the sampling system is located. Temperatures of ambient air and sampler box interior are recorded on the canister sampling field test data sheet (FTDS), as documented in Figure 9.

[Note: The following discussion is related to Figure 1]

8.3.5 To verify correct sample flow, a "practice" (evacuated) canister is used in the sampling system.

[Note: For a subatmospheric sampler, a flow meter and practice canister are needed. For the pump-driven system, the practice canister is not needed, as the flow can be measured at the outlet of the system.]

A certified mass flow meter is attached to the inlet line of the manifold, just in front of the filter. The canister is opened. The sampler is turned on and the reading of the certified mass flow meter is compared to the sampler mass flow controller. The values should agree within ±10%. If not, the sampler mass flow meter needs to be recalibrated or there is a leak in the system. This should be investigated and corrected.

[Note: Mass flow meter readings may drift. Check the zero reading carefully and add or subtract the zero reading when reading or adjusting the sampler flow rate to compensate for any zero drift.]

After 2 minutes, the desired canister flow rate is adjusted to the proper value (as indicated by the certified mass flow meter) by the sampler flow control unit controller (e.g., 3.5 mL/min for 24 hr, 7.0 mL/min for 12 hr). Record final flow under "CANISTER FLOW RATE" on the FTDS.

8.3.6 The sampler is turned off and the elapsed time meter is reset to 000.0.

[Note: Whenever the sampler is turned off, wait at least 30 seconds to turn the sampler back on.]

8.3.7 The "practice" canister and certified mass flow meter are disconnected and a clean certified (see Section 8.4.1) canister is attached to the system.

8.3.8 The canister valve and vacuum/pressure gauge valve are opened.

8.3.9 Pressure/vacuum in the canister is recorded on the canister FTDS (see Figure 9) as indicated by the sampler vacuum/pressure gauge.

8.3.10 The vacuum/pressure gauge valve is closed and the maximum-minimum thermometer is reset to current temperature. Time of day and elapsed time meter readings are recorded on the canister FTDS.

8.3.11 The electronic timer is set to start and stop the sampling period at the appropriate times. Sampling starts and stops by the programmed electronic timer.

8.3.12 After the desired sampling period, the maximum, minimum, current interior temperature and current ambient temperature are recorded on the FTDS. The current reading from the flow controller is recorded.

8.3.13 At the end of the sampling period, the vacuum/pressure gauge valve on the sampler is briefly opened and closed and the pressure/vacuum is recorded on the FTDS. Pressure should be close to desired pressure.

[Note: For a subatmospheric sampling system, if the canister is at atmospheric pressure when the field final pressure check is performed, the sampling period may be suspect. This information should be noted on the sampling field data sheet.]

Time of day and elapsed time meter readings are also recorded.

8.3.14 The canister valve is closed. The sampling line is disconnected from the canister and the canister is removed from the system. For a subatmospheric system, a certified mass flow meter is once again connected to the inlet manifold in front of the in-line filter and a "practice" canister is attached to the Magnelatch valve of the sampling system. The final flow rate is recorded on the canister FTDS (see Figure 9).

[Note: For a pressurized system, the final flow may be measured directly.]

The sampler is turned off.

8.3.15 An identification tag is attached to the canister. Canister serial number, sample number, location, and date, as a minimum, are recorded on the tag. The canister is routinely transported back to the analytical laboratory with other canisters in a canister shipping case.

8.4 Cleaning and Certification Program

8.4.1 Canister Cleaning and Certification.

8.4.1.1 All canisters must be clean and free of any contaminants before sample collection.

8.4.1.2 All canisters are leak-tested by pressurizing them to approximately 206 kPa (30 psig) with zero air.

[Note: The canister cleaning system in Figure 10 can be used for this task.]

The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than ± 13.8 kPa (± 2 psig) over the 24 hour period.

8.4.1.3 A canister cleaning system may be assembled as illustrated in Figure 10. Cryogen is added to both the vacuum pump and zero air supply traps. The canister(s) are connected to the manifold. The vent shut-off valve and the canister valve(s) are opened to release any remaining pressure in the canister(s). The vacuum pump is started and the vent shut-off valve is then closed and the vacuum shut-off valve is opened. The canister(s) are evacuated to <0.05 mm Hg (see Appendix B) for at least 1 hour.

[Note: On a daily basis or more often if necessary, the cryogenic traps should be purged with zero air to remove any trapped water from previous canister cleaning cycles.]

Air released/evacuated from canisters should be diverted to a fume hood.

8.4.1.4 The vacuum and vacuum/pressure gauge shut-off valves are closed and the zero air shut-off valve is opened to pressurize the canister(s) with humid zero air to approximately 206 kPa (30 psig). If a zero gas generator system is used, the flow rate may need to be limited to maintain the zero air quality.

8.4.1.5 The zero air shut-off valve is closed and the canister(s) is allowed to vent down to atmospheric pressure through the vent shut-off valve. The vent shut-off valve is closed. Repeat Sections 8.4.1.3 through 8.4.1.5 two additional times for a total of three (3) evacuation/pressurization cycles for each set of canisters.

8.4.1.6 At the end of the evacuation/pressurization cycle, the canister is pressurized to 206 kPa (30 psig) with humid zero air. The canister is then analyzed by a GC/MS analytical system. Any canister that has not tested clean (compared to direct analysis of humidified zero air of less than 0.2 ppbv of targeted VOCs) should not be used. As a "blank" check of the canister(s) and cleanup procedure, the final humid zero air fill of 100% of the canisters is analyzed until the cleanup system and canisters are proven reliable (less than 0.2 ppbv of any target VOCs). The check can then be reduced to a lower percentage of canisters.

8.4.1.7 The canister is reattached to the cleaning manifold and is then reevacuated to <0.05 mm Hg (see Appendix B) and remains in this condition until used. The canister valve is closed. The canister is removed from the cleaning system and the canister connection is capped with a stainless steel fitting. The canister is now ready for collection of an air sample. An identification tag is attached to the inlet of each canister for field notes and chain-of-custody purposes. An alternative to evacuating the canister at this point is to store the canisters and reevacuate them just prior to the next use.

8.4.1.8 As an option to the humid zero air cleaning procedures, the canisters are heated in an isothermal oven not to exceed 100°C during evacuation of the canister to ensure that higher molecular weight compounds are not retained on the walls of the canister.

[Note: For sampling more complex VOC mixtures the canisters should be heated to higher temperatures during the cleaning procedure although a special high temperature valve would be needed].

Once heated, the canisters are evacuated to <0.05 mm Hg (see Appendix B) and maintained there for 1 hour. At the end of the heated/evacuated cycle, the canisters are pressurized with humid zero air and analyzed by a GC/MS system after a minimum of 12 hrs of "aging." Any canister that has not tested clean (less than 0.2 ppbv each of targeted compounds) should not be used. Once tested clean, the canisters are reevacuated to <0.05 mm Hg (see Appendix B) and remain in the evacuated state until used. As noted in Section 8.4.1.7, reevacuation can occur just prior to the next use.

8.4.2 Cleaning Sampling System Components.

8.4.2.1 Sample components are disassembled and cleaned before the sampler is assembled. Nonmetallic parts are rinsed with HPLC grade deionized water and dried in a vacuum oven at 50°C. Typically, stainless steel parts and fittings are cleaned by placing them in a beaker of methanol in an ultrasonic bath for 15 minutes. This procedure is repeated with hexane as the solvent.

8.4.2.2 The parts are then rinsed with HPLC grade deionized water and dried in a vacuum oven at 100°C for 12 to 24 hours.

8.4.2.3 Once the sampler is assembled, the entire system is purged with humid zero air for 24 hours.

8.4.3 Zero Air Certification.

[Note: In the following sections, "certification" is defined as evaluating the sampling system with humid zero air and humid calibration gases that pass through all active components of the sampling system. The system is "certified" if no significant additions or deletions (less than 0.2 ppbv each of target compounds) have occurred when challenged with the test gas stream.]

8.4.3.1 The cleanliness of the sampling system is determined by testing the sampler with humid zero air without an evacuated gas sampling canister, as follows.

8.4.3.2 The calibration system and manifold are assembled, as illustrated in Figure 8. The sampler (without an evacuated gas canister) is connected to the manifold and the zero air cylinder is activated to generate a humid gas stream (2 L/min) to the calibration manifold [see Figure 8(b)].

8.4.3.3 The humid zero gas stream passes through the calibration manifold, through the sampling system (without an evacuated canister) to the water management system/VOC preconcentrator of an analytical system.

[Note: The exit of the sampling system (without the canister) replaces the canister in Figure 11.]

After the sample volume (e.g., 500 mL) is preconcentrated on the trap, the trap is heated and the VOCs are thermally desorbed and refocussed on a cold trap. This trap is heated and the VOCs are thermally desorbed onto the head of the capillary column. The VOCs are refocussed prior to gas chromatographic separation. Then, the oven temperature (programmed) increases and the VOCs begin to elute and are detected by a GC/MS (see Section 10) system. The analytical system should not detect greater than 0.2 ppbv of any targeted VOCs in order for the sampling system to pass the humid zero air certification test. Chromatograms (using an FID) of a certified sampler and contaminated sampler are illustrated in Figures 12(a) and 12(b), respectively. If the sampler passes the humid zero air test, it is then tested with humid calibration gas standards containing selected VOCs at concentration levels expected in field sampling (e.g., 0.5 to 2 ppbv) as outlined in Section 8.4.4.

8.4.4 Sampler System Certification with Humid Calibration Gas Standards from a Dynamic Calibration System

8.4.4.1 Assemble the dynamic calibration system and manifold as illustrated in Figure 8.

8.4.4.2 Verify that the calibration system is clean (less than 0.2 ppbv of any target compounds) by sampling a humidified gas stream, *without* gas calibration standards, with a previously certified clean canister (see Section 8.1).

8.4.4.3 The assembled dynamic calibration system is certified clean if less than 0.2 ppbv of any targeted compounds is found.

8.4.4.4 For generating the humidified calibration standards, the calibration gas cylinder(s) containing nominal concentrations of 10 ppmv in nitrogen of selected VOCs is attached to the calibration system as illustrated in Figure 8. The gas cylinders are opened and the gas mixtures are passed through 0 to 10 mL/min certified mass flow controllers to generate ppb levels of calibration standards.

8.4.4.5 After the appropriate equilibrium period, attach the sampling system (containing a certified evacuated canister) to the manifold, as illustrated in Figure 8(b).

8.4.4.6 Sample the dynamic calibration gas stream with the sampling system.

8.4.4.7 Concurrent with the sampling system operation, realtime monitoring of the calibration gas stream is accomplished by the on-line GC/MS analytical system [Figure 8(a)] to provide reference concentrations of generated VOCs.

8.4.4.8 At the end of the sampling period (normally the same time period used for experiments), the sampling system canister is analyzed and compared to the reference GC/MS analytical system to determine if the concentration of the targeted VOCs was increased or decreased by the sampling system.

8.4.4.9 A recovery of between 90% and 110% is expected for all targeted VOCs.

8.4.5 Sampler System Certification without Compressed Gas Cylinder Standards.

8.4.5.1 Not all the gases on the Title III list are available/compatible with compressed gas standards. In these cases sampler certification must be approached by different means.

8.4.5.2 Definitive guidance is not currently available in these cases; however, Section 9.2 lists several ways to generate gas standards. In general, Compendium Method TO-14A compounds (see Table 1) are available commercially as compressed gas standards.

9. GC/MS Analysis of Volatiles from Canisters

9.1 Introduction

9.1.1 The analysis of canister samples is accomplished with a GC/MS system. Fused silica capillary columns are used to achieve high temporal resolution of target compounds. Linear quadrupole or ion trap mass spectrometers are employed for compound detection. The heart of the system is composed of the sample inlet concentrating device that is needed to increase sample loading into a detectable range. Two examples of concentrating systems are discussed. Other approaches are acceptable as long as they are compatible with achieving the system performance criteria given in Section 11.

9.1.2 With the first technique, a whole air sample from the canister is passed through a multisorbent packing (including single adsorbent packings) contained within a metal or glass tube maintained at or above the surrounding air temperature. Depending on the water retention properties of the packing, some or most of the water vapor passes completely through the trap during sampling. Additional drying of the sample is accomplished after the sample concentration is completed by forward purging the trap with clean, dry helium or another inert gas (air is not used). The sample is then thermally desorbed from the packing and backflushed from the trap onto a gas chromatographic column. In some systems a "refocusing" trap is placed between the primary trap and the gas chromatographic column. The specific system design downstream of the primary trap depends on technical factors such as the rate of thermal desorption and sampled volume, but the objective in most cases is to enhance chromatographic resolution of the individual sample components before detection on a mass spectrometer.

9.1.3 Sample drying strategies depend on the target list of compounds. For some target compound lists, the multisorbent packing of the concentrator can be selected from hydrophobic adsorbents which allow a high percentage of water vapor in the sample to pass through the concentrator during sampling and without significant loss of the target compounds. However, if very volatile organic compounds are on the target list, the adsorbents required for their retention may also strongly retain water vapor and a more lengthy dry purge is necessary prior to analysis.

9.1.4 With the second technique, a whole air sample is passed through a concentrator, where the VOCs are condensed on a reduced temperature surface (cold trap). Subsequently, the condensed gases are thermally desorbed and backflushed from the trap with an inert gas onto a gas chromatographic column. This concentration technique is similar to that discussed in Compendium Method TO-14, although a membrane dryer is not used. The sample size is reduced in volume to limit the amount of water vapor that is also collected (100 mL or less may be necessary). The attendant reduction in sensitivity is offset by enhancing the sensitivity of detection, for example by using an ion trap detector.

9.2 Preparation of Standards

9.2.1 Introduction.

9.2.1.1 When available, standard mixtures of target gases in high pressure cylinders must be certified traceable to a NIST Standard Reference Material (SRM) or to a NIST/EPA approved Certified Reference Material (CRM). Manufacturer's certificates of analysis must be retained to track the expiration date.

9.2.1.2 The neat standards that are used for making trace gas standards must be of high purity; generally a purity of 98 percent or better is commercially available.

9.2.1.3 Cylinder(s) containing approximately 10 ppmv of each of the target compounds are typically used as primary stock standards. The components may be purchased in one cylinder or in separate cylinders depending on compatibility of the compounds and the pressure of the mixture in the cylinder. Refer to manufacturer's specifications for guidance on purchasing and mixing VOCs in gas cylinders.

9.2.2 Preparing Working Standards.

9.2.2.1 **Instrument Performance Check Standard.** Prepare a standard solution of BFB in humidified zero air at a concentration which will allow collection of 50 ng of BFB or less under the optimized concentration parameters.

9.2.2.2 **Calibration Standards.** Prepare five working calibration standards in humidified zero air at a concentration which will allow collection at the 2, 5, 10, 20, and 50 ppbv level for each component under the optimized concentration parameters.

9.2.2.3 **Internal Standard Spiking Mixture.** Prepare an internal spiking mixture containing bromochloromethane, chlorobenzene-d_5, and 1,4-difluorobenzene at 10 ppmv each in humidified zero air to be added to the sample or calibration standard. 500 µL of this mixture spiked into 500 mL of sample will result in a concentration of 10 ppbv. The internal standard is introduced into the trap during the collection time for all calibration, blank, and sample analyses using the apparatus shown in Figure 13 or by equivalent means. The volume of internal standard spiking mixture added for each analysis must be the same from run to run.

9.2.3 Standard Preparation by Dynamic Dilution Technique.

9.2.3.1 Standards may be prepared by dynamic dilution of the gaseous contents of a cylinder(s) containing the gas calibration stock standards with humidified zero air using mass flow controllers and a calibration manifold. The working standard may be delivered from the manifold to a clean, evacuated canister using a pump and mass flow controller.

9.2.3.2 Alternatively, the analytical system may be calibrated by sampling directly from the manifold if the flow rates are optimized to provide the desired amount of calibration standards. However, the use of the canister as a reservoir prior to introduction into the concentration system resembles the procedure normally used to collect samples and is preferred. Flow rates of the dilution air and cylinder standards (all expressed in the same units) are measured using a bubble meter or calibrated electronic flow measuring device, and the concentrations of target compounds in the manifold are then calculated using the dilution ratio and the original concentration of each compound.

$$\text{Manifold Conc.} = \frac{(\text{Original Conc.})\ (\text{Std. Gas Flowrate})}{(\text{Air Flowrate}) + (\text{Std. Gas Flowrate})}$$

9.2.3.3 Consider the example of 1 mL/min flow of 10 ppmv standard diluted with 1,000 mL/min of humid air provides a nominal 10 ppbv mixture, as calculated below:

$$\text{Manifold Conc.} = \frac{(10\ \text{ppm})(1\ \text{mL/min})(1000\ \text{ppb}/1\ \text{ppm})}{(1000\ \text{mL/min}) + (1\ \text{mL/min})} = 10\ \text{ppb}$$

9.2.4 Standard Preparation by Static Dilution Bottle Technique

[Note: Standards may be prepared in canisters by spiking the canister with a mixture of components prepared in a static dilution bottle (12). This technique is used specifically for liquid standards.]

9.2.4.1 The volume of a clean 2-liter round-bottom flask, modified with a threaded glass neck to accept a Mininert septum cap, is determined by weighing the amount of water required to completely fill up the flask. Assuming a density for the water of 1 g/mL, the weight of the water in grams is taken as the volume of the flask in milliliters.

9.2.4.2 The flask is flushed with helium by attaching a tubing into the glass neck to deliver the helium. After a few minutes, the tubing is removed and the glass neck is immediately closed with a Mininert septum cap.

9.2.4.3 The flask is placed in a 60°C oven and allowed to equilibrate at that temperature for about 15 minutes. Predetermined aliquots of liquid standards are injected into the flask making sure to keep the flask temperature constant at 60°C.

9.2.4.4 The contents are allowed to equilibrate in the oven for at least 30 minutes. To avoid condensation, syringes must be preheated in the oven at the same temperature prior to withdrawal of aliquots to avoid condensation.

9.2.4.5 Sample aliquots may then be taken for introduction into the analytical system or for further dilution. An aliquot or aliquots totaling greater than 1 percent of the flask volume should be avoided.

9.2.4.6 Standards prepared by this method are stable for one week. The septum must be replaced with each freshly prepared standard.

9.2.4.7 The concentration of each component in the flask is calculated using the following equation:

$$\text{Concentration, mg/L} = \frac{(V_a)(d)}{V_f}$$

where: V_a = Volume of liquid neat standard injected into the flask, µL.
d = Density of the liquid neat standard, mg/µL.
V_f = Volume of the flask, L.

9.2.4.8 To obtain concentrations in ppbv, the equation given in Section 9.2.5.7 can be used.

[Note: In the preparation of standards by this technique, the analyst should make sure that the volume of neat standard injected into the flask does not result in an overpressure due to the higher partial pressure produced by the standard compared to the vapor pressure in the flask. Precautions should also be taken to avoid a significant decrease in pressure inside the flask after withdrawal of aliquot(s).]

9.2.5 Standard Preparation Procedure in High Pressure Cylinders

[Note: Standards may be prepared in high pressure cylinders (13). A modified summary of the procedure is provided below.]

9.2.5.1 The standard compounds are obtained as gases or neat liquids (greater than 98 percent purity).

9.2.5.2 An aluminum cylinder is flushed with high-purity nitrogen gas and then evacuated to better than 25 in. Hg.

9.2.5.3 Predetermined amounts of each neat standard compound are measured using a microliter or gastight syringe and injected into the cylinder. The cylinder is equipped with a heated injection port and nitrogen flow to facilitate sample transfer.

9.2.5.4 The cylinder is pressurized to 1000 psig with zero nitrogen.

[Note: User should read all SOPs associated with generating standards in high pressure cylinders. Follow all safety requirements to minimize danger from high pressure cylinders.]

9.2.5.5 The contents of the cylinder are allowed to equilibrate (~24 hrs) prior to withdrawal of aliquots into the GC system.

9.2.5.6 If the neat standard is a gas, the cylinder concentration is determined using the following equation:

$$\text{Concentration, ppbv} = \frac{\text{Volume}_{\text{standard}}}{\text{Volume}_{\text{dilution gas}}} \times 10^9$$

[Note: Both values must be expressed in the same units.]

9.2.5.7 If the neat standard is a liquid, the gaseous concentration can be determined using the following equations:

$$V = \frac{nRT}{P}$$

and:

$$n = \frac{(mL)(d)}{MW}$$

where:
- V = Gaseous volume of injected compound at EPA standard temperature (25°C) and pressure (760 mm Hg), L.
- n = Moles.
- R = Gas constant, 0.08206 L-atm/mole °K.
- T = 298°K (standard temperature).
- P = 1 standard pressure, 760 mm Hg (1 atm).
- mL = Volume of liquid injected, mL.
- d = Density of the neat standard, g/mL.
- MW = Molecular weight of the neat standard expressed, g/g-mole.

The gaseous volume of the injected compound is divided by the cylinder volume at STP and then multiplied by 10^9 to obtain the component concentration in ppb units.

9.2.6 **Standard Preparation by Water Methods.**

[Note: Standards may be prepared by a water purge and trap method (14) and summarized as follows].

9.2.6.1 A previously cleaned and evacuated canister is pressurized to 760 mm Hg absolute (1 atm) with zero grade air.

9.2.6.2 The air gauge is removed from the canister and the sparging vessel is connected to the canister with the short length of 1/16 in. stainless steel tubing.

[Note: Extra effort should be made to minimize possible areas of dead volume to maximize transfer of analytes from the water to the canister.]

9.2.6.3 A measured amount of the stock standard solution and the internal standard solution is spiked into 5 mL of water.

9.2.6.4 This water is transferred into the sparge vessel and purged with nitrogen for 10 mins at 100 mL/min. The sparging vessel is maintained at 40°C.

9.2.6.5 At the end of 10 mins, the sparge vessel is removed and the air gauge is re-installed, to further pressurize the canister with pure nitrogen to 1500 mm Hg absolute pressure (approximately 29 psia).

9.2.6.6 The canister is allowed to equilibrate overnight before use.

9.2.6.7 A schematic of this approach is shown in Figure 14.

9.2.7 **Preparation of Standards by Permeation Tubes.**

9.2.7.1 Permeation tubes can be used to provide standard concentration of a trace gas or gases. The permeation of the gas can occur from inside a permeation tube containing the trace species of interest to an air stream outside. Permeation can also occur from outside a permeable membrane tube to an air stream passing through the tube (e.g., a tube of permeable material immersed in a liquid).

9.2.7.2 The permeation system is usually held at a constant temperature to generate a constant concentration of trace gas. Commercial suppliers provide systems for generation and dilution of over 250 compounds. Some commercial suppliers of permeation tube equipment are listed in Appendix D.

9.2.8 **Storage of Standards.**

9.2.8.1 Working standards prepared in canisters may be stored for thirty days in an atmosphere free of potential contaminants.

9.2.8.2 It is imperative that a storage logbook be kept to document storage time.

10. GC/MS Operating Conditions

10.1 Preconcentrator

The following are typical cryogenic and adsorbent preconcentrator analytical conditions which, however, depend on the specific combination of solid sorbent and must be selected carefully by the operator. The reader is referred to Tables 1 and 2 of Compendium Method TO-17 for guidance on selection of sorbents. An example of a system using a solid adsorbent preconcentrator with a cryofocusing trap is discussed in the literature (15). Oven temperature programming starts above ambient.

10.1.1 **Sample Collection Conditions**

Cryogenic Trap	Adsorbent Trap

Set point	-150°C	Set point	27°C
Sample volume	- up to 100 mL	Sample volume	- up to 1,000 mL
Carrier gas purge flow	- none	Carrier gas purge flow	- selectable

[Note: The analyst should optimize the flow rate, duration of sampling, and absolute sample volume to be used. Other preconcentration systems may be used provided performance standards (see Section 11) are realized.]

10.1.2 Desorption Conditions

Cryogenic Trap		Adsorbent Trap	
Desorb Temperature	120°C	Desorb Temperature	Variable
Desorb Flow Rate	~ 3 mL/min He	Desorb Flow Rate	~3 mL/min He
Desorb Time	<60 sec	Desorb Time	<60 sec

The adsorbent trap conditions depend on the specific solid adsorbents chosen (see manufacturers' specifications).

10.1.3 Trap Reconditioning Conditions.

Cryogenic Trap		Adsorbent Trap	
Initial bakeout	120°C (24 hrs)	Initial bakeout	
Variable (24 hrs)			
After each run	120°C (5 min)	After each run	Variable (5 min)

10.2 GC/MS System

10.2.1 Optimize GC conditions for compound separation and sensitivity. Baseline separation of benzene and carbon tetrachloride on a 100% methyl polysiloxane stationary phase is an indication of acceptable chromatographic performance.

10.2.2 The following are the recommended gas chromatographic analytical conditions when using a 50-meter by 0.3-mm I.D., 1 µm film thickness fused silica column with refocusing on the column.

Item	Condition	
Carrier Gas:	Helium	
Flow Rate:	Generally 1-3 mL/min as recommended by manufacturer	
Temperature Program:	Initial Temperature:	-50°C
	Initial Hold Time:	2 min
	Ramp Rate:	8° C/min
	Final Temperature:	200°C
	Final Hold Time:	Until all target compounds elute.

10.2.3 The following are the recommended mass spectrometer conditions:

Item	Condition

Electron Energy: 70 Volts (nominal)
Mass Range: 35-300 amu [the choice of 35 amu excludes the detection of some target compounds such as methanol and formaldehyde, and the quantitation of others such as ethylene oxide, ethyl carbamate, etc. (see Table 2). Lowering the mass range and using special programming features available on modern gas chromatographs will be necessary in these cases, but are not considered here.
Scan Time: To give at least 10 scans per peak, not to exceed 1 second per scan].

A schematic for a typical GC/MS analytical system is illustrated in Figure 15.

10.3 Analytical Sequence

10.3.1 Introduction. The recommended GC/MS analytical sequence for samples during each 24-hour time period is as follows:

- Perform instrument performance check using bromofluorobenzene (BFB).
- Initiate multi-point calibration or daily calibration checks.
- Perform a laboratory method blank.
- Complete this sequence for analysis of ≤20 field samples.

10.4 Instrument Performance Check

10.4.1 Summary. It is necessary to establish that a given GC/MS meets tuning and standard mass spectral abundance criteria prior to initiating any data collection. The GC/MS system is set up according to the manufacturer's specifications, and the mass calibration and resolution of the GC/MS system are then verified by the analysis of the instrument performance check standard, bromofluorobenzene (BFB).

10.4.2 Frequency. Prior to the analyses of any samples, blanks, or calibration standards, the Laboratory must establish that the GC/MS system meets the mass spectral ion abundance criteria for the instrument performance check standard containing BFB. The instrument performance check solution must be analyzed initially and once per 24-hour time period of operation.

The 24-hour time period for GC/MS instrument performance check and standards calibration (initial calibration or daily calibration check criteria) begins at the injection of the BFB which the laboratory records as documentation of a compliance tune.

10.4.3 Procedure. The analysis of the instrument performance check standard is performed by trapping 50 ng of BFB under the optimized preconcentration parameters. The BFB is introduced from a cylinder into the GC/MS via a sample loop valve injection system similar to that shown in Figure 13.

The mass spectrum of BFB must be acquired in the following manner. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is conducted using a single scan prior to the elution of BFB.

10.4.4 Technical Acceptance Criteria. Prior to the analysis of any samples, blanks, or calibration standards, the analyst must establish that the GC/MS system meets the mass spectral ion abundance criteria for the instrument performance check standard as specified in Table 3.

10.4.5 Corrective Action. If the BFB acceptance criteria are not met, the MS must be retuned. It may be necessary to clean the ion source, or quadrupoles, or take other necessary actions to achieve the acceptance criteria.

10.4.6 Documentation. Results of the BFB tuning are to be recorded and maintained as part of the instrumentation log.

10.5 Initial Calibration

10.5.1 Summary. Prior to the analysis of samples and blanks but after the instrument performance check standard criteria have been met, each GC/MS system must be calibrated at five concentrations that span the monitoring range of interest in an initial calibration sequence to determine instrument sensitivity and the linearity of GC/MS response for the target compounds. For example, the range of interest may be 2 to 20 ppbv, in which case the five concentrations would be 1, 2, 5, 10 and 25 ppbv.

One of the calibration points from the initial calibration curve must be at the same concentration as the daily calibration standard (e.g., 10 ppbv).

10.5.2 Frequency. Each GC/MS system must be recalibrated following corrective action (e.g., ion source cleaning or repair, column replacement, etc.) which may change or affect the initial calibration criteria or if the daily calibration acceptance criteria have not been met.

If time remains in the 24-hour time period after meeting the acceptance criteria for the initial calibration, samples may be analyzed.

If time does not remain in the 24-hour period after meeting the acceptance criteria for the initial calibration, a new analytical sequence shall commence with the analysis of the instrument performance check standard followed by analysis of a daily calibration standard.

10.5.3 Procedure. Verify that the GC/MS system meets the instrument performance criteria in Section 10.4.

The GC must be operated using temperature and flow rate parameters equivalent to those in Section 10.2.2. Calibrate the preconcentration-GC/MS system by drawing the standard into the system. Use one of the standards preparation techniques described under Section 9.2 or equivalent.

A minimum of five concentration levels are needed to determine the instrument sensitivity and linearity. One of the calibration levels should be near the detection level for the compounds of interest. The calibration range should be chosen so that linear results are obtained as defined in Sections 10.5.1 and 10.5.5.

Quantitation ions for the target compounds are shown in Table 2. The primary ion should be used unless interferences are present, in which case a secondary ion is used.

10.5.4 Calculations.

[Note: In the following calculations, an internal standard approach is used to calculate response factors. The area response used is that of the primary quantitation ion unless otherwise stated.]

10.5.4.1 Relative Response Factor (RRF). Calculate the relative response factors for each target compound relative to the appropriate internal standard (i.e., standard with the nearest retention time) using the following equation:

$$RRF = \frac{A_x C_{is}}{A_{is} C_x}$$

where: RRF = Relative response factor.
A_x = Area of the primary ion for the compound to be measured, counts.
A_{is} = Area of the primary ion for the internal standard, counts.
C_{is} = Concentration of internal standard spiking mixture, ppbv.
C_x = Concentration of the compound in the calibration standard, ppbv.

[Note: The equation above is valid under the condition that the volume of internal standard spiking mixture added in all field and QC analyses is the same from run to run, and that the volume of field and QC sample introduced into the trap is the same for each analysis. C_{is} and C_x must be in the same units.]

10.5.4.2 Mean Relative Response Factor. Calculate the mean RRF for each compound by averaging the values obtained at the five concentrations using the following equation:

$$\overline{RRF} = \sum_{i=1}^{n} \frac{x_i}{n}$$

where: $\overline{RRF}$ = Mean relative response factor.
x_i = RRF of the compound at concentration i.
n = Number of concentration values, in this case 5.

10.5.4.3 Percent Relative Standard Deviation (%RSD). Using the RRFs from the initial calibration, calculate the %RSD for all target compounds using the following equations:

$$\%RSD = \frac{SD_{RRF}}{\overline{RRF}} \times 100$$

and

$$SD_{RRF} = \sqrt{\sum_{i=1}^{N} \frac{(RRF_i - \overline{RRF})^2}{N - 1}}$$

where: SD_{RRF} = Standard deviation of initial response factors (per compound).
RRF_i = Relative response factor at a concentration level i.
$\overline{RRF}$ = Mean of initial relative response factors (per compound).

10.5.4.4 Relative Retention Times (RRT). Calculate the RRTs for each target compound over the initial calibration range using the following equation:

$$RRT = \frac{RT_c}{RT_{is}}$$

where: RT_c = Retention time of the target compound, seconds
RT_{is} = Retention time of the internal standard, seconds.

10.5.4.5 Mean of the Relative Retention Times ($\overline{RRT}$). Calculate the mean of the relative retention times ($\overline{RRT}$) for each analyte target compound over the initial calibration range using the following equation:

$$\overline{RRT} = \sum_{i=1}^{n} \frac{RRT}{n}$$

where: $\overline{RRT}$ = Mean relative retention time for the target compound for each initial calibration standard.

RRT = Relative retention time for the target compound at each calibration level.

10.5.4.6 Tabulate Primary Ion Area Response (Y) for Internal Standard. Tabulate the area response (Y) of the primary ions (see Table 2) and the corresponding concentration for each compound and internal standard.

10.5.4.7 Mean Area Response ($\overline{Y}$) for Internal Standard. Calculate the mean area response ($\overline{Y}$) for each internal standard compound over the initial calibration range using the following equation:

$$\overline{Y} = \sum_{i=1}^{n} \frac{Y_i}{n}$$

where: $\overline{Y}$ = Mean area response.

Y = Area response for the primary quantitation ion for the internal standard for each initial calibration standard.

10.5.4.8 Mean Retention Times ($\overline{RT}$). Calculate the mean of the retention times ($\overline{RT}$) for each internal standard over the initial calibration range using the following equation:

$$\overline{RT} = \sum_{i=1}^{n} \frac{RT_i}{n}$$

where: $\overline{RT}$ = Mean retention time, seconds

RT = Retention time for the internal standard for each initial calibration standard, seconds.

10.5.5 Technical Acceptance Criteria for the Initial Calibration.

10.5.5.1 The calculated %RSD for the RRF for each compound in the calibration table must be less than 30% with at most two exceptions up to a limit of 40%.

[Note: This exception may not be acceptable for all projects. Many projects may have a specific target list of compounds which would require the lower limit for all compounds.]

10.5.5.2 The RRT for each target compound at each calibration level must be withiin 0.06 RRT units of the mean RRT for the compound.

10.5.5.3 The area response Y of at each calibration level must be within 40% of the mean area response $\overline{Y}$ over the initial calibration range for each internal standard.

10.5.5.4 The retention time shift for each of the internal standards at each calibration level must be within 20 s of the mean retention time over the initial calibration range for each internal standard.

10.5.6 Corrective Action.

10.5.6.1 Criteria. If the initial calibration technical acceptance criteria are not met, inspect the system for problems. It may be necessary to clean the ion source, change the column, or take other corrective actions to meet the initial calibration technical acceptance criteria.

10.5.6.2 Schedule. Initial calibration acceptance criteria *must* be met before any field samples, performance evaluation (PE) samples, or blanks are analyzed.

10.6 Daily Calibration

10.6.1 Summary. Prior to the analysis of samples and blanks but after tuning criteria have been met, the initial calibration of each GC/MS system must be routinely checked by analyzing a daily calibration standard to ensure that the instrument continues to remain under control. The daily calibration standard, which is the nominal 10 ppbv level calibration standard, should contain all the target compounds.

10.6.2 Frequency. A check of the calibration curve must be performed once every 24 hours on a GC/MS system that has met the tuning criteria. The daily calibration sequence starts with the injection of the BFB. If the BFB analysis meets the ion abundance criteria for BFB, then a daily calibration standard may be analyzed.

10.6.3 Procedure. The mid-level calibration standard (10 ppbv) is analyzed in a GC/MS system that has met the tuning and mass calibration criteria following the same procedure in Section 10.5.

10.6.4 Calculations. Perform the following calculations.

[Note: As indicated earlier, the area response of the primary quantitation ion is used unless otherwise stated.]

10.6.4.1 Relative Response Factor (RRF). Calculate a relative response factor (RRF) for each target compound using the equation in Section 10.5.4.1.

10.6.4.2 Percent Difference (%D). Calculate the percent difference in the RRF of the daily RRF (24-hour) compared to the mean RRF in the most recent initial calibration. Calculate the %D for each target compound using the following equation:

$$\%D = \frac{RRF_c - \overline{RRF_i}}{\overline{RRF_i}} \times 100$$

where: RRF_c = RRF of the compound in the continuing calibration standard.

$\overline{RRF_i}$ = Mean RRF of the compound in the most recent initial calibration.

10.6.5 Technical Acceptance Criteria. The daily calibration standard must be analyzed at the concentration level and frequency described in this Section 10.6 and on a GC/MS system meeting the BFB instrument performance check criteria (see Section 10.4).

The %D for each target compound in a daily calibration sequence must be within ±30 percent in order to proceed with the analysis of samples and blanks. A control chart showing %D values should be maintained.

10.6.6 Corrective Action. If the daily calibration technical acceptance criteria are not met, inspect the system for problems. It may be necessary to clean the ion source, change the column, or take other corrective actions to meet the daily calibration technical acceptance criteria.

Daily calibration acceptance criteria must be met before any field samples, performance evaluation (PE) samples, or blanks are analyzed. If the % D criteria are not met, it will be necessary to rerun the daily calibration sample.

10.7 Blank Analyses

10.7.1 Summary. To monitor for possible laboratory contamination, laboratory method blanks are analyzed at least once in a 24-hour analytical sequence. All steps in the analytical procedure are performed on the blank

using all reagents, standards, equipment, apparatus, glassware, and solvents that would be used for a sample analysis.

A laboratory method blank (LMB) is an unused, certified canister that has not left the laboratory. The blank canister is pressurized with humidified, ultra-pure zero air and carried through the same analytical procedure as a field sample. The injected aliquot of the blank must contain the same amount of internal standards that are added to each sample.

10.7.2 Frequency. The laboratory method blank must be analyzed after the calibration standard(s) and before any samples are analyzed.

Whenever a high concentration sample is encountered (i.e., outside the calibration range), a blank analysis should be performed immediately after the sample is completed to check for carryover effects.

10.7.3 Procedure. Fill a cleaned and evacuated canister with humidified zero air (RH >20 percent, at 25°C). Pressurize the contents to 2 atm.

The blank sample should be analyzed using the same procedure outlined under Section 10.8.

10.7.4 Calculations. The blanks are analyzed similar to a field sample and the equations in Section 10.5.4 apply.

10.7.5 Technical Acceptance Criteria. A blank canister should be analyzed daily.

The area response for each internal standard (IS) in the blank must be within ±40 percent of the mean area response of the IS in the most recent valid calibration.

The retention time for each of the internal standards must be within ±0.33 minutes between the blank and the most recent valid calibration.

The blank should not contain any target analyte at a concentration greater than its quantitation level (three times the MDL as defined in Section 11.2) and should not contain additional compounds with elution characteristics and mass spectral features that would interfere with identification and measurement of a method analyte.

10.7.6 Corrective Action. If the blanks do not meet the technical acceptance criteria, the analyst should consider the analytical system to be out of control. It is the responsibility of the analyst to ensure that contaminants in solvents, reagents, glassware, and other sample storage and processing hardware that lead to discrete artifacts and/or elevated baselines in gas chromatograms be eliminated. If contamination is a problem, the source of the contamination must be investigated and appropriate corrective measures need to be taken and documented before further sample analysis proceeds.

If an analyte in the blank is found to be out of control (i.e., contaminated) and the analyte is also found in associated samples, those sample results should be "flagged" as possibly contaminated.

10.8 Sample Analysis

10.8.1 Summary. An aliquot of the air sample from a canister (e.g., 500 mL) is preconcentrated and analyzed by GC/MS under conditions stated in Sections 10.1 and 10.2. If using the multisorbent/dry purge approach, adjust the dry purge volume to reduce water effects in the analytical system to manageable levels.

[Note: The analyst should be aware that pressurized samples of high humidity samples will contain condensed water. As a result, the humidity of the sample released from the canister during analysis will vary

in humidity, being lower at the higher canister pressures and increasing in humidity as the canister pressures decreases. Storage integrity of water soluble compounds may also be affected.]

10.8.2 Frequency. If time remains in the 24-hour period in which an initial calibration is performed, samples may be analyzed without analysis of a daily calibration standard.

If time does not remain in the 24-hour period since the injection of the instrument performance check standard in which an initial calibration is performed, both the instrument performance check standard and the daily calibration standard should be analyzed before sample analysis may begin.

10.8.3 Procedure for Instrumental Analysis. Perform the following procedure for analysis.

10.8.3.1 All canister samples should be at temperature equilibrium with the laboratory.

10.8.3.2 Check and adjust the mass flow controllers to provide correct flow rates for the system.

10.8.3.3 Connect the sample canister to the inlet of the GC/MS analytical system, as shown in Figure 15 [Figure 16 shows an alternate two stage concentrator using multisorbent traps followed by a trap cooled by a closed cycle cooler (15)]. The desired sample flow is established through the six-port chromatographic valve and the preconcentrator to the downstream flow controller. The absolute volume of sample being pulled through the trap must be consistent from run to run.

10.8.3.4 Heat/cool the GC oven and cryogenic or adsorbent trap to their set points. Assuming a six-port value is being used, as soon as the trap reaches its lower set point, the six-port chromatographic valve is cycled to the trap position to begin sample collection. Utilize the sample collection time which has been optimized by the analyst.

10.8.3.5 Use the arrangement shown in Figure 13, (i.e., a gastight syringe or some alternate method) introduce an internal standard during the sample collection period. Add sufficient internal standard equivalent to 10 ppbv in the sample. For example, a 0.5 mL volume of a mixture of internal standard compounds, each at 10 ppmv concentration, added to a sample volume of 500 mL, will result in 10 ppbv of each internal standard in the sample.

10.8.3.6 After the sample and internal standards are preconcentrated on the trap, the GC sampling valve is cycled to the inject position and the trap is swept with helium and heated. Assuming a focusing trap is being used, the trapped analytes are thermally desorbed onto a focusing trap and then onto the head of the capillary column and are separated on the column using the GC oven temperature program. The canister valve is closed and the canister is disconnected from the mass flow controller and capped. The trap is maintained at elevated temperature until the beginning of the next analysis.

10.8.3.7 Upon sample injection onto the column, the GC/MS system is operated so that the MS scans the atomic mass range from 35 to 300 amu. At least ten scans per eluting chromatographic peak should be acquired. Scanning also allows identification of unknown compounds in the sample through searching of library spectra.

10.8.3.8 Each analytical run must be checked for saturation. The level at which an individual compound will saturate the detection system is a function of the overall system sensitivity and the mass spectral characteristics of that compound.

10.8.3.9 Secondary ion quantitation is allowed only when there are sample matrix interferences with the primary ion. If secondary ion quantitation is performed, document the reasons in the laboratory record book.

10.8.4 Calculations. The equation below is used for calculating concentrations.

$$C_x = \frac{A_x C_{is} DF}{A_{is} \overline{RRF}}$$

where: C_x = Compound concentration, ppbv.

A_x = Area of the characteristic ion for the compound to be measured, counts.

A_{is} = Area of the characteristic ion for the specific internal standard, counts.

C_{is} = Concentration of the internal standard spiking mixture, ppbv

$\overline{RRF}$ = Mean relative response factor from the initial calibration.

DF = Dilution factor calculated as described in section 2. If no dilution is performed, DF = 1.

[Note: The equation above is valid under the condition that the volume (~500 µL) of internal standard spiking mixture added in all field and QC analyses is the same from run to run, and that the volume (~500 mL) of field and QC sample introduced into the trap is the same for each analysis.]

10.8.5 Technical Acceptance Criteria.

[Note: If the most recent valid calibration is an initial calibration, internal standard area responses and RTs in the sample are evaluated against the corresponding internal standard area responses and RTs in the mid level standard (10 ppbv) of the initial calibration.]

10.8.5.1 The field sample must be analyzed on a GC/MS system meeting the BFB tuning, initial calibration, and continuing calibration technical acceptance criteria at the frequency described in Sections 10.4, 10.5 and 10.6.

10.8.5.2 The field samples must be analyzed along with a laboratory method blank that met the blank technical acceptance criteria.

10.8.5.3 All of the target analyte peaks should be within the initial calibration range.

10.8.5.4 The retention time for each internal standard must be within ±0.33 minutes of the retention time of the internal standard in the most recent valid calibration.

10.8.6 Corrective Action. If the on-column concentration of any compound in any sample exceeds the initial calibration range, an aliquot of the original sample must be diluted and reanalyzed. Guidance in performing dilutions and exceptions to this requirement are given below.

- Use the results of the original analysis to determine the approximate dilution factor required to get the largest analyte peak within the initial calibration range.
- The dilution factor chosen should keep the response of the largest analyte peak for a target compound in the upper half of the initial calibration range of the instrument.

[Note: Analysis involving dilution should be reported with a dilution factor and nature of the dilution gas.]

10.8.6.1 Internal standard responses and retention times must be evaluated during or immediately after data acquisition. If the retention time for any internal standard changes by more than 20 sec from the latest daily (24-hour) calibration standard (or mean retention time over the initial calibration range), the GC/MS system must be inspected for malfunctions, and corrections made as required.

10.8.6.2 If the area response for any internal standard changes by more than ±40 percent between the sample and the most recent valid calibration, the GC/MS system must be inspected for malfunction and

corrections made as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is necessary.

10.8.6.3 If, after reanalysis, the area responses or the RTs for all internal standards are inside the control limits, then the problem with the first analysis is considered to have been within the control of the Laboratory. Therefore, submit only data from the analysis with SICPs within the limits. This is considered the initial analysis and should be reported as such on all data deliverables.

11. Requirements for Demonstrating Method Acceptability for VOC Analysis from Canisters

11.1 Introduction

11.1.1 There are three performance criteria which must be met for a system to qualify under Compendium Method TO-15. These criteria are: the method detection limit of ≤0.5 ppbv, replicate precision within 25 percent, and audit accuracy within 30 percent for concentrations normally expected in contaminated ambient air (0.5 to 25 ppbv).

11.1.2 Either SIM or SCAN modes of operation can be used to achieve these criteria, and the choice of mode will depend on the number of target compounds, the decision of whether or not to determine tentatively identified compounds along with other VOCs on the target list, as well as on the analytical system characteristics.

11.1.3 Specific criteria for each Title III compound on the target compound list must be met by the analytical system. These criteria were established by examining summary data from EPA's Toxics Air Monitoring System Network and the Urban Air Toxics Monitoring Program network. Details for the determination of each of the criteria follow.

11.2 Method Detection Limit

11.2.1 The procedure chosen to define the method detection limit is that given in the *Code of Federal Regulations* (40 CFR 136 Appendix B).

11.2.2 The method detection limit is defined for each system by making seven replicate measurements of the compound of interest at a concentration near (within a factor of five) the expected detection limit, computing the standard deviation for the seven replicate concentrations, and multiplying this value by 3.14 (i.e., the Student's t value for 99 percent confidence for seven values). Employing this approach, the detection limits given in Table 4 were obtained for some of the VOCs of interest.

11.3 Replicate Precision

11.3.1 The measure of replicate precision used for this program is the absolute value of the difference between replicate measurements of the sample divided by the average value and expressed as a percentage as follows:

$$\text{percent difference} = \frac{|x_1 - x_2|}{\bar{x}} \times 100$$

where: x_1 = First measurement value.

x_2 = Second measurement value.

$\bar{x}$ = Average of the two values.

11.3.2 There are several factors which may affect the precision of the measurement. The nature of the compound of interest itself such as molecular weight, water solubility, polarizability, etc., each have some effect on the precision, for a given sampling and analytical system. For example, styrene, which is classified as a polar VOC, generally shows slightly poorer precision than the bulk of nonpolar VOCs. A primary influence on precision is the concentration level of the compound of interest in the sample, i.e., the precision degrades as the concentration approaches the detection limit. A conservative measure was obtained from replicate analysis of "real world" canister samples from the TAMS and UATMP networks. These data are summarized in Table 5 and suggest that a replicate precision value of 25 percent can be achieved for each of the target compounds.

11.4 Audit Accuracy

11.4.1 A measure of analytical accuracy is the degree of agreement with audit standards. Audit accuracy is defined as the difference between the nominal concentration of the audit compound and the measured value divided by the audit value and expressed as a percentage, as illustrated in the following equation:

$$\text{Audit Accuracy, \%} = \frac{\text{Spiked Value} - \text{Observed Value}}{\text{Spiked Value}} \times 100$$

11.4.2 Audit accuracy results for TAMS and UATMP analyses are summarized in Table 6 and were used to form the basis for a selection of 30 percent as the performance criterion for audit accuracy.

12. References

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APPENDIX A.

LISTING OF SOME COMMERCIAL WATER MANAGEMENT SYSTEMS USED WITH AUTOGC SYSTEMS

Tekmar Dohrman Company
7143 East Kemper Road
Post Office Box 429576
Cincinnati, Ohio 45242-9576
(513) 247-7000
(513) 247-7050 (Fax)
(800) 543-4461
[Moisture control module]

Entech Laboratory Automation
950 Enchanted Way No. 101
Simi Valley, California 93065
(805) 527-5939
(805) 527-5687 (Fax)
[Microscale Purge and Trap]

Dynatherm Analytical Instruments
Post Office Box 159
Kelton, Pennsylvania 19346
(215) 869-8702
(215) 869-3885 (Fax)
[Thermal Desorption System]

XonTech Inc.
6862 Hayenhurst Avenue
Van Nuys, CA 91406
(818) 787-7380
(818) 787-4275 (Fax)
[Multi-adsorbent trap/dry purge]

Graseby
500 Technology Ct.
Smyrna, Georgia 30082
(770) 319-9999
(770) 319-0336 (Fax)
(800) 241-6898
[Controlled Desorption Trap]

Varian Chromatography System
2700 Mitchell Drive
Walnut Creek, California 94898
(510) 945-2196
(510) 945-2335 (FAX)
[Variable Temperature Adsorption Trap]

APPENDIX B.

COMMENT ON CANISTER CLEANING PROCEDURES

The canister cleaning procedures given in Section 8.4 require that canister pressure be reduced to <0.05mm Hg before the cleaning process is complete. Depending on the vacuum system design (diameter of connecting tubing, valve restrictions, etc.) and the placement of the vacuum gauge, the achievement of this value may take several hours. In any case, the pressure gauge should be placed near the canisters to determine pressure. The objective of requiring a low pressure evacuation during canister cleaning is to reduce contaminants. If canisters can be routinely certified (<0.2 ppbv for target compounds) while using a higher vacuum, then this criteria can be relaxed. However, the ultimate vacuum achieved during cleaning should always be <0.2mm Hg.

Canister cleaning as described in Section 8.4 and illustrated in Figure 10 requires components with special features. The vacuum gauge shown in Figure 10 must be capable of measuring 0.05mm Hg with less than a 20% error. The vacuum pump used for evacuating the canister must be noncontaminating while being capable of achieving the 0.05 mm Hg vacuum as monitored near the canisters. Thermoelectric vacuum gauges and turbomolecular drag pumps are typically being used for these two components.

An alternate to achieving the canister certification requirement of <0.2 ppbv for all target compounds is the criteria used in Compendium Method TO-12 that the total carbon count be <10ppbC. This check is less expensive and typically more exacting than the current certification requirement and can be used if proven to be equivalent to the original requirement. This equivalency must be established by comparing the total nonmethane organic carbon (TNMOC) expressed in ppbC to the requirement that individual target compounds be <0.2 ppbv for a series of analytical runs.

APPENDIX C.

LISTING OF COMMERCIAL MANUFACTURERS AND RE-SUPPLIERS OF SPECIALLY-PREPARED CANISTERS

BRC/Rasmussen
17010 NW Skyline Blvd.
Portland, Oregon 97321
(503) 621-1435

Meriter
1790 Potrero Drive
San Jose, CA 95124
(408) 265-6482

Restek Corporation
110 Benner Circle
Bellefonte, PA 16823-8812
(814) 353-1300
(800) 356-1688

Scientific Instrumentation Specialists
P.O. Box 8941
815 Courtney Street
Moscow, ID 83843
(208) 882-3860

Graseby
500 Technology Ct.
Smyrna, Georgia 30082
(404) 319-9999
(800) 241-6898

XonTech Inc.
6862 Hayenhurst Avenue
Van Nuys, CA 91406
(818) 787-7380

APPENDIX D.

LISTING OF COMMERCIAL SUPPLIERS OF PERMEATION TUBES AND SYSTEMS

Kin-Tek
504 Laurel St.
Lamarque, Texas 77568
(409) 938-3627
(800) 326-3627

Vici Metronics, Inc.
2991 Corvin Drive
Santa Clara, CA 95051
(408) 737-0550

Analytical Instrument Development, Inc.
Rt. 41 and Newark Rd.
Avondale, PA 19311
(215) 268-3181

Ecology Board, Inc.
9257 Independence Ave.
Chatsworth, CA 91311
(213) 882-6795

Tracor, Inc.
6500 Tracor Land
Austin, TX
(512) 926-2800

Metronics Associates, Inc.
3201 Porter Drive
Standford Industrial Park
Palo Alto, CA 94304
(415) 493-5632

TABLE 1. VOLATILE ORGANIC COMPOUNDS ON THE TITLE III CLEAN AIR AMENDMENT LIST--MEMBERSHIP IN COMPENDIUM METHOD TO-14A LIST AND THE SOW-CLP LIST OF VOCs

Compound	CAS No.	BP (°C)	v.p. (mmHg)[1]	MW[1]	TO-14A	CLP-SOW
Methyl chloride (chloromethane); CH3Cl	74-87-3	-23.7	3.8 x 10	50.5	X	X
Carbonyl sulfide; COS	463-58-1	-50.0	3.7 x 10	60.1		
Vinyl chloride (chloroethene); C2H3Cl	75-01-4	-14.0	3.2 x 10	62.5	X	X
Diazomethane; CH2N2	334-88-3	-23.0	2.8 x 10	42.1		
Formaldehyde; CH2O	50-00-0	-19.5	2.7 x 10	30		
1,3-Butadiene; C4H6	106-99-0	-4.5	2.0 x 10	54		X
Methyl bromide (bromomethane); CH3Br	74-83-9	3.6	1.8 x 10	94.9	X	X
Phosgene; CCl2O	75-44-5	8.2	1.2 x 10	99		
Vinyl bromide (bromoethene); C2H3Br	593-60-2	15.8	1.1 x 10	107		
Ethylene oxide; C2H4O	75-21-8	10.7	1.1 x 10	44		
Ethyl chloride (chloroethane); C2H5Cl	75-00-3	12.5	1.0 x 10	64.5	X	X
Acetaldehyde (ethanal); C2H4O	75-07-0	21.0	952	44		
Vinylidene chloride (1,1-dichloroethylene); C2H2Cl2	75-35-4	31.7	500	97	X	X
Propylene oxide; C3H6O	75-56-9	34.2	445	58		
Methyl iodide (iodomethane); CH3I	74-88-4	42.4	400	141.9		
Methylene chloride; CH2Cl2	75-09-2	40.0	349	84.9	X	X
Methyl isocyanate; C2H3NO	624-83-9	59.6	348	57.1		
Allyl chloride (3-chloropropene); C3H5Cl	107-05-1	44.5	340	76.5	X	X
Carbon disulfide; CS2	75-15-0	46.5	260	76		
Methyl tert-butyl ether; C5H12O	1634-04-4	55.2	249	86		
Propionaldehyde; C2H5CHO	123-38-6	49.0	235	58.1		
Ethylidene dichloride (1,1-dichloroethane); C2H4Cl2	75-34-3	57.0	230	99	X	

TABLE 1. (continued)

Compound	CAS No.	BP (°C)	v.p. (mmHg)[1]	MW[1]	TO-14A	CLP-SOW
Chloroprene (2-chloro-1,3-butadiene); C4H5Cl	126-99-8	59.4	226	88.5		
Chloromethyl methyl ether; C2H5ClO	107-30-2	59.0	224	80.5		
Acrolein (2-propenal); C3H4O	107-02-8	52.5	220	56		X
1,2-Epoxybutane (1,2-butylene oxide); C4H8O	106-88-7	63.0	163	72		
Chloroform; CHCl3	67-66-3	61.2	160	119	X	X
Ethyleneimine (aziridine); C2H5N	151-56-4	56	160.0	43		
1,1-Dimethylhydrazine; C2H8N2	57-14-7	63	157.0	60.0		
Hexane; C6H14	110-54-3	69.0	120	86.2	X	
1,2-Propyleneimine (2-methylaziridine); C3H7N	75-55-8	66.0	112	57.1		
Acrylonitrile (2-propenenitrile); C3H3N	107-13-1	77.3	100	53	X	
Methyl chloroform (1,1,1-trichloroethane); C2H3Cl3	71-55-6	74.1	100	133.4	X	X
Methanol; CH4O	67-56-1	65.0	92.0	32		X
Carbon tetrachloride; CCl4	56-23-5	76.7	90.0	153.8	X	X
Vinyl acetate; C4H6O2	108-05-4	72.2	83.0	86		X
Methyl ethyl ketone (2-butanone); C4H8O	78-93-3	79.6	77.5	72		X
Benzene; C6H6	71-43-2	80.1	76.0	78	X	X
Acetonitrile (cyanomethane); C2H3N	75-05-8	82	74.0	41.0		X
Ethylene dichloride (1,2-dichloroethane); C2H4Cl2	107-06-2	83.5	61.5	99	X	X
Triethylamine; C6H15N	121-44-8	89.5	54.0	101.2		
Methylhydrazine; CH6N2	60-34-4	87.8	49.6	46.1		
Propylene dichloride (1,2-dichloropropane); C3H6Cl2	78-87-5	97.0	42.0	113	X	X
2,2,4-Trimethyl pentane C8H18	540-84-1	99.2	40.6	114		
1,4-Dioxane (1,4-Diethylene oxide); C4H8O2	123-91-1	101	37.0	88		
Bis(chloromethyl) ether; C2H4Cl2O	542-88-1	104	30.0	115		
Ethyl acrylate; C5H8O2	140-88-5	100	29.3	100		
Methyl methacrylate; C5H8O2	80-62-6	101	28.0	100.1		

TABLE 1. (continued)

Compound	CAS No.	BP (°C)	v.p. (mmgHg)[1]	MW[1]	TO-14A	CLP-SOW
Methyl methacrylate; C5H8O2	80-62-101	101	28.0	100.1		
1,3-Dichloropropene; C3H4Cl2 (cis)	542-75-6	112	27.8	111	X	X
Toluene; C7H8	108-88-3	111	22.0	92	X	X
Trichloroethylene; C2HCl3	79-01-6	87.0	20.0	131.4	X	X
1,1,2-Trichloroethane; C2H3Cl3	79-00-5	114	19.0	133.4	X	X
Tetrachloroethylene; C2Cl4	127-18-4	121	14.0	165.8	X	X
Epichlorohydrin (1-chloro-2,3-epoxy propane); C3H5ClO	106-89-8	117	12.0	92.5		
Ethylene dibromide (1,2-dibromoethane); C2H4Br2	106-93-4	132	11.0	187.9	X	X
N-Nitroso-N-methylurea; C2H5N3O2	684-93-5	124	10.0	103		
2-Nitropropane; C3H7NO2	79-46-9	120	10.0	89		
Chlorobenzene; C6H5Cl	108-90-7	132	8.8	112.6	X	X
Ethylbenzene; C8H10	100-41-4	136	7.0	106	X	X
Xylenes (isomer & mixtures); C8H10	1330-20-7	142	6.7	106.2	X	X
Styrene; C8H8	100-42-5	145	6.6	104	X	X
p-Xylene; C8H10	106-42-3	138	6.5	106.2	X	X
m-Xylene; C8H10	108-38-3	139	6.0	106.2	X	X
Methyl isobutyl ketone (hexone); C6H12O	108-10-1	117	6.0	100.2		
Bromoform (tribromomethane); CHBr3	75-25-2	149	5.6	252.8		
1,1,2,2-Tetrachloroethane; C2H2Cl4	79-34-5	146	5.0	167.9	X	X
o-Xylene; C8H10	95-47-6	144	5.0	106.2	X	X
Dimethylcarbamyl chloride; C3H6ClNO	79-44-7	166	4.9	107.6		
N-Nitrosodimethylamine; C2H6N2O	62-75-9	152	3.7	74		
Beta-Propiolactone; C3H4O2	57-57-8	Decomposes at 162	3.4	72		
Cumene (isopropylbenzene); C9H12	98-82-8	153	3.2	120		

TABLE 1. (continued)

Compound	CAS No.	BP (°C)	v.p. (mmHg)[1]	MW[1]	TO-14A	CLP-SOW
Cumene (isopropylbenzene); C9H12	98-82-8	153	3.2	120		
Acrylic acid; C3H4O2	79-10-7	141	3.2	72		
N,N-Dimethylformamide; C3H7NO	68-12-2	153	2.7	73		
1,3-Propane sultone; C3H6O3S	1120-71-4	180/30mm	2.0	122.1		
Acetophenone; C8H8O	98-86-2	202	1.0	120		
Dimethyl sulfate; C2H6O4S	77-78-1	188	1.0	126.1		
Benzyl chloride (a-chlorotoluene); C7H7Cl	100-44-7	179	1.0	126.6	X	X
1,2-Dibromo-3-chloropropane; C3H5Br2Cl	96-12-8	196	0.80	236.4		
Bis(2-Chloroethyl)ether; C4H8Cl2O	111-44-4	178	0.71	143		
Chloroacetic acid; C2H3ClO2	79-11-8	189	0.69	94.5		
Aniline (aminobenzene); C6H7N	62-53-3	184	0.67	93		
1,4-Dichlorobenzene (p-); C6H4Cl2	106-46-7	173	0.60	147	X	X
Ethyl carbamate (urethane); C3H7NO2	51-79-6	183	0.54	89		
Acrylamide; C3H5NO	79-06-1	125/25 mm	0.53	71		
N,N-Dimethylaniline; C8H11N	121-69-7	192	0.50	121		
Hexachloroethane; C2Cl6	67-72-1	Sublimes at 186	0.40	236.7		
Hexachlorobutadiene; C4Cl6	87-68-3	215	0.40	260.8	X	X
Isophorone; C9H14O	78-59-1	215	0.38	138.2		
N-Nitrosomorpholine; C4H8N2O2	59-89-2	225	0.32	116.1		
Styrene oxide; C8H8O	96-09-3	194	0.30	120.2		
Diethyl sulfate; C4H10O4S	64-67-5	208	0.29	154		
Cresylic acid (cresol isomer mixture);C7H8O	1319-77-3	202	0.26	108		
o-Cresol; C7H8O	95-48-7	191	0.24	108		
Catechol (o-hydroxyphenol); C6H6O2	120-80-9	240	0.22	110		
Phenol; C6H6O	108-95-2	182	0.20	94		

TABLE 1. (continued)

Compound	CAS No.	BP (°C)	v.p. (mmHg)[1]	MW[1]	TO-14A	CLP-SOW
Catechol (o-hydroxyphenol); C6H6O2	120-80-9	240	0.22	110		
Phenol; C6H6O	108-95-2	182	0.20	94		
1,2,4-Trichlorobenzene; C6H3Cl3	120-82-1	213	0.18	181.5	X	X
nitrobenzene C6H5NO2	98-95-3	211	0.15	123		

[1]Vapor pressure (v.p.), boiling point (BP) and molecularweight (MW) data from:
(a)D. L. Jones and J. bursey, "Simultaneous Control of PM-10 and Hazardous Air Pollutants II: Rationale for Selection of Hazardous Air Pollutants as Potential Particulate Matter," Report EPA-452/R-93/013, U. S. Environmental Protection Agency, Research Triangle Park, NC. October 1992;
(b)R. C. Weber, P. A. Parker, and M. Bowser. Vapor Pressure Distribution of Selected Organic Chemicals, Report EPA-600/2-81-021, U. S. Environmental Protection Agency, Cincinnati, OH, February 1981; and
(c)R. C. Weast, ed., "CRC Handbook of Chemistry and Physics," 59th edition, CRC Press, Boca Raton, 1979.

TABLE 2. CHARACTERISTIC MASSES (M/Z) USED FOR QUANTIFYING THE TITLE III CLEAN AIR ACT AMENDMENT COMPOUNDS

Compound	CAS No.	Primary Ion	Secondary Ion
Methyl chloride (chloromethane); CH3Cl	74-87-3	50	52
Carbonyl sulfide; COS	463-S8-1	60	62
Vinyl chloride (chloroethene); C2H3Cl	7S-01-4	62	64
Diazomethane; CH2N2	334-88-3	42	41
Formaldehyde; CH2O	50-00-0	29	30
1,3-Butadiene; C4H6	106-99-0	39	54
Methyl bromide (bromomethane); CH3Br	74-83-9	94	96
Phosgene; CCl2O	75-44-5	63	65
Vinyl bromide (bromoethene); C2H3Br	593-60-2	106	108
Ethylene oxide; C2H4O	75-21-8	29	44
Ethyl chloride (chloroethane); C2H5Cl	75-00-3	64	66
Acetaldehyde (ethanal); C2H4O	75-07-0	44	29, 43
Vinylidene chloride (1,1-dichloroethylene); C2H2Cl2	75-35-4	61	96
Propylene oxide; C3H6O	75-56-9	58	57
Methyl iodide (iodomethane); CH3I	74-88-4	142	127
Methylene chloride; CH2Cl2	75-09-2	49	84, 86
Methyl isocyanate; C2H3NO	624-83-9	57	56
Allyl chloride (3-chloropropene); C3H5Cl	107-05-1	76	41, 78
Carbon disulfide; CS2	75-15-0	76	44, 78
Methyl tert-butyl ether; C5H12O	1634-04-4	73	41, 53
Propionaldehyde; C2H5CHO	123-38-6	58	29, 57
Ethylidene dichloride (1,1-dichloroethane); C2H4Cl2	75-34-3	63	65, 27
Chloroprene (2-chloro-1,3-butadiene); C4H5Cl	126-99-8	88	53, 90
Chloromethyl methyl ether; C2H5ClO	107-30-2	45	29, 49
Acrolein (2-propenal); C3H4O	107-02-8	56	55
1,2-Epoxybutane (1,2-butylene oxide); C4H8O	106-88-7	42	41, 72
Chloroform; CHCl3	67-66-3	83	85, 47
Ethyleneimine (aziridine); C2H5N	151-56-4	42	43
1,1-Dimethylhydrazine; C2H8N2	57-14-7	60	45, 59
Hexane; C6H14	110-54-3	57	41, 43
1,2-Propyleneimine (2-methylazindine); C3H7N	75-55-8	56	57, 42
Acrylonitrile (2-propenenitrile); C3H3N	107-13-1	53	52
Methyl chloroform (1,1,1 trichloroethane); C2H3Cl3	71-55-6	97	99, 61
Methanol; CH4O	67-56-1	31	29
Carbon tetrachloride; CCl4	56-23-5	117	119
Vinyl acetate; C4H6O2	108-05-4	43	86
Methyl ethyl ketone (2-butanone); C4H8O	78-93-3	43	72

TABLE 2. (continued)

Compound	CAS No.	Primary Ion	Secondary Ion
Benzene; C6H6	71-43-2	78	77,50
Acetonitrile (cyanomethane); C2H3N	75-05-8	41	40
Ethylene dichloride (1,2-dichloroethane); C2H4Cl2	107-06-2	62	64, 27
Triethylamine; C6H15N	121-44-8	86	58, 101
Methylhydrazine; CH6N2	60-34-4	46	31, 45
Propylene dichloride (1,2-dichloropropane); C3H6Cl2	78-87-5	63	41, 62
2,2,4-Trimethyl pentane; C8H18	540-84-1	57	41, 56
1,4-Dioxane (1,4 Diethylene oxide); C4H8O2	123-91-1	88	58
Bis(chloromethyl) ether; C2H4Cl2O	542-88-1	79	49, 81
Ethyl acrylate; C5H8O2	140-88-5	55	73
Methyl methacrylate; C5H8O2	80-62-6	41	69, 100
1,3-Dichloropropene; C3H4Cl2 (cis)	542-75-6	75	39, 77
Toluene; C7H8	108-88-3	91	92
Trichloethylene; C2HCl3	79-01-6	130	132, 95
1,1,2-Trichloroethane; C2H3Cl3	79-00-5	97	83, 61
Tetrachloroethylene; C2Cl4	127-18-4	166	164, 131
Epichlorohydrin (l-chloro-2,3-epoxy propane); C3H5ClO	106-89-8	57	49, 62
Ethylene dibromide (1,2-dibromoethane); C2H4Br2	106-93-4	107	109
N-Nitrso-N-methylurea; C2H5N3O2	684-93-5	60	44, 103
2-Nitropropane; C3H7NO2	79-46-9	43	41
Chlorobenzene; C6H5Cl	108-90-7	112	77, 114
Ethylbenzene; C8H10	100-41-4	91	106
Xylenes (isomer & mixtures); C8H10	1330-20-7	91	106
Styrene; C8H8	100-42-5	104	78, 103
p-Xylene; C8H10	106-42-3	91	106
m-Xylene; C8H10	108-38-3	91	106
Methyl isobutyl ketone (hexone); C6H12O	108-10-1	43	58, 100
Bromoform (tribromomethane); CHBr3	75-25-2	173	171, 175
1,1,2,2-Tetrachloroethane; C2H2Cl4	79-34-5	83	85
o-Xylene; C8H10	95-47-6	91	106
Dimethylcarbamyl chloride; C3H6ClNO	79-44-7	72	107
N-Nitrosodimethylamine; C2H6N2O	62-75-9	74	42
Beta-Propiolactone; C3H4O2	57-57-8	42	43
Cumene (isopropylbenzene); C9H12	98-82-8	105	120
Acrylic acid; C3H4O2	79-10-7	72	45, 55
N,N-Dimethylformamide; C3H7NO	68-12-2	73	42, 44
1,3-Propane sultone; C3H6O3S	1120-71-4	58	65, 122

TABLE 2. (continued)

Compound	CAS No.	Primary Ion	Secondary Ion
Acetophenone; C8H8O	98-86-2	105	77,120
Dimethyl sulfate; C2H6O4S	77-78-1	95	66,96
Benzyl chloride (a-chlorotoluene); C7H7Cl	100-44-7	91	126
1,2-Dibromo-3-chloropropane; C3H5Br2Cl	96-12-8	57	155, 157
Bis(2-Chloroethyl)ether; C4H8Cl2O	111-44-4	93	63, 95
Chloroacetic acid; C2H3ClO2	79-11-8	50	45, 60
Aniline (aminobenzene); C6H7N	62-53-3	93	66
1,4-Dichlorobenzene (p-); C6H4Cl2	106-46-7	146	148, 111
Ethyl carbamate (urethane); C3H7NO2	51-79-6	31	44, 62
Acrylamide; C3H5NO	79-06-1	44	55, 71
N,N-Dimethylaniline; C8H11N	121-69-7	120	77, 121
Hexachloroethane; C2Cl6	67-72-1	201	199, 203
Hexachlorobutadiene; C4Cl6	87-68-3	225	227, 223
Isophorone; C9H14O	78-59-1	82	138
N-Nitrosomorpholine; C4H8N2O2	59-89-2	56	86, 116
Styrene oxide; C8H8O	96-09-3	91	120
Diethyl sulfate; C4H10O4S	64-67-5	45	59, 139
Cresylic acid (cresol isomer mixture); C7H8O	1319-77-3		
o-Cresol; C7H8O	95-48-7	108	107
Catechol (o-hydroxyphenol); C6H6O2	120-80-9	110	64
Phenol; C6H6O	108-95-2	94	66
1,2,4-Trichlorobenzene; C6H3Cl3	120-82-1	180	182, 184
Nitrobenzene; C6H5NO2	98-95-3	77	51, 123

TABLE 3. REQUIRED BFB KEY IONS AND ION ABUNDANCE CRITERIA

Mass	Ion Abundance Criteria[1]
50	8.0 to 40.0 Percent of m/e 95
75	30.0 to 66.0 Percent of m/e 95
95	Base Peak, 100 Percent Relative Abundance
96	5.0 to 9.0 Percent of m/e 95 (See note)
173	Less than 2.0 Percent of m/e 174
174	50.0 to 120.0 Percent of m/e 95
175	4.0 to 9.0 Percent of m/e 174
176	93.0 to 101.0 Percent of m/e 174
177	5.0 to 9.0 Percent of m/e 176

[1]All ion abundances must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120 percent that of m/z 95.

TABLE 4. METHOD DETECTION LIMITS (MDL)[1]

TO-14A List	Lab #1, SCAN	Lab #2, SIM
Benzene	0.34	0.29
Benzyl Chloride	--	--
Carbon tetrachloride	0.42	0.15
Chlorobenzene	0.34	0.02
Chloroform	0.25	0.07
1,3-Dichlorobenzene	0.36	0.07
1,2-Dibromoethane	--	0.05
1,4-Dichlorobenzene	0.70	0.12
1,2-Dichlorobenzene	0.44	--
1,1-Dichloroethane	0.27	0.05
1,2-Dichloroethane	0.24	--
1,1-Dichloroethene	--	0.22
cis-1,2-Dichloroethene	--	0.06
Methylene chloride	1.38	0.84
1,2-Dichloropropane	0.21	--
cis-1,3-Dichloropropene	0.36	--
trans-1,3-Dichloropropene	0.22	--
Ethylbenzene	0.27	0.05
Chloroethane	0.19	--
Trichlorofluoromethane	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane		--
1,2-Dichloro-1,1,2,2-tetrafluoroethane	--	--
Dichlorodifluoromethane	--	--
Hexachlorobutadiene	--	--
Bromomethane	0.53	--
Chloromethane	0.40	--
Styrene	1.64	0.06
1,1,2,2-Tetrachloroethane	0.28	0.09
Tetrachloroethene	0.75	0.10
Toluene	0.99	0.20
1,2,4-Trichlorobenzene	--	--
1,1,1-Trichloroethane	0.62	0.21
1,1,2-Trichloroethane	0.50	--
Trichloroethene	0.45	0.07
1,2,4-Trimethylbenzene	--	--
1,3,5-Trimethylbenzene	--	--
Vinyl Chloride	0.33	0.48
m,p-Xylene	0.76	0.08
o-Xylene	0.57	0.28

[1]Method Detection Limits (MDLs) are defined as the product of the standard deviation of seven replicate analyses and the student's "t" test value for 99% confidence. For Lab #2, the MDLs represent an average over four studies. MDLs are for MS/SCAN for Lab #1 and for MS/SIM for Lab #2.

TABLE 5. SUMMARY OF EPA DATA ON REPLICATE PRECISION (RP) FROM EPA NETWORK OPERATIONS[1]

Monitoring Compound Identification	EPA's Urban Air Toxics Monitoring Program (UATMP)			EPA's Toxics Air Monitoring Stations (TAMS)		
	%RP	#	ppbv	%RP	#	ppbv
Dichlorodifluoromethane	--		--	13.9	47	0.9
Methylene chloride	16.3	07	4.3	19.4	47	0.6
1,2-Dichloroethane	36.2	31	1.6	--	--	--
1,1,1-Trichloroethane	14.1	44	1.0	10.6	47	2.0
Benzene	12.3	56	1.6	4.4	47	1.5
Trichloroethene	12.8	08	1.3	--	--	--
Toluene	14.7	76	3.1	3.4	47	3.1
Tetrachloroethene	36.2	12	0.8	--	--	--
Chlorobenzene	20.3	21	0.9	--	--	--
Ethylbenzene	14.6	32	0.7	5.4	47	0.5
m-Xylene	14.7	75	4.0	5.3	47	1.5
Styrene	22.8	59[2]	1.1	8.7	47	0.2[2]
o-Xylene	--		--	6.0	47	0.5
p-Xylene	--					
1,3-Dichlorobenzene	49.1	06	0.6	--	--	--
1,4-Dichlorobenzene	14.7	14	6.5	--	--	--

[1]Denotes the number of replicate or duplicate analysis used to generate the statistic. The replicate precision is defined as the mean ratio of absolute difference to the average value.
[2]Styrene and o-xylene coelute from the GC column used in UATMP. For the TAMS entries, both values were below detection limits for 18 of 47 replicates and were not included in the calculation.

TABLE 6. AUDIT ACCURACY (AA) VALUES[1] FOR SELECTED COMPENDIUM METHOD TO-14A COMPOUNDS

Selected Compounds From TO-14A List	FY-88 TAMS AA(%), N=30	FY-88 UATMP AA(%), N=3
Vinyl chloride	4.6	17.9
Bromomethane	--	6.4
Trichlorofluoromethane	6.4	--
Methylene chloride	8.6	31.4
Chloroform	--	4.2
1,2-Dichloroethane	6.8	11.4
1,1,1-Trichloroethane	18.6	11.3
Benzene	10.3	10.1
Carbon tetrachloride	12.4	9.4
1,2-Dichloropropane	--	6.2
Trichloroethene	8.8	5.2
Toluene	8.3	12.5
Tetrachloroethene	6.2	--
Chlorobenzene	10.5	11.7
Ethylbenzene	12.4	12.4
o-Xylene	16.2	21.2

[1]Audit accuracy is defined as the relative difference between the audit measurement result and its nominal value divided by the nominal value. N denotes the number of audits averaged to obtain the audit accuracy value. Information is not available for other TO-14A compounds because they were not present in the audit materials.

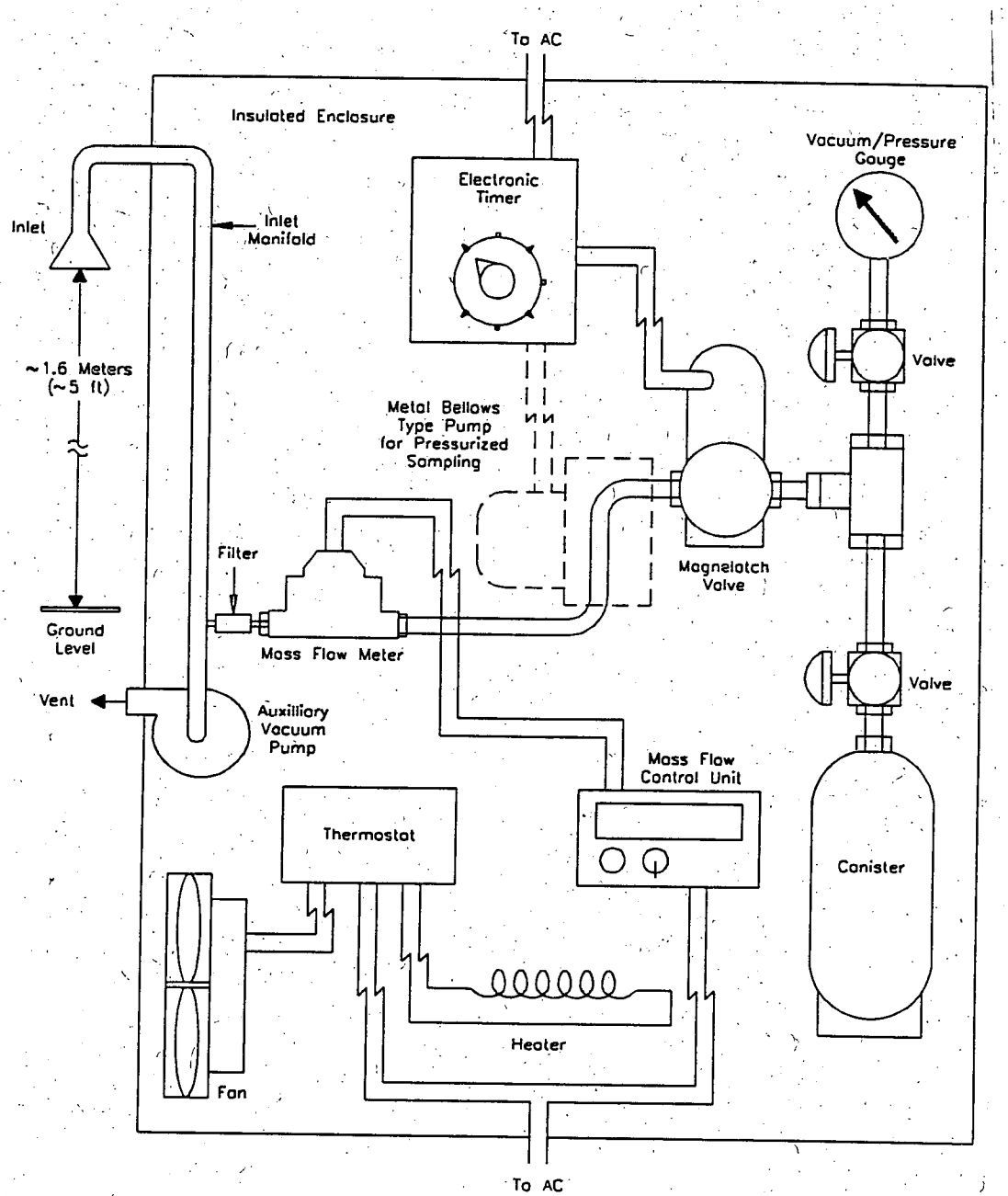
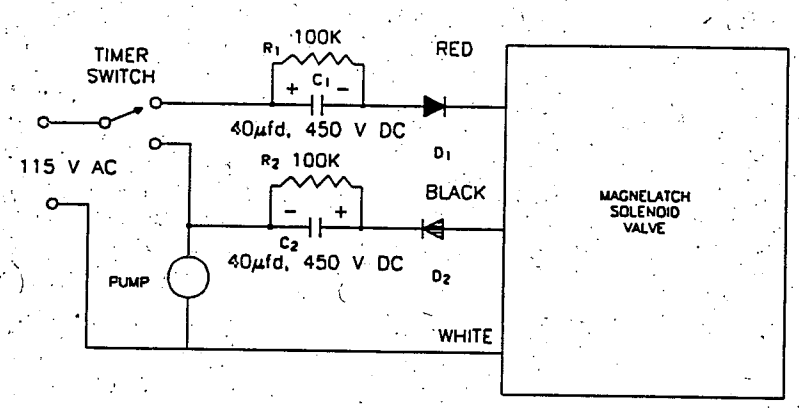


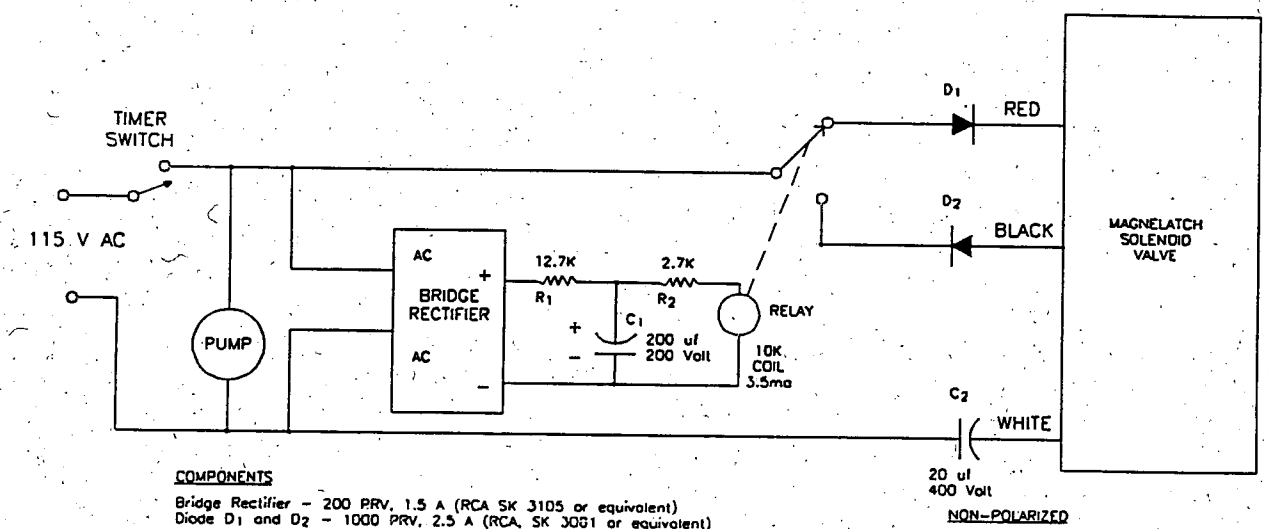
Figure 1. Sampler configuration for subatmospheric pressure or pressurized canister sampling.



COMPONENTS

Capacitor C_1 and C_2 – 40 uf, 450 VDC (Sprague Atom TVA 1712 or equivanent)
Resister R_1 and R_2 – 0.5 watt, 5% tolerance
Diode D_1 and D_2 – 1000 PRV, 2.5 A (RCA SK 3001 or equivalent)

(a). Simple Circuit for Operating Magnelatch Valve



COMPONENTS

Bridge Rectifier – 200 PRV, 1.5 A (RCA SK 3105 or equivalent)
Diode D_1 and D_2 – 1000 PRV, 2.5 A (RCA, SK 3001 or equivalent)
Capacitor C_1 – 200 uf, 250 VDC (Sprague Atom TVA 1528 or equivalent)
Capacitor C_2 – 20 uf, 400 VDC Non-Polarized (Sprague Atom TVAN 1652 or equivalent)
Relay – 10,000 ohm coil, 3.5 ma (AMF Potter and Brumfield, KCP 5, or equivalent)
Resister R_1 and R_2 – 0.5 watt, 5% tolerance

(b). Improved Circuit Designed to Handle Power Interruptions

Figure 2. Electrical pulse circuits for driving Skinner magnelatch solenoid valve with mechanical timer.

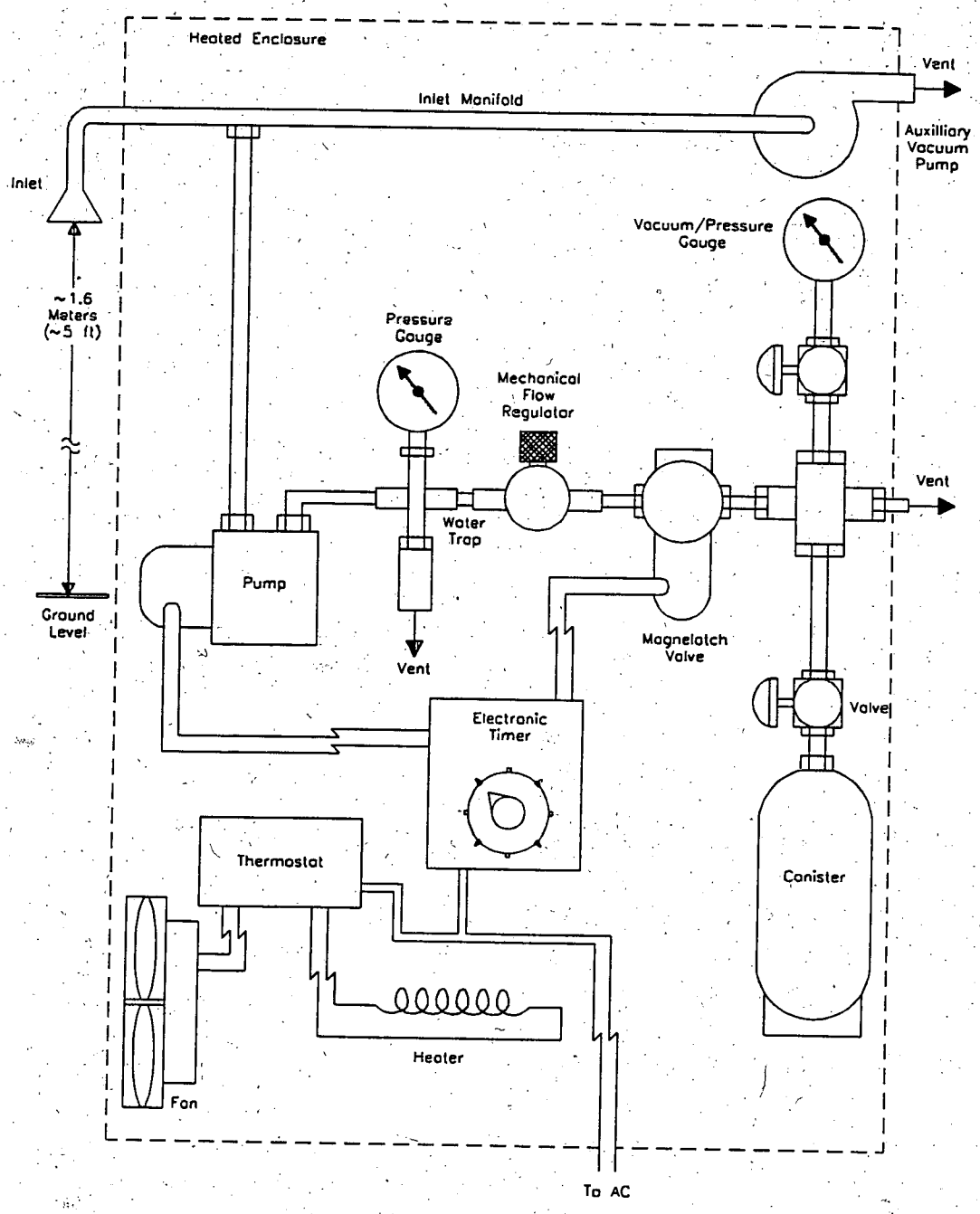


Figure 3. Alternative sampler configuration for pressurized canister sampling.

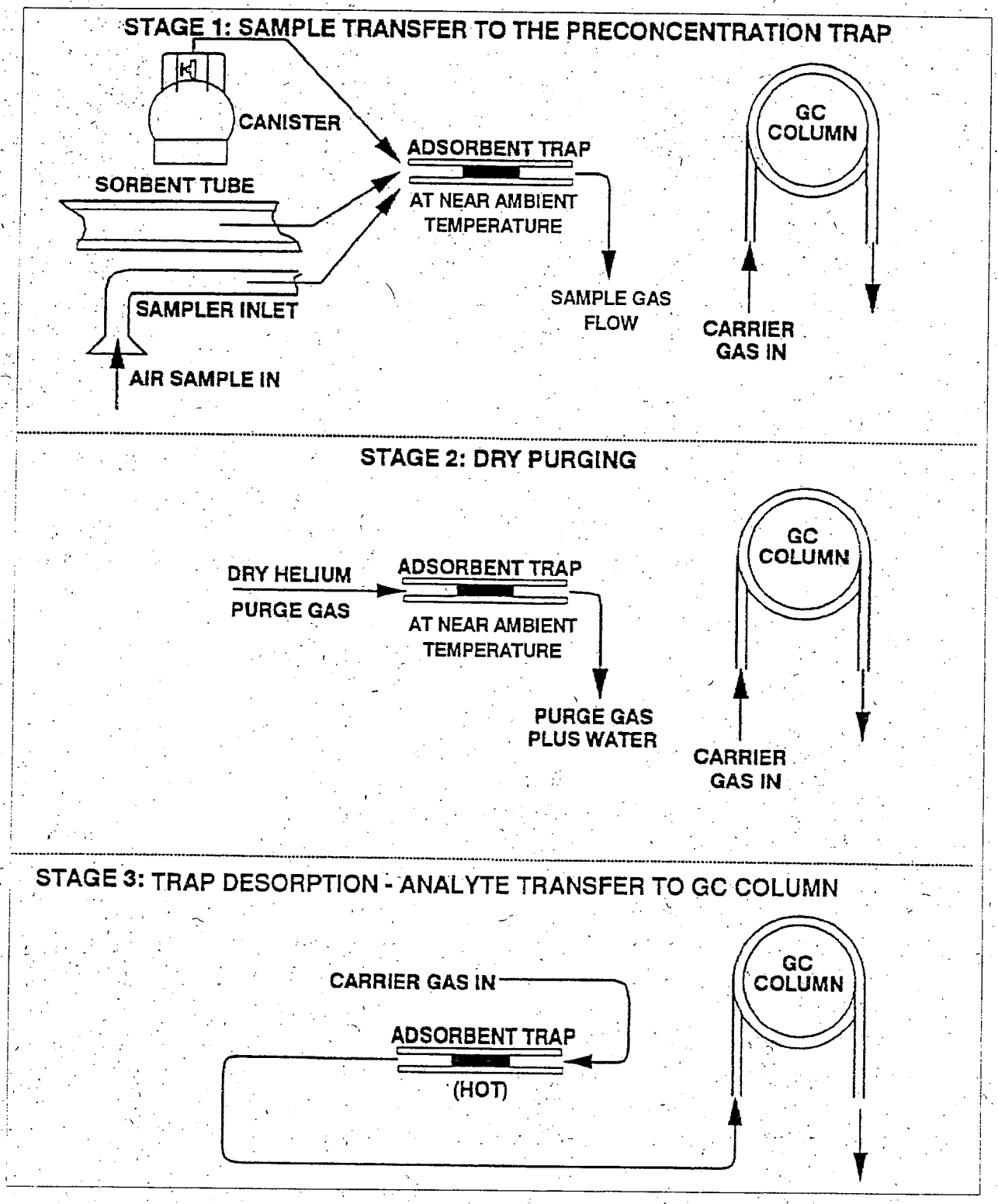


Figure 4. Illustration of three stages of dry purging of adsorbent trap.

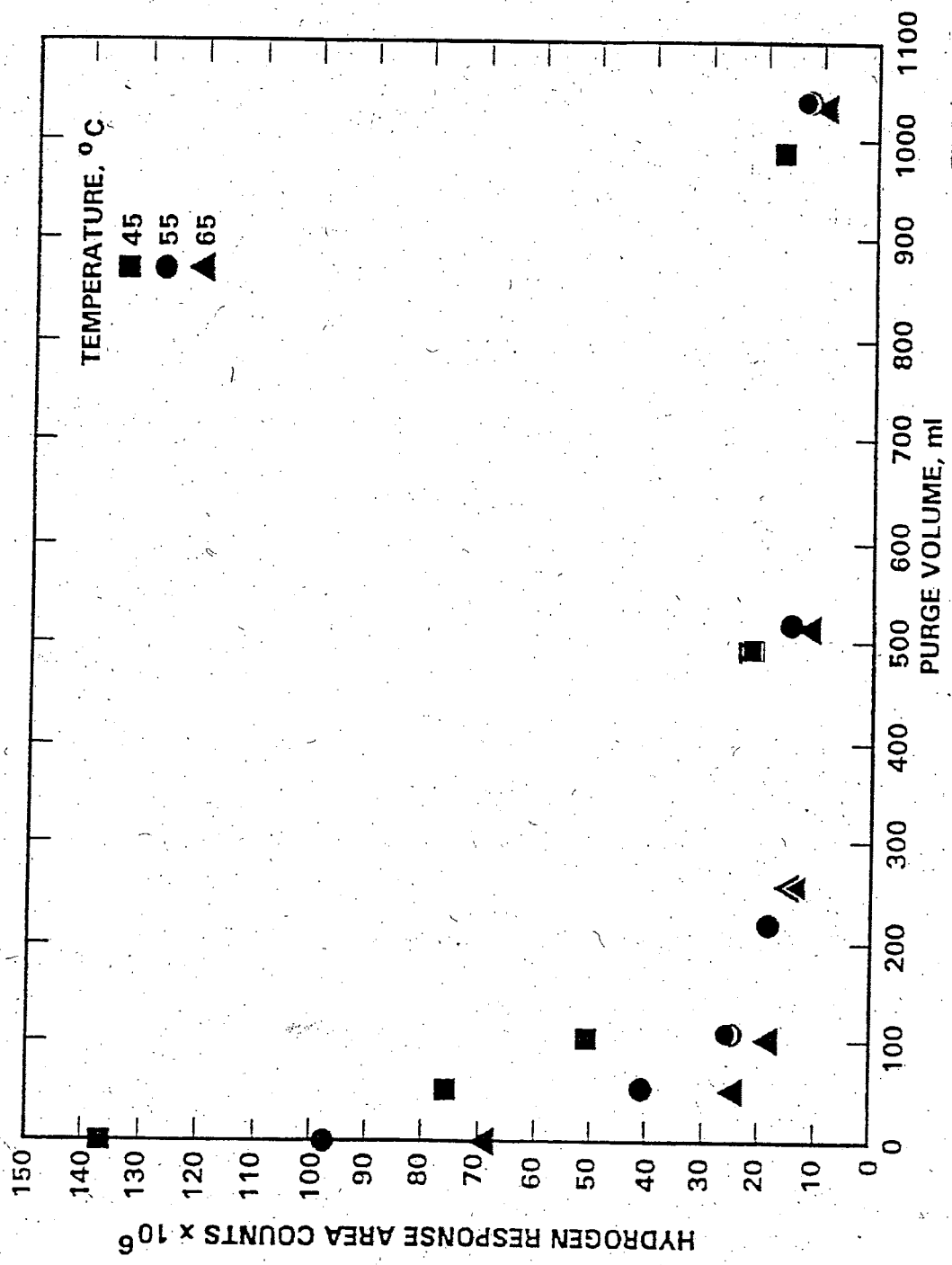


Figure 5. Residual water vapor on VOC concentrator vs. dry He purge volume.

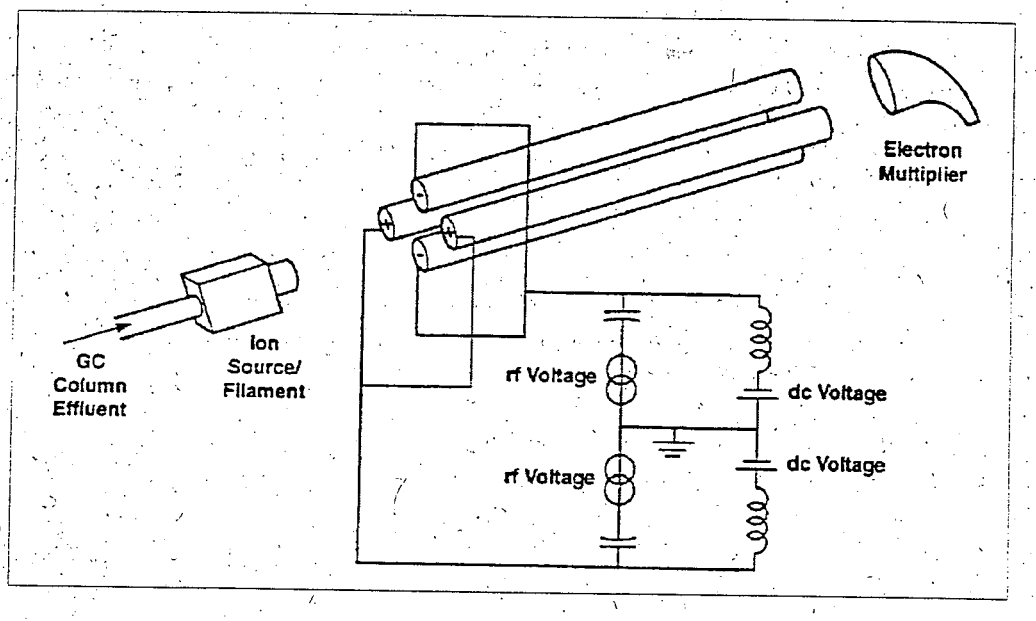


Figure 6. Simplified diagram of a quadrupole mass spectrometer.

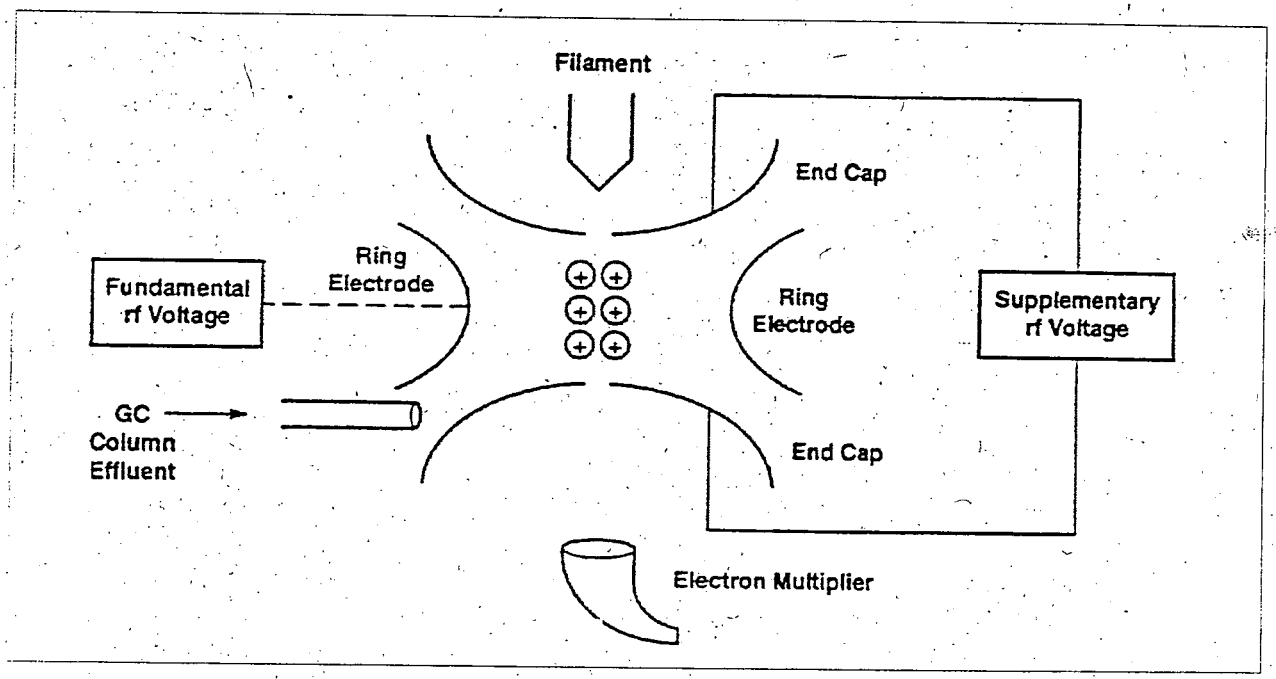


Figure 7. Simplified diagram of an ion trap mass spectrometer.

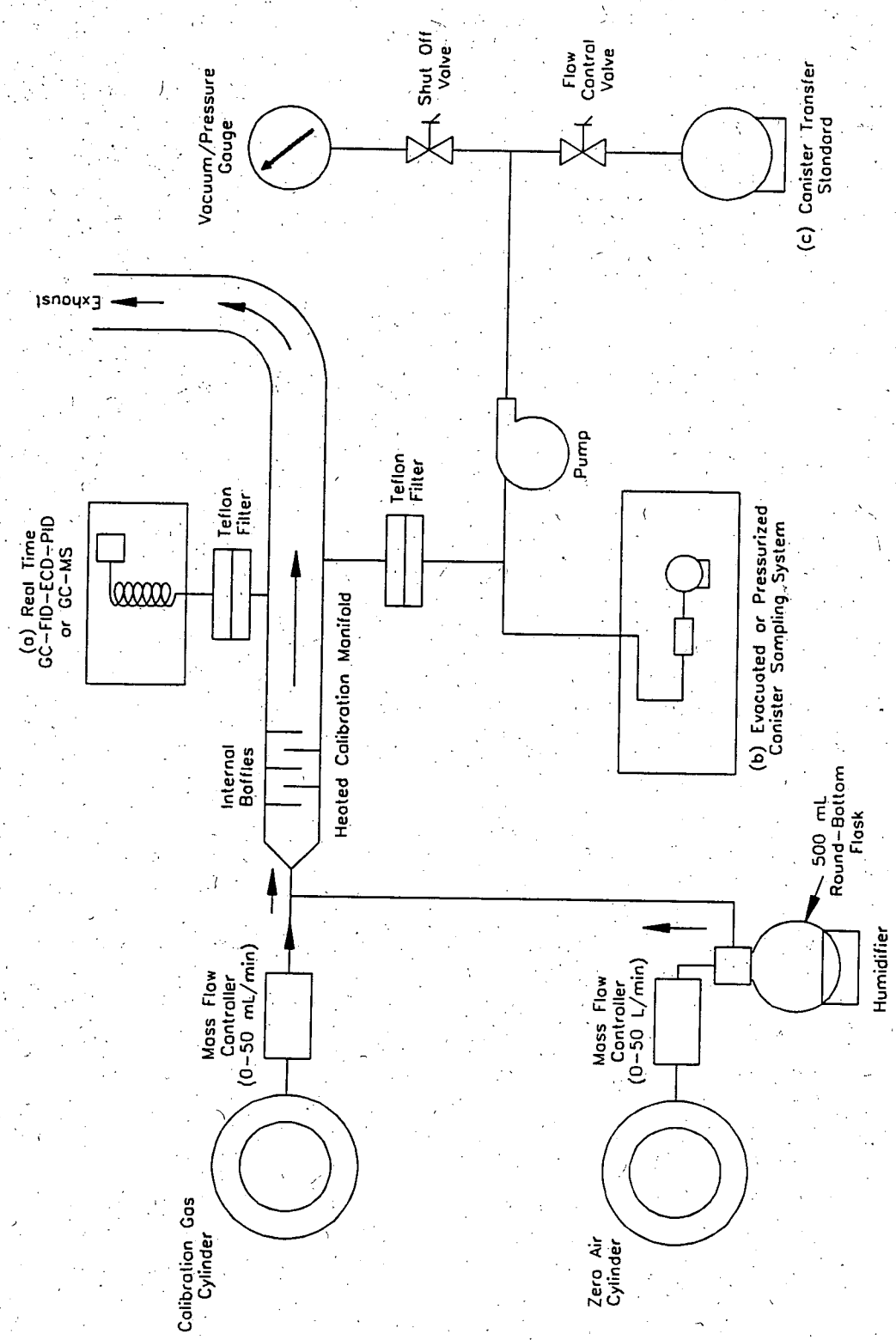


Figure 8. Schematic diagram of calibration system and manifold for (a) analytical system calibration, (b) testing canister sampling system and (c) preparing canister transfer standards.

COMPENDIUM METHOD TO-15
CANISTER SAMPLING FIELD TEST DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: _____

SITE ADDRESS: _____

_____

SAMPLING DATE: _____

SHIPPING DATE: _____

CANISTER SERIAL NO.: _____

SAMPLER ID: _____

OPERATOR: _____

CANISTER LEAK CHECK DATE: _____

B. SAMPLING INFORMATION

TEMPERATURE

	INTERIOR	AMBIENT	MAXIMUM	MINIMUM
START				
STOP				

PRESSURE

CANISTER PRESSURE	

SAMPLING TIMES

	LOCAL TIME	ELAPSED TIME METER READING
START		
STOP		

FLOW RATES

MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT

SAMPLING SYSTEM CERTIFICATION DATE: _____

QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATA RECEIVED: _____

RECEIVED BY: _____

INITIAL PRESSURE: _____

FINAL PRESSURE: _____

DILUTION FACTOR: _____

ANALYSIS

GC-FID-ECD DATE: _____

GC-MSD-SCAN DATE: _____

GC-MSD-SIM DATE: _____

RESULTS*: _____

_____

GC-FID-ECD: _____

GC-MSD-SCAN: _____

GC-MSD-SIM: _____

_____

SIGNATURE/TITLE

Figure 9. Canister sampling field test data sheet (FTDS).

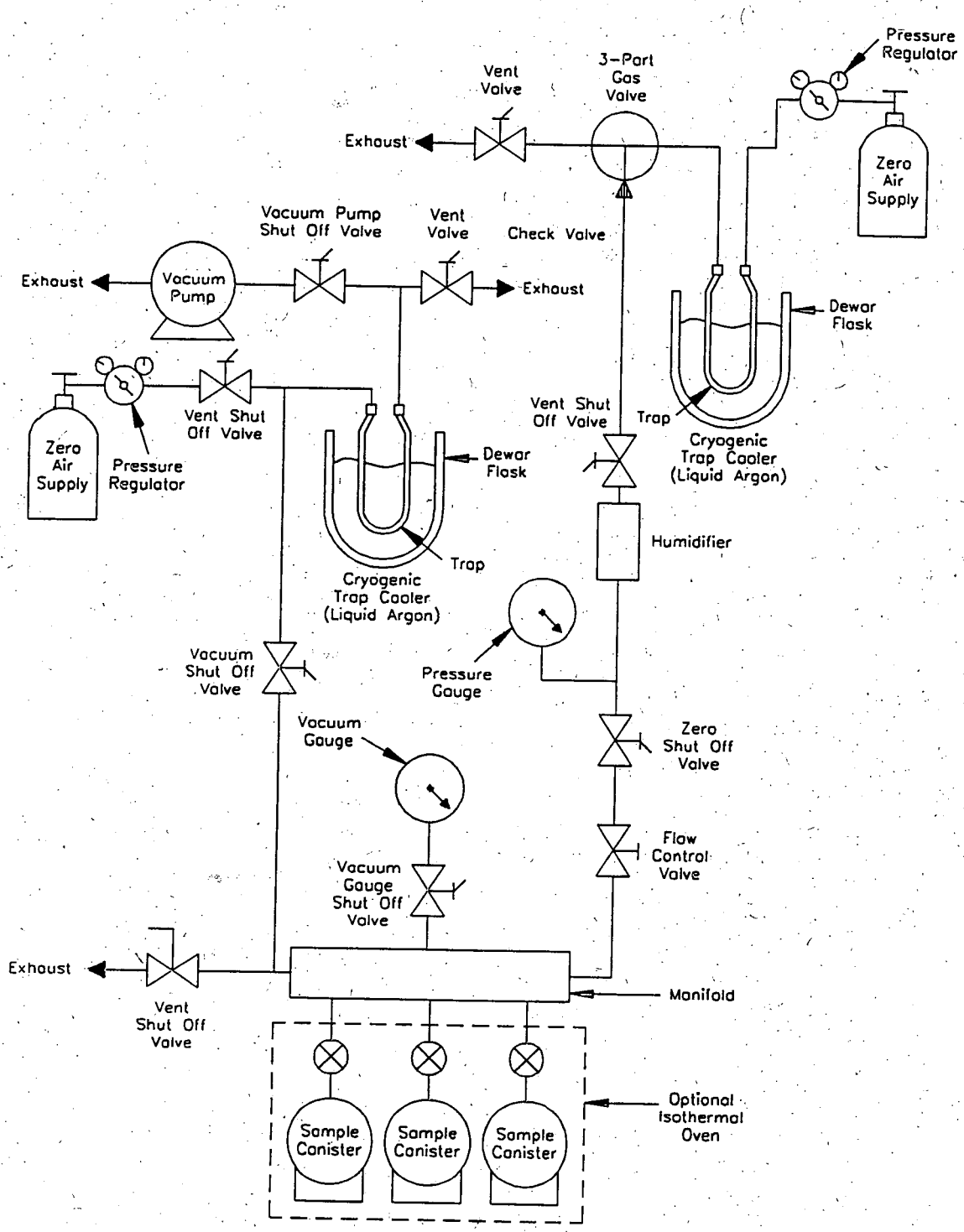


Figure 10. Canister cleaning system.

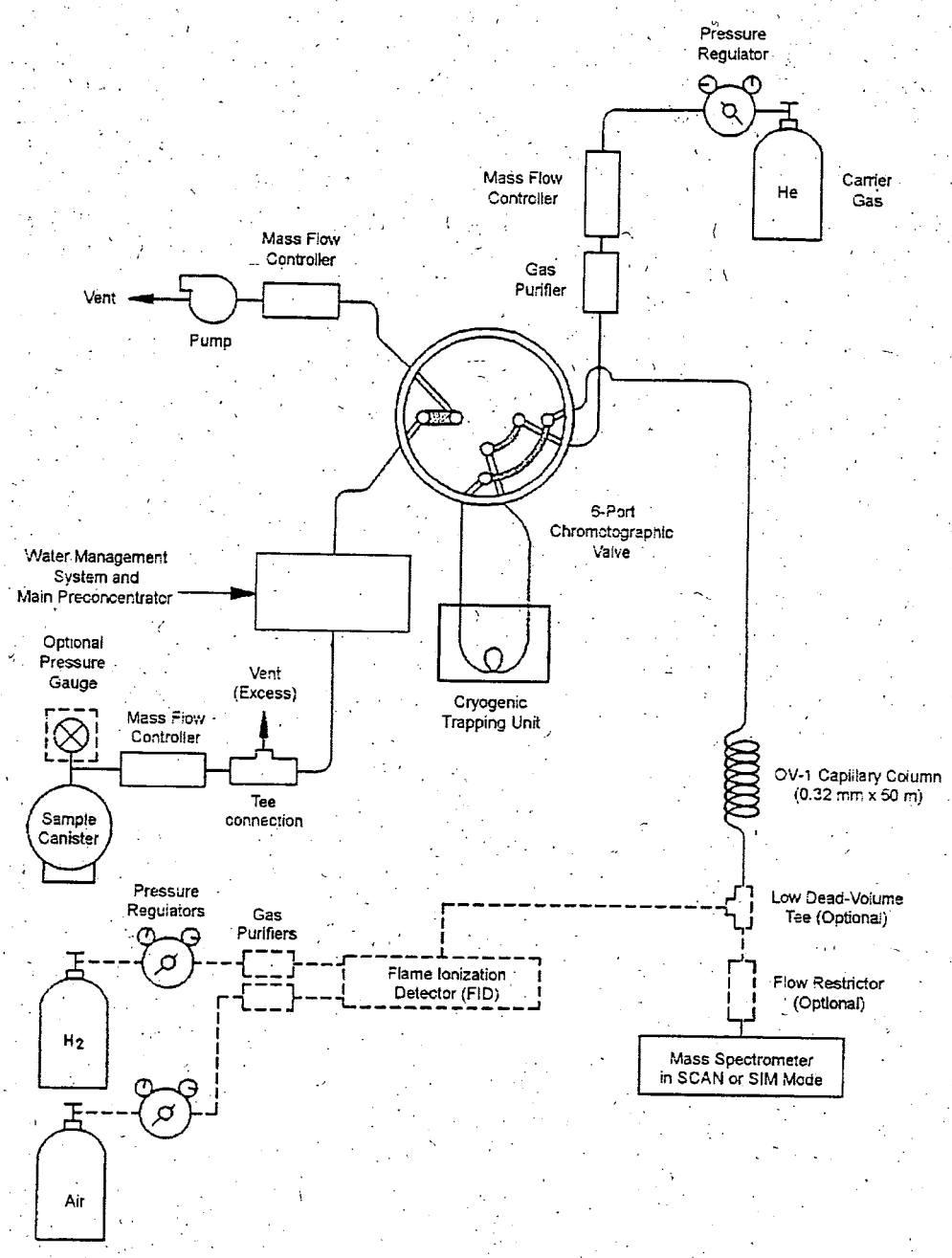
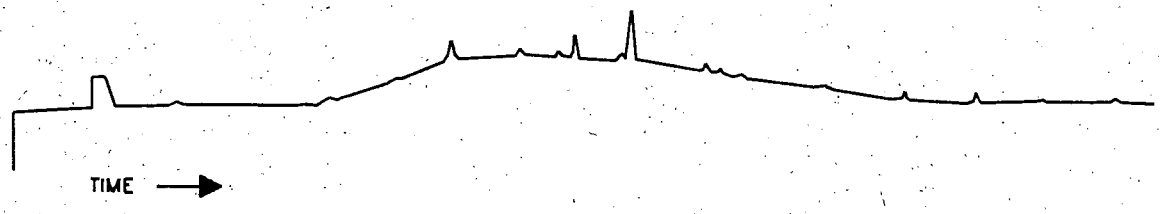
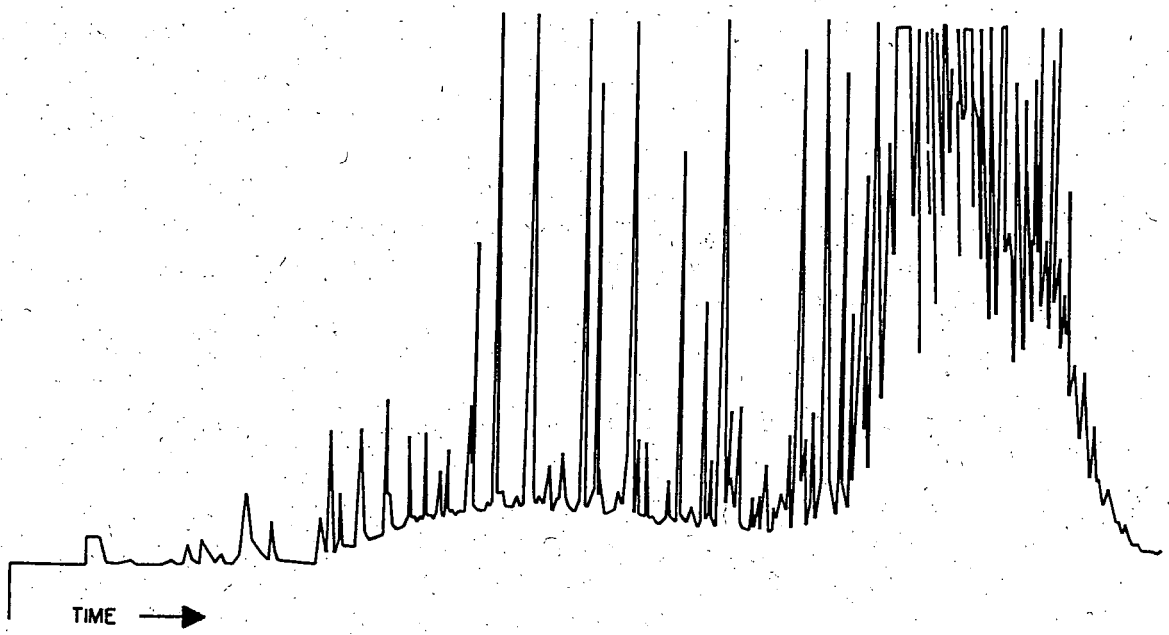


Figure 11. Canister analysis utilizing GC/MS/SCAN/SIM analytical system with optional flame ionization detector with 6-port chromatographic valve in the sample desorption mode.
[Alternative analytical system illustrated in Figure 16.]



(a). Certified Sampler



(b). Contaminated Sampler

Figure 12. Example of humid zero air test results for a clean sample canister (a) and a contaminated sample canister (b).

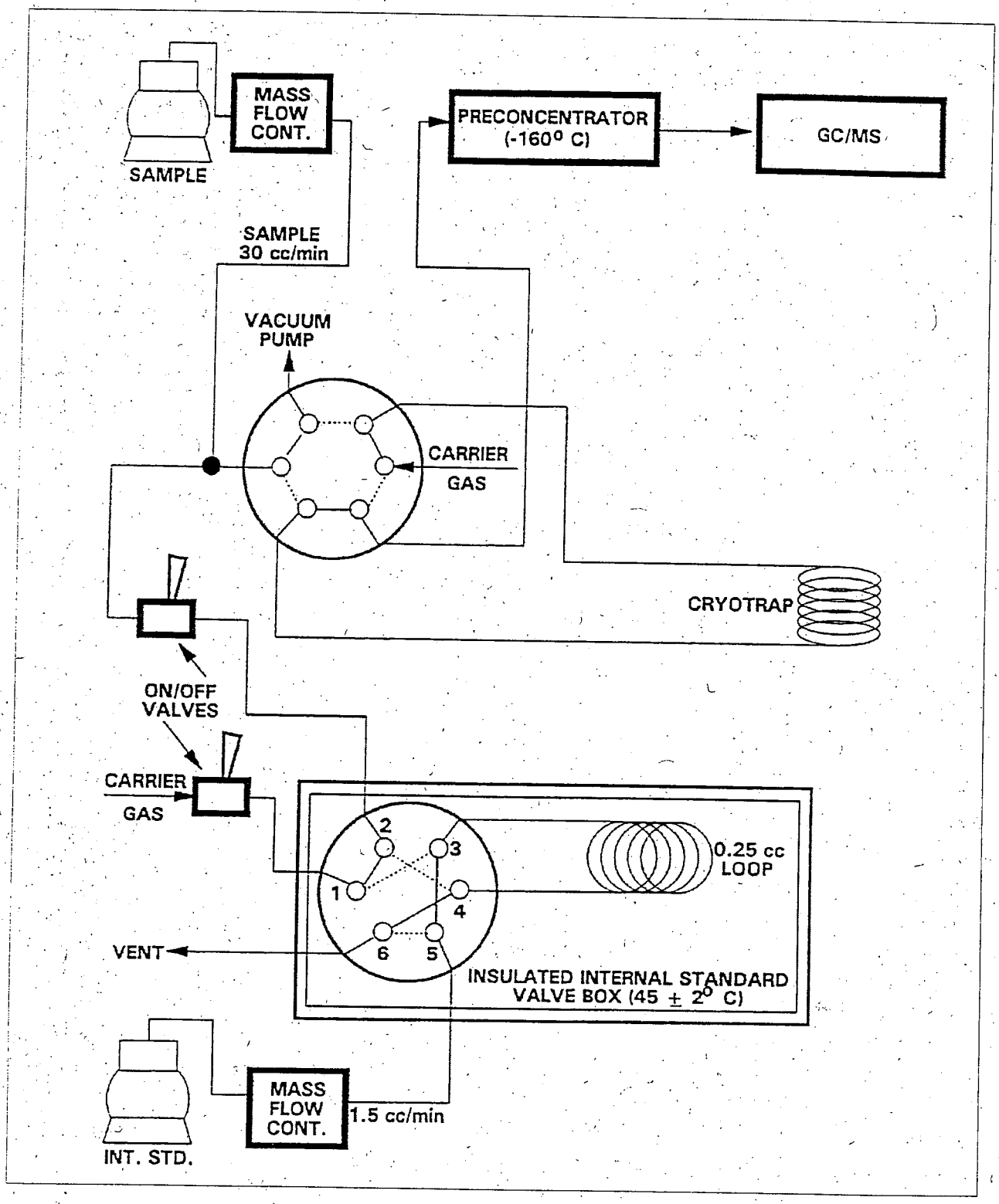


Figure 13. Diagram of design for internal standard addition.

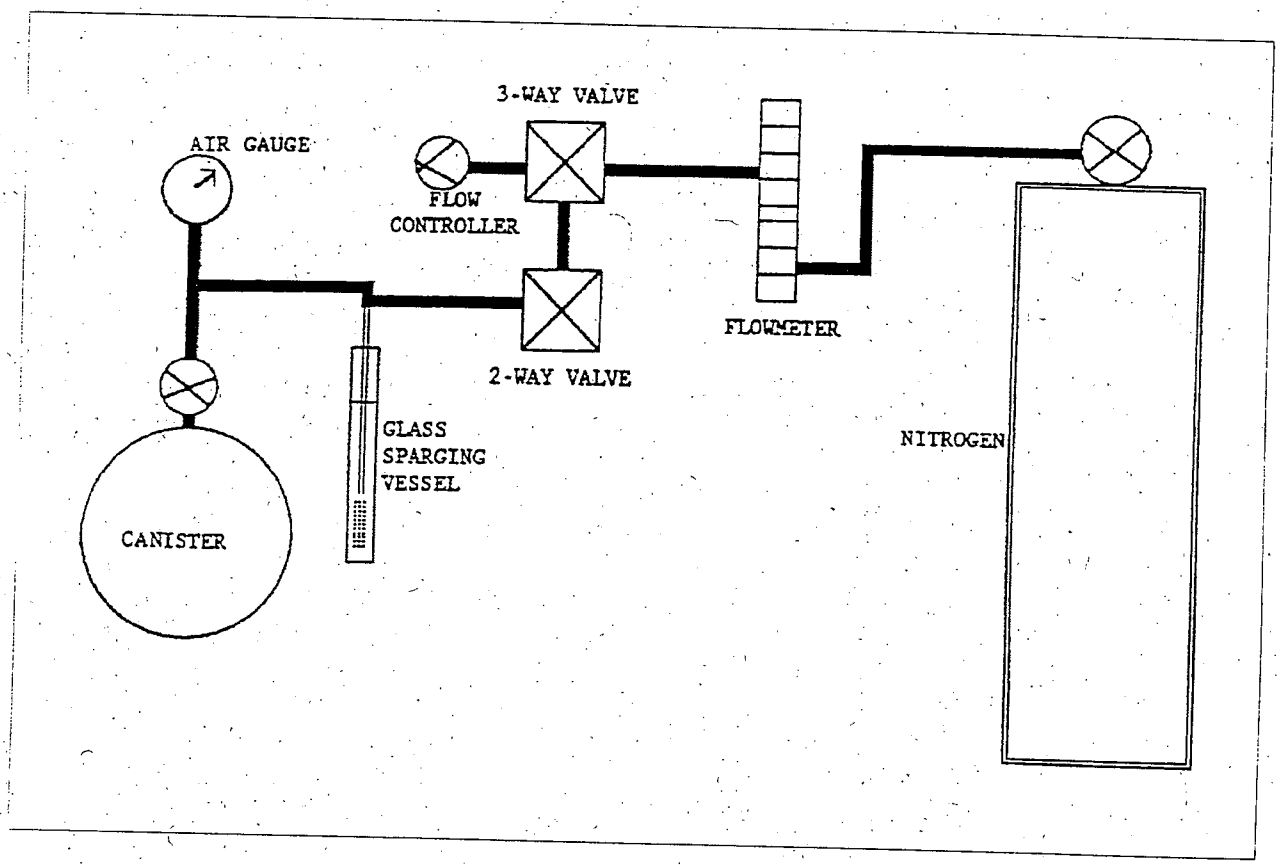


Figure 14. Water method of standard preparation in canisters.

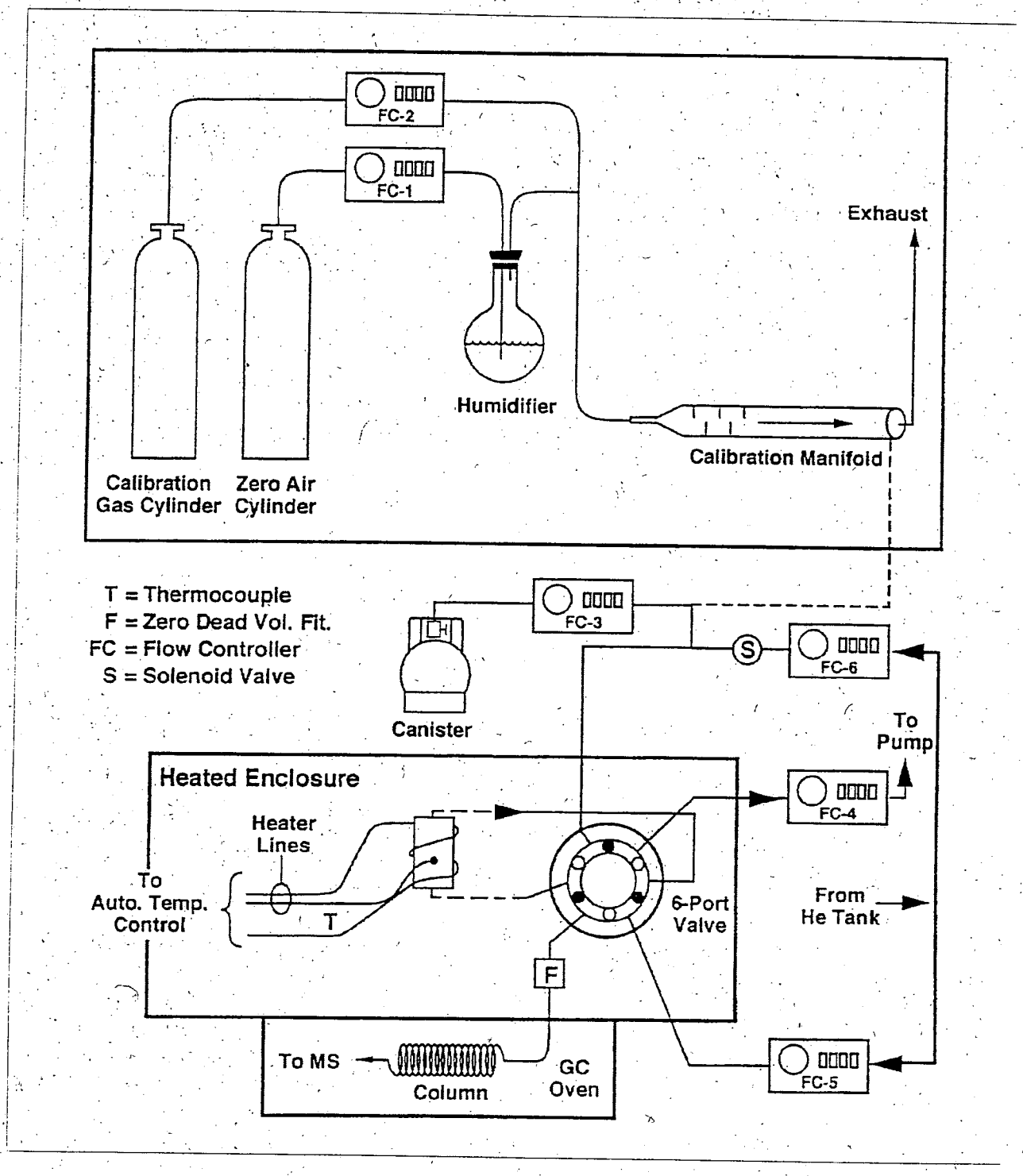


Figure 15. Diagram of the GC/MS analytical system.

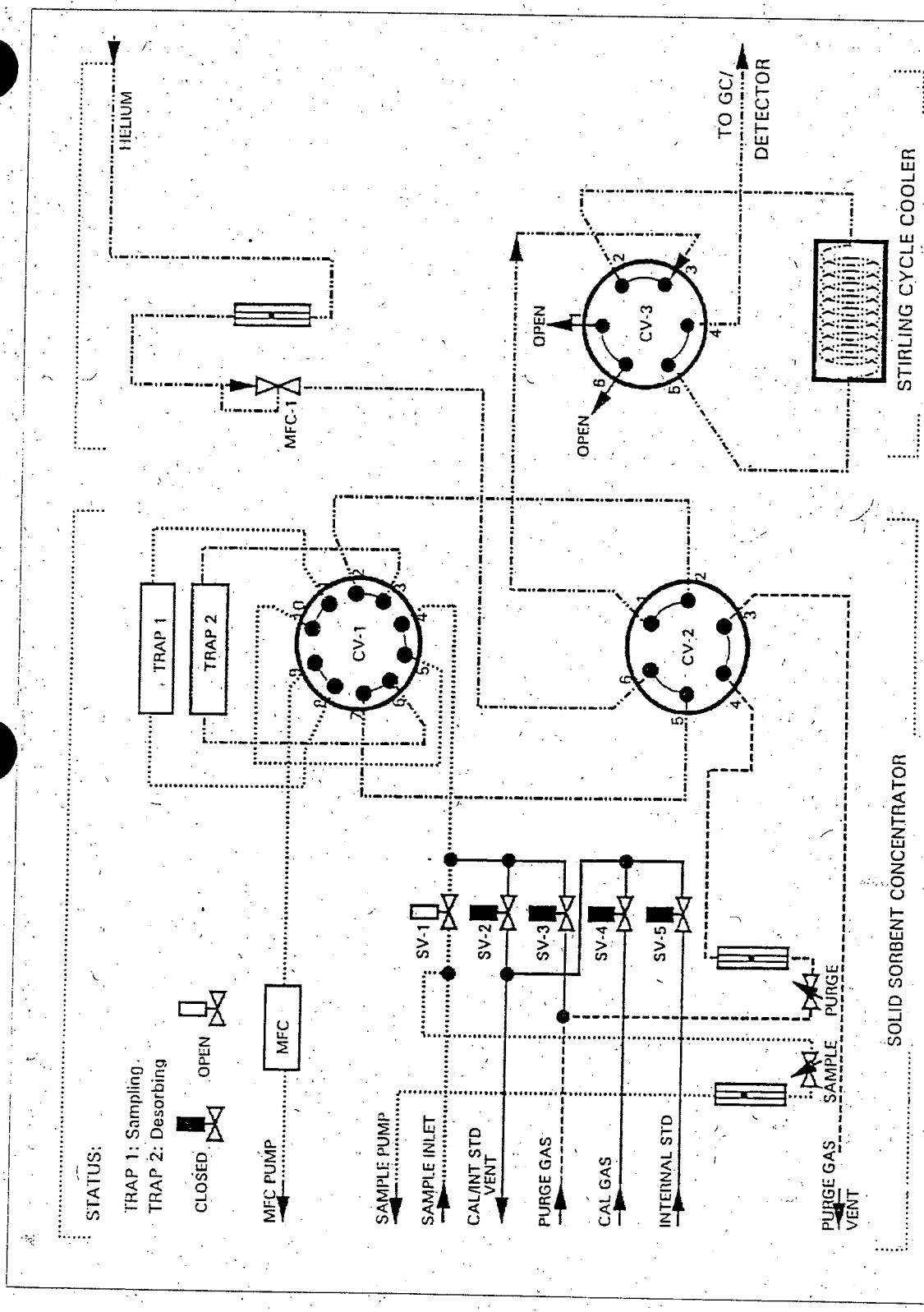


Figure 16. Sample flow diagram of a commercially available concentrator showing the combination of multisorbent tube and cooler (Trap 1 sampling; Trap 2 desorbing).

Appendix C

U.S. EPA (Environmental Protection Agency)Environmental Response Team (ERT)

Standard Operating Procedure (SOP) #1704: SUMMA Canister Sampling
Office of Emergency and Remedial Response (OERR), Washington, DC

July 1995

U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

SUMMA CANISTER SAMPLING

CONTENTS

1.0 SCOPE AND APPLICATION

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13.0 APPENDICES

A - Volatile Organic Compound Data Sheet
B - Figure
C - Canister Sampling Field Data Sheet*

* This section affected by Revision 0.1.

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe a procedure for sampling of volatile organic compounds (VOCs) in ambient air. The method is based on samples collected as whole air samples in Summa passivated stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by mass-selective detector or multidetector techniques. This method presents procedures for sampling into canisters at final pressures both above and below atmospheric pressure (respectively referred to as pressurized and subatmospheric pressure 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 pressurized canisters by this method are listed in the Volatile Organic Compound Data Sheet (Appendix A). These compounds have been measured at the parts per billion by volume (ppbv) level.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Both subatmospheric pressure and pressurized sampling modes use an initially evacuated canister. Both modes may also use a mass flow controller/vacuum pump arrangement to regulate flow. With the above configuration, a sample of ambient air is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated Summa passivated canister. Alternatively, subatmospheric pressure sampling may be performed using a fixed orifice, capillary, or adjustable micrometering valve in lieu of the mass flow controller/vacuum pump arrangement for taking grab samples or short duration time-integrated samples. Usually, the alternative types of flow controllers are appropriate only in situations where screening samples are taken to assess for future sampling activities.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

After the air sample is collected, the canister valve is closed, an identification tag is attached to the canister, and the canister is transported to a laboratory for analysis. Upon receipt at the laboratory, the canister tag data is recorded. Sample holding times and expiration should be determined prior to initiating field activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, all other sampling equipment (e.g., pump and flow controllers) should be thoroughly cleaned. Instructions for cleaning the Summa canisters are described in ERT/REAC SOP #1703, Summa Canister Cleaning Procedures.

5.0 EQUIPMENT/APPARATUS

The following equipment/apparatus (Figure 1, Appendix B) is required:

5.1 Subatmospheric Pressure Sampling Equipment

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100 or equivalent).

2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.

3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).

4. Particulate matter filter - 2- m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).

5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.

6. Fixed orifice, capillary, or adjustable micrometering valve - used in lieu of the electronic flow controller/vacuum pump for grab samples or short duration time-integrated samples.

5.2 Pressurized Sampling Equipment

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100).

2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.

3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).

4. Particulate matter filter - 2- m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).

5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.

6.0 REAGENTS

This section is not applicable to this SOP.

7.0 PROCEDURE

7.1 Subatmospheric Pressure Sampling

7.1.1 Sampling Using a Fixed Orifice, Capillary, or Adjustable Micrometering Valve

1. Prior to sample collection, the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).

2. A canister, which is evacuated to 0.05 mm Hg and fitted with a flow restricting device, is opened to the atmosphere containing the VOCs to be sampled.

3. The pressure differential causes the sample to flow into the canister.

4. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). The sampling duration depends on the degree to which the flow is restricted.

5. A critical orifice flow restrictor will have a decrease in the flow rate as the pressure approaches atmospheric.

6. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

7.1.2 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Andersen Sampler Model 87-100)

1. Prior to sample collection the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).

2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the VOCs to be sampled.

3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.

4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.

5. The initially evacuated canister is filled by action of the flow controlled pump to near atmospheric pressure.

6. A digital time-program is used to pre-select sample duration and start and stop times.

7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

7.2 Pressurized Sampling

7.2.1 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Andersen Sampler Model 87-100)

1. Prior to sample commencement at the location, the appropriate information is completed on the Canister Sampling Field Data Sheet.

2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the VOCs to be sampled.

3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.

4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.

5. The initially evacuated canister is filled by action of the flow controlled pump to a positive pressure not to exceed 25 psig.

6. A digital time-programmer is used to pre-select sample duration and start and stop times.

7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

8.0 CALCULATIONS

1. A flow control device is chosen to maintain a constant flow into the canister over the desired sample period. This flow rate is determined so the canister is filled to about 88.1 kPa for subatmospheric pressure sampling or to about one atmosphere above ambient pressure for pressurized sampling over the desired sample period. The flow rate can be calculated by:

$$F \quad \frac{(P)(V)}{(T)(60)}$$

where:

F	=	flow rate (cm^3/min)
P	=	final canister pressure, atmospheres absolute
V	=	volume of the canister (cm^3)
T	=	sample period (hours)

For example, if a 6-L canister is to be filled to 202 kPa (two atmospheres) absolute pressure in 24 hours, the flow rate can be calculated by:

$$F \quad \frac{(2)(6000)}{(24)(60)} \quad 8.3 cm^3/\text{min}$$

2. If the canister pressure is increased, a dilution factor (DF) is calculated and recorded on the sampling data sheet.

$$DF \quad \frac{Ya}{Xa}$$

where:

Xa	=	canister pressure (kPa, psia) absolute before dilution.
Ya	=	canister pressure (kPa, psia) absolute after dilution.

After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

The following general quality assurance procedures apply:

1. All data must be documented on standard chain of custody records, field data sheets, or site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety practices. Specifically, pressurizing of Summa canisters should be performed in a well ventilated room, or preferably under a fume hood. Care must be taken not to exceed 40 psi in the canisters. Canisters are under pressure, albeit only 20-30 psi, and should not be dented or punctured. They should be stored in a cool dry place and always be placed in their plastic shipping boxes during transport and storage.

12.0 REFERENCES

1. Ralph M. Riggin, Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air, EPA-600/4-83-027 U. S. Environmental Protection Agency, Research Triangle Park, NC, 1983.

2. W. A. McClenny, J. D. Pleil, T. A. Lumpkin and K. D. Oliver, "Update on Canister-Based Samplers for VOCs," Proceedings of the 1987 EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, May, 1987 APCA Publication VIP-8, EPA 600/9-87-010.

3. J. F. Walling, "The Utility of Distributed Air Volume Sets When Sampling Ambient Air Using Solid Adsorbents," Atmospheric Environ., 18:855-859, 1984.

4. J. F. Walling, J. E. Bumgarner, J. D. Driscoll, C. M. Morris, A. E. Riley, and L. H. Wright, "Apparent Reaction Products Desorbed From Tenax Used to Sample Ambient Air," Atmospheric Environ., 20:51-57, 1986.

5. Portable Instruments User's Manual for Monitoring VOC Sources, EPA-340/1-88-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington, D.C., June 1986.

6. R. A. Rasmussen and J. E. Lovelock, Atmospheric Measurements Using Canister Technology, J. Geophys. Res., 83: 8369-8378, 1983.

7. R. A. Rasmussen and M. A. K. Khalil, "Atmospheric Halocarbon: Measurements and Analysis of Selected Trace Gases," Proc. NATO ASI on Atmospheric Ozone, BO: 209-231.

8. EPA Method TO-14 "Determination of Volatile Organic Compounds (VOC's) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis", May 1988.

APPENDIX A
Volatile Organic Compound Data Sheet
SOP #1704
July 1995

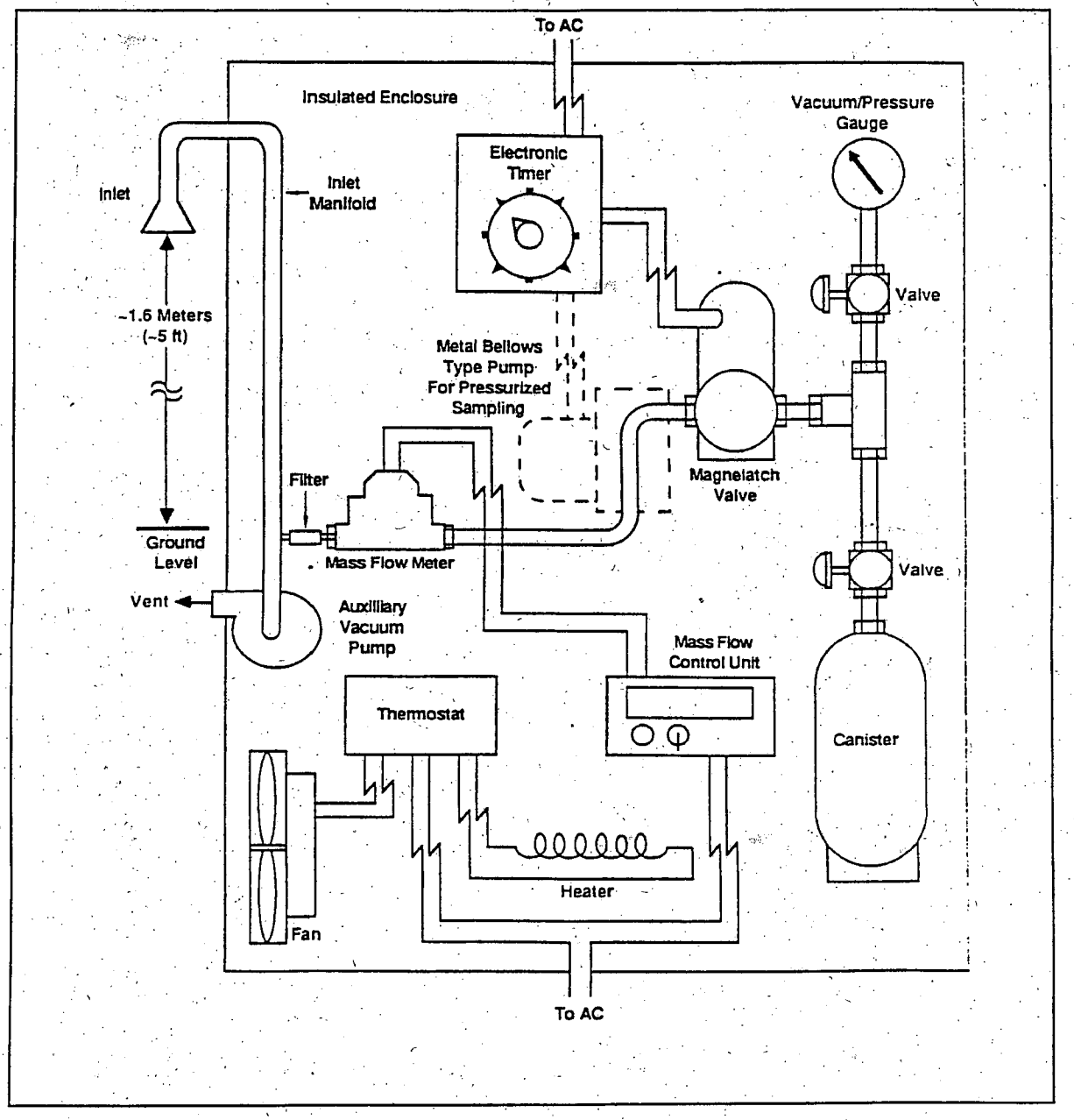
Volatile Organic Compound Data Sheet

TABLE 1. VOLATILE ORGANIC COMPOUND DATA SHEET

COMPOUND (SYNONYM)	FORMULA	MOLECULAR WEIGHT	BOILING POINT (°C)	MELTING POINT (°C)	CAS NUMBER
Freon 12 (Dichlorodifluoromethane)	Cl_2CF_2	120.91	-29.8	-158.0	
Methyl chloride (Chloromethane)	CH_3Cl	50.49	-24.2	-97.1	74-87-3
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	$ClCF_2CClF_2$	170.93	4.1	-94.0	
Vinyl chloride (Chloroethylene)	$CH_2{=}CHCl$	62.50	-13.4	-1538.0	75-01-4
Methyl bromide (Bromomethane)	CH_3Br	94.94	3.6	-93.6	74-83-9
Ethyl chloride (Chloroethane)	CH_3CH_2Cl	64.52	12.3	-136.4	75-00-3
Freon 11 (Trichlorofluoromethane)	CCl_3F	137.38	23.7	-111.0	
Vinylidene chloride (1,1-Dichloroethene)	$C_2H_2Cl_2$	96.95	31.7	-122.5	75-35-4
Dichloromethane (Methylene chloride)	CH_2Cl_2	84.94	39.8	-95.1	75-09-2
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	CF_2ClCCl_2F	187.38	47.7	-36.4	
1,1-Dichloroethane (Ethylidene chloride)	CH_3CHCl_2	98.96	57.3	-97.0	74-34-3
cis-1,2-Dichloroethylene	$CHCl{=}CHCl$	96.94	60.3	-80.5	
Chloroform (Trichloromethane)	$CHCl_3$	119.38	61.7	-63.5	67-66-3
1,2-Dichloroethane (Ethylene dichloride)	$ClCH_2CH_2Cl$	98.96	83.5	-35.3	107-06-2
Methyl chloroform (1,1,1-Trichloroethane)	CH_3CCl_3	133.41	74.1	-30.4	71-55-6
Benzene (Cyclohexatriene)	C_6H_6	78.12	80.1	5.5	71-43-2
Carbon tetrachloride (Tetrachloromethane)	CCl_4	153.82	76.5	-23.0	56-23-5
1,2-Dichloropropane (Propylene dichloride)	$CH_3CHClCH_2Cl$	112.99	96.4	-100.4	78-87-5
Trichloroethylene (Trichloroethene)	$ClCH{=}CCl_2$	131.29	87	-73.0	79-01-6
cis-1,3-Dichloropropene (cis-1,3-dichloropropylene)	$CH_3CCl{=}CHCl$	110.97	76		
trans-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	$ClCH_2CH{=}CHCl$	110.97	112.0		
1,1,2-Trichloroethane (Vinyl trichloride)	$CH_2ClCHCl_2$	133.41	113.8	-36.5	79-00-5
Toluene (Methyl benzene)	$C_6H_5CH_3$	92.15	110.6	-95.0	108-88-3
1,2-Dibromoethane (Ethylene dibromide)	$BrCH_2CH_2Br$	187.88	131.3	9.8	106-93-4
Tetrachloroethylene (Perchloroethylene)	$Cl_2C{=}CCl_2$	165.83	121.1	-19.0	127-18-4
Chlorobenzene (Phenyl chloride)	C_6H_5Cl	112.56	132.0	-45.6	108-90-7
Ethylbenzene	$C_6H_5C_2H_5$	106.17	136.2	-95.0	100-41-4
m-Xylene (1,3-Dimethylbenzene)	$1,3-(CH_3)_2C_6H_4$	106.17	139.1	-47.9	
p-Xylene (1,4-Dimethylxylene)	$1,4-(CH_3)_2C_6H_4$	106.17	138.3	13.3	
Styrene (Vinyl benzene)	$C_6H_5CH{=}CH_2$	104.16	145.2	-30.6	100-42-5
1,1,2,2-Tetrachloroethane	$CHCl_2CHCl_2$	167.85	146.2	-36.0	79-34-5
o-Xylene (1,2-Dimethylbenzene)	$1,2-(CH_3)_2C_6H_4$	106.17	144.4	-25.2	
1,3,5-Trimethylbenzene (Mesitylene)	$1,3,5-(CH_3)_3C_6H_6$	120.20	164.7	-44.7	108-67-8
1,2,4-Trimethylbenzene (Pseudocumene)	$1,2,4-(CH_3)_3C_6H_6$	120.20	169.3	-43.8	95-63-6
m-Dichlorobenzene (1,3-Dichlorobenzene)	$1,3-Cl_2C_6H_4$	147.01	173.0	-24.7	541-73-1
Benzyl chloride (α-Chlorotoluene)	$C_6H_5CH_2Cl$	126.59	179.3	-39.0	100-44-7
o-Dichlorobenzene (1,2-Dichlorobenzene)	$1,2-Cl_2C_6H_4$	147.01	180.5	-17.0	95-50-1
p-Dichlorobenzene (1,4-Dichlorobenzene)	$1,4-Cl_2C_6H_4$	147.01	174.0	53.1	106-46-7
1,2,4-Trichlorobenzene	$1,2,4-Cl_3C_6H_3$	181.45	213.5	17.0	120-82-1
Hexachlorobutadiene (1,1,2,3,4,4-Hexachloro-1,3-butadiene)					

APPENDIX B
Figure
SOP #1704
July 1995

FIGURE 1. Subatmospheric/Pressurized Sampling Equipment



APPENDIX C
Canister Sampling Field Data Sheet
SOP #1704
July 1995

ENVIRONMENTAL RESPONSE TEAM
SUMMA AIR SAMPLING WORK SHEET

Roy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-C4-0022

Site: _____ WA#: _____
Samplers: _____ EPA/ERT WAM: _____
Date: _____ REAC Task Leader: _____

Sample #					
Location					
SUMMA ID					
Orifice Used					
Analysis/Method					
Time (Start)					
Time (Stop)					
Total Time					
SUMMA WENT TO AMBIENT	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO
Pressure Gauge Reading					
Pressure Gauge Reading					
Flow Rate (Pre)					
Flow Rate (Post)					
Flow Rate (Average)					

MET Station On-site? Y / N

General Comments:

Appendix D

Response Engineering and Analytical Contract (REAC)

Standard Operating Procedure 2082: Construction and Installation of Permanent Sub-Slab Soil Gas Wells

March 2004

Response Engineering and Analytical Contract

STANDARD OPERATING PROCEDURES

CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

DRAFT

CONTENTS

1.0 SCOPE AND APPLICATION

2.0 METHOD SUMMARY

3.0 EQUIPMENT/APPARATUS

4.0 PROCEDURE FOR PROBE ASSEMBLY AND INSTALLATION

5.0 PROCEDURE FOR SAMPLING SETUP

6.0 PROCEDURE FOR REPAIRING A LOOSE PROBE

7.0 APPENDICES

CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

DRAFT

1.0 SCOPE AND APPLICATION

Soil gas monitoring provides a quick means of detecting volatile organic compounds (VOCs) in the soil subsurface. Using this method, underground VOC contamination can be identified, and the source, extent, and movement of pollutants can be traced.

This standard operating procedure (SOP) outlines the methods used for the construction and installation of permanent sub-slab soil gas wells. The wells are utilized to sample the gas contained in the interstitial spaces beneath the concrete floor slab of dwellings and other structures. The thickness of a concrete slab may vary from structure to structure. A structure may have a single slab where the thickness varies. The type of equipment described in this standard operating procedure (SOP) may be purchased at a local home center or hardware store and should allow the installation of a soil gas well in a slab up to 8-inches thick. Equipment can be purchased to drill thru a slab of greater thickness, however this equipment may not be available locally.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute United States Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Using an electric Hammer Drill or Rotary Hammer, an inner or pilot hole is drilled into the concrete slab to a depth of approximately 2 inches (") with the 3/8" diameter drill bit. Using the pilot hole as the center, drill an outer hole to an approximate depth of 1 3/8" using the 1" diameter drill bit. Replacing the 3/8" diameter drill bit continue to drill the pilot hole thru the slab and several inches into the sub-slab material. Once drilling is completed, a stainless steel probe is assembled and inserted into the pre-drilled hole. The probe is mounted flush with the surrounding slab so it will not interfere with pedestrian or vehicular traffic and cemented into place. A length of Teflon® tubing is attached to the probe assembly and to a sample container or system. Sample collection may now begin.

3.0 EQUIPMENT/APPARATUS

- Hammer Drill or Rotary Hammer
- AC extension cord
- AC generator (if AC power is not available on site)
- Hammer or Rotary Hammer drill bit, 3/8"diameter
- Hammer or Rotary Hammer drill bit, 1"diameter
- Portable vacuum cleaner
- (1) 3/4" open end wrench or (1) medium adjustable wrench
- (2) 9/16" open end wrenches or (2) small adjustable wrenches

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2 Hex head wrench, 1/4"
X Tubing cutter
X Bucket
Trowel or putty knife
✓ Swagelok® SS-400-7-4 Female Connector, 1/4"NPT to 1/4" Swagelok® connector 8.80 ea
✓ Swagelok® SS-400-1-4 Male Connector, 1/4"NPT to 1/4" Swagelok® connector 5.40 ea
✓ 1/4"NPT flush mount hex socket plug, Teflon® coated SS-4-P 4.00
✓ 1/4"OD stainless steel tubing, pre-cleaned instrument grade SS-T4-S035-20 - come in 20' cut however
✓ 1/4"OD Teflon® tubing PFA-T4-062 2.21 a foot 50' or 100'
✓ Teflon® thread tape MS-STR-4 2.10 ea
✓ Anchoring cement (requires water for mixing)
✓ Modeling clay

4.0 PROCEDURE FOR PROBE ASSEMBLY AND INSTALLATION

- Drill a 3/8"diameter inner, or pilot hole to a depth of 2". (Figure 1)
- Using the 3/8" pilot hole as your center, drill a 1" diameter outer hole to a depth of 1 3/8". (Figure 2)
- Vacuum out any cuttings from the hole.
- Continue drilling the 3/8" inner, or pilot hole thru the slab and a few inches into the sub-slab material. (Figure 3)
- Figure 4 details installed probe assembly.
- Vacuum out any cuttings from the outer hole.
- Determine the length of stainless steel tubing required to reach from the bottom of the outer hole, thru the slab, and into the open cavity below the slab. To avoid obstruction of the probe tube, insure that it does not contact the sub-slab material. Cut the tubing to the desired length.
- Attach the measured length of 1/4"OD stainless tubing to the female connector with the Swagelok® nut. Tighten the nut.
- Insert the 1/4" hex socket plug into the female connector. Tighten the plug. **Do not over tighten.** If excessive force is required to remove the plug during the sample set up phase the probe may break loose from the anchoring cement.
- Place the completed probe into the outer hole. The probe tubing should not contact the sub-slab material and the top of the female connector should be flush with the surface of the slab and centered in the outer hole.

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- Mix a small amount of the anchoring cement. Fill the space between the probe and the outside of the outer hole. Allow the cement to cure according to manufacturers instructions before sampling.

5.0 PROCEDURE FOR SAMPLING SETUP

Complete the sampling setup (Figure 5) as follows:

- Wrap one layer of Teflon® thread tape onto the NPT end of the male connector.
- Remove the 1/4" hex socket plug from the female connector. Refer to Section 6.0 if the probe breaks loose from the anchoring cement during this step.
- Screw and tighten the male connector into the female connector. **Do not over tighten**. This may cause the probe to break loose from the anchoring cement during this step or when the male connector is removed upon completion of the sampling event. Refer to Section 6.0 if the probe breaks loose from the anchoring cement during this step.
- Attach a length of 1/4"OD Teflon® tubing to the male connector with a Swagelok® nut. The Teflon® tubing is then connected to the sampling container or system to be utilized for sample collection.
- After sample collection remove the male connector from the probe and reinstall the hex socket plug. **Do not over tighten** the hex socket plug. If excessive force is required to remove the plug during the next sampling event the probe may break loose from the anchoring cement .Refer to Section 6.0 if the probe breaks loose from the anchoring cement during this step.

6.0 PROCEDURE FOR REPAIRING A LOOSE PROBE

- If the probe breaks loose from the anchoring cement while removing or installing the hex head plug, or the male connector, lift the probe slightly above the surface of the concrete slab.
- Hold the female connector with the 3/4"open end wrench.
- Complete the step being taken during which the probe broke loose, following the instructions contained in the standard operating procedure (SOP). (i.e. **Do not over tighten** the hex socket plug or male connector)
- Push the probe back down into place and reapply the anchoring cement.
- Modeling clay may be used as a temporary patch to effect a seal around the probe until the anchoring cement can be reapplied.

REAC
Response Engineering and Analytical Contract

STANDARD OPERATING PROCEDURES

CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

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FIGURE 2
OUTER HOLE

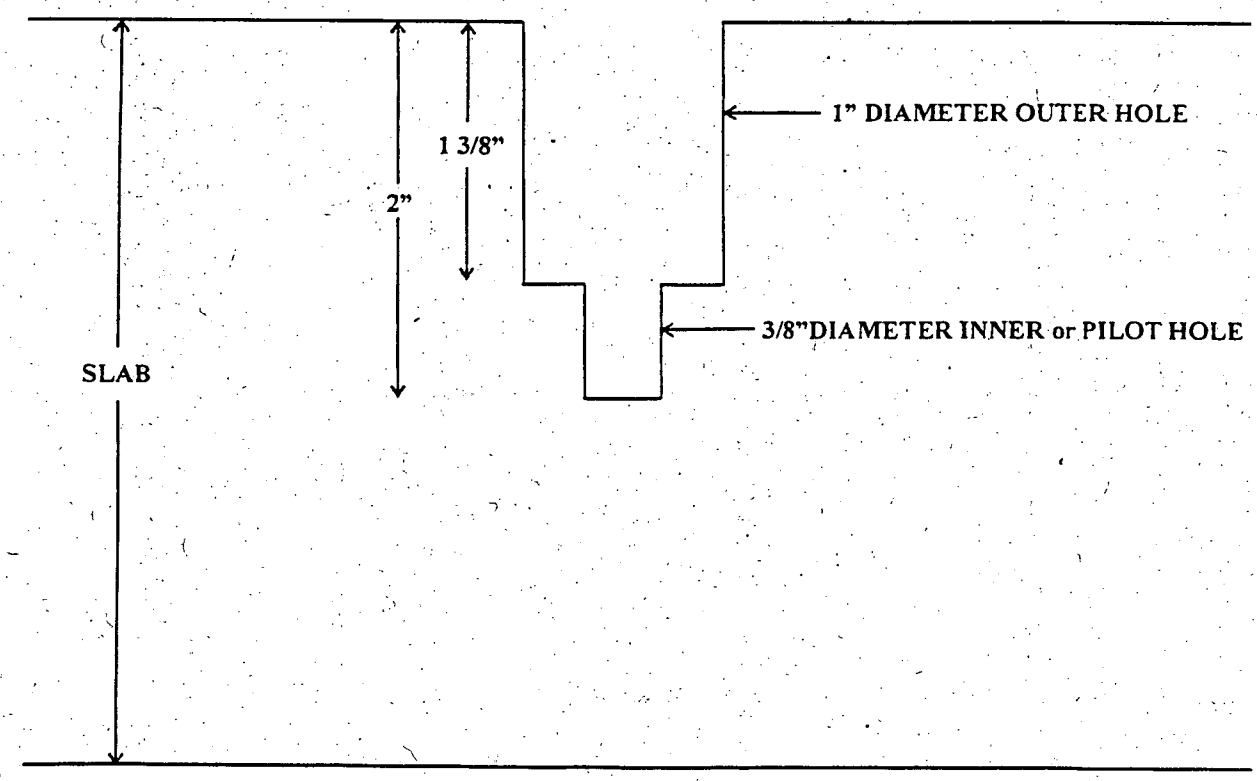

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FIGURE 3

COMPLETED HOLE PRIOR to PROBE INSTALLATION

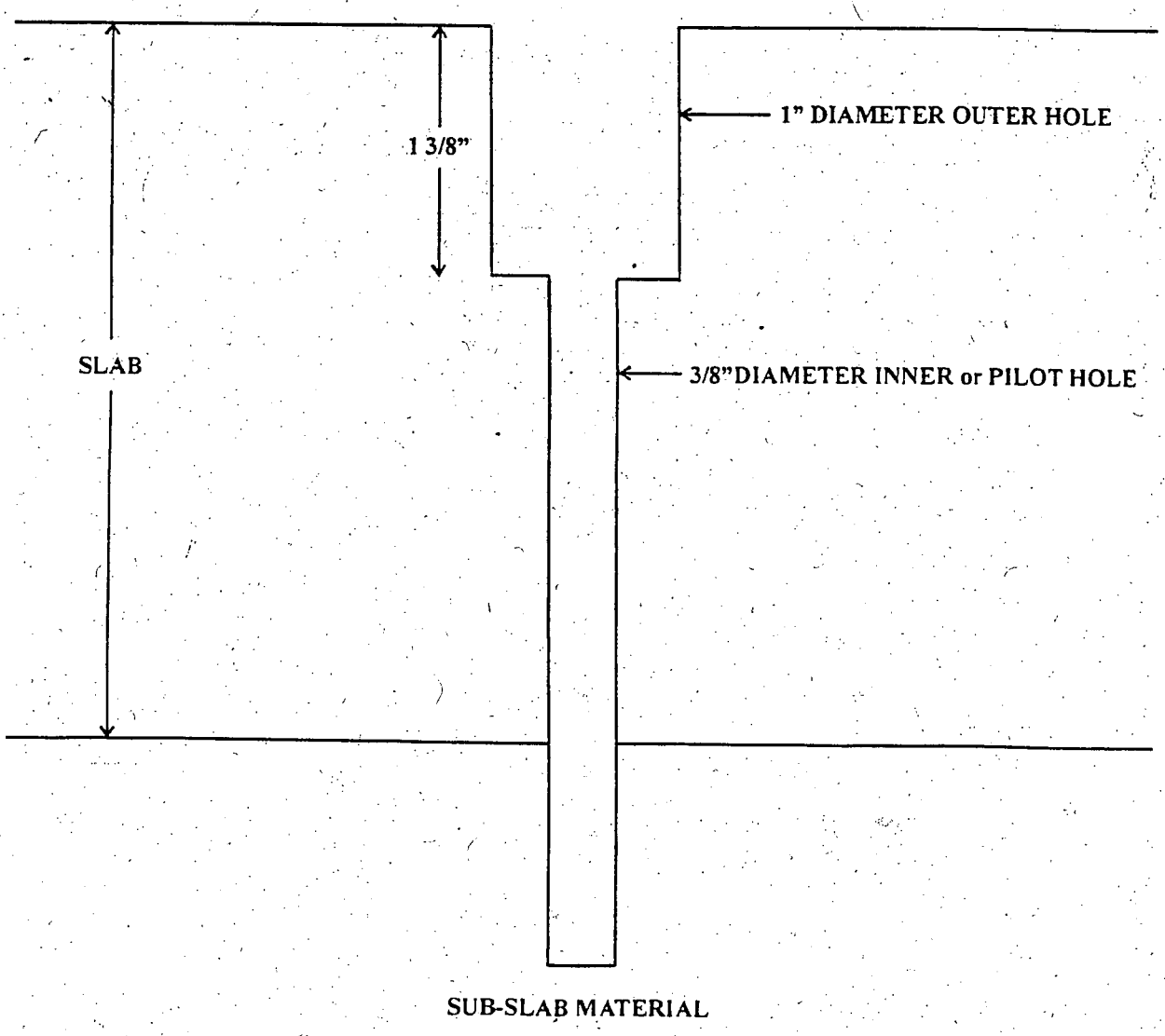

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FIGURE 4

SOIL GAS PROBE INSTALLED

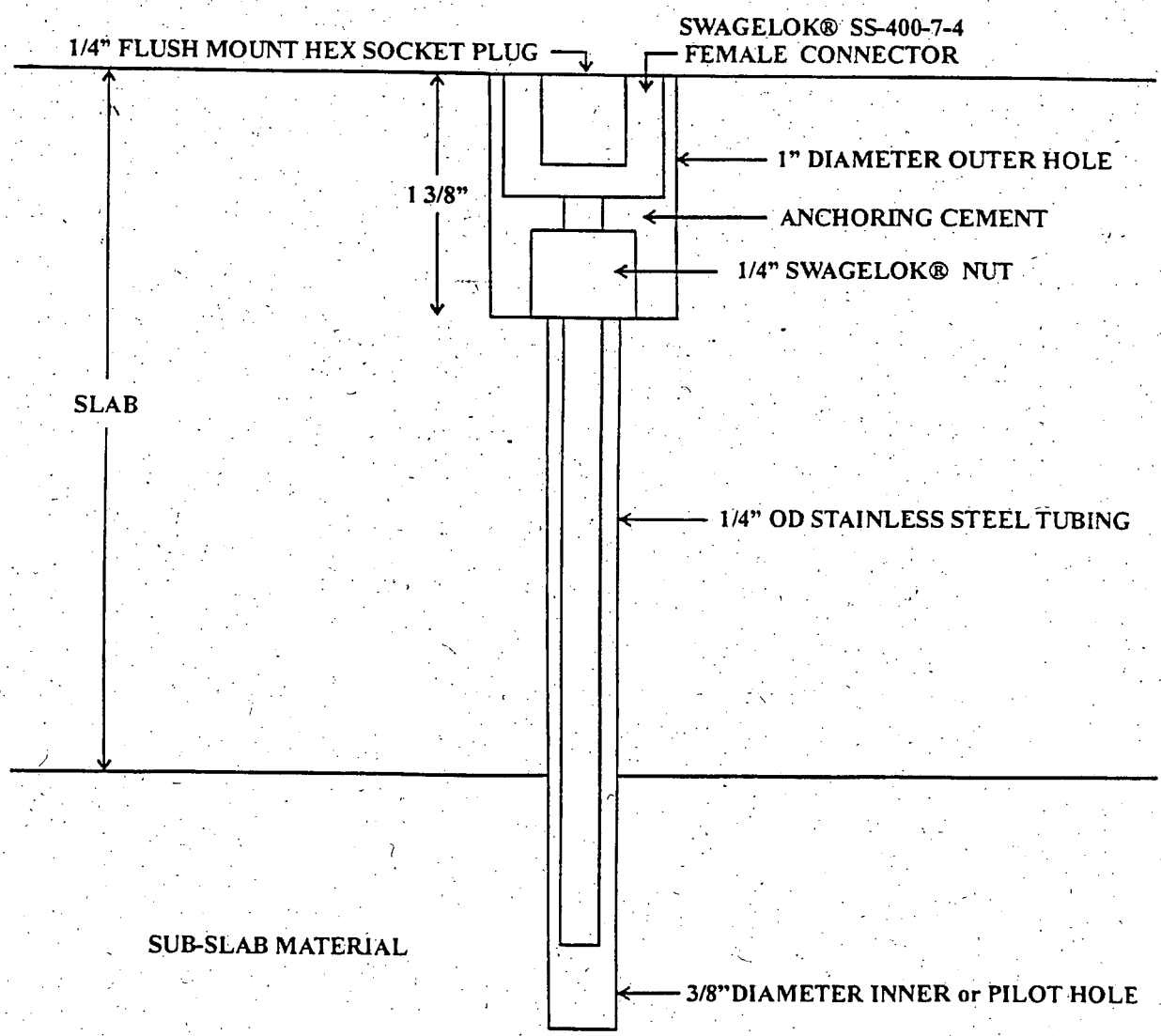

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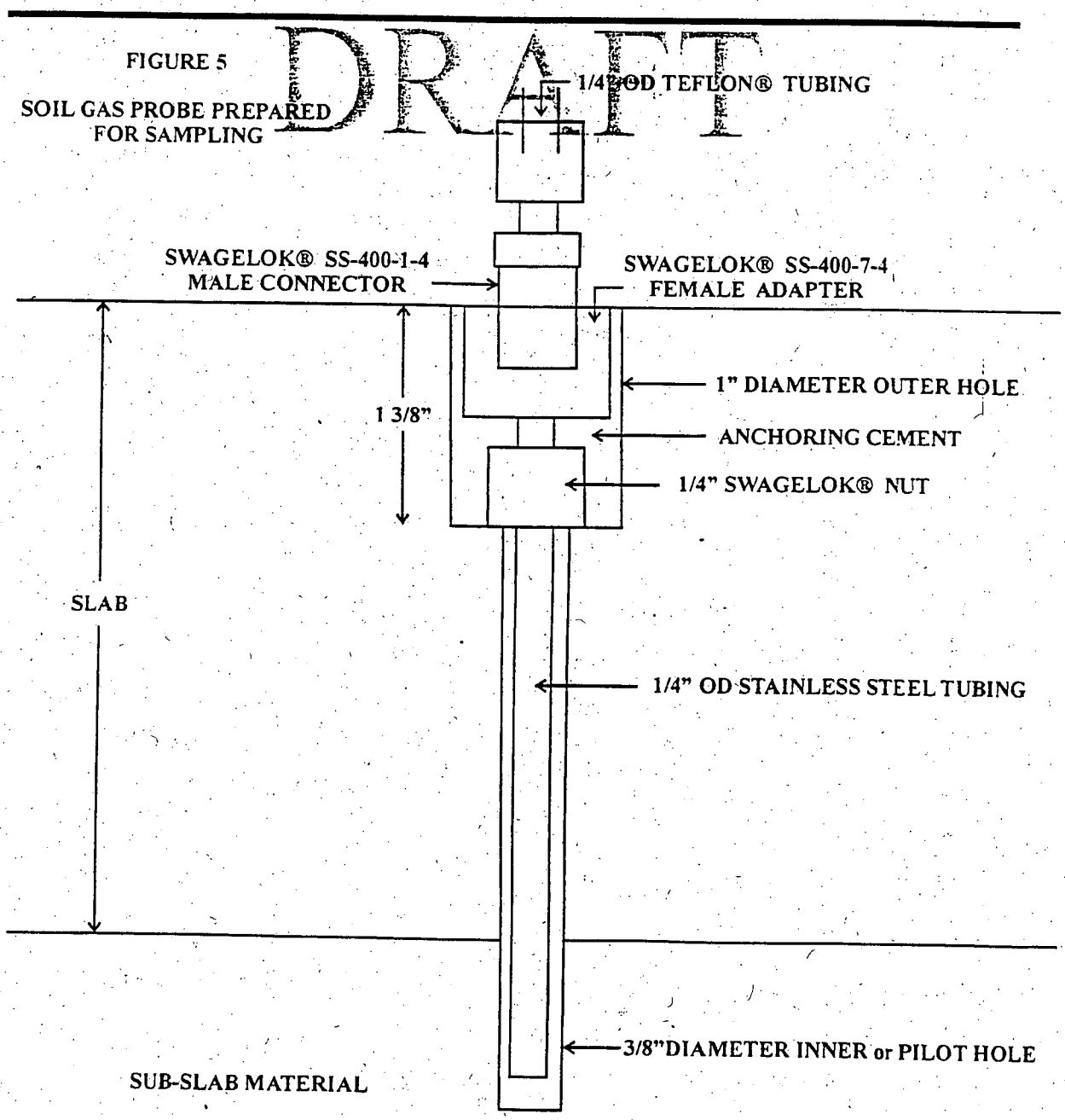
FIGURE 5

SOIL GAS PROBE PREPARED FOR SAMPLING



Appendix E

Example Questionnaire, Example Canister Field Data Sheet, Example Chain of Custody record, Resident Instructions, Example Access Agreement

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
2890 WOODBRIDGE AVENUE
EDISON, NEW JERSEY 08837

April 4, 2006

Re: Consent to Access for Sub-slab and Indoor Air Sampling for the property at [illegible], Morristown, NJ.)

Dear [illegible]

The U.S. Environmental Protection Agency (EPA) is currently investigating groundwater contamination in the vicinity of Morris Avenue, Wilmot Street and Pine Street in Morristown, New Jersey. Preliminary investigations have indicated significant tetrachloroethene (PCE) and trichloroethene (TCE) concentrations in shallow ground water in that area. PCE and TCE are chemical compounds known as volatile organic compounds (VOCs), which easily evaporate into the air. Similarly, VOCs can move from groundwater through the soil into air inside homes and businesses.

EPA would like to determine the potential for intrusion of chemical vapors into structures that are located above or near the groundwater contaminated with VOCs. EPA will be performing interior sampling in your area during late April 2006. Your property is among those that EPA believes should be tested as a precaution.

We wish to make an appointment to visit your property to collect a soil gas sample below your basement or building slab and to collect samples of your indoor air. The sub-slab sampling will involve drilling a small hole through the concrete slab and installing a sampling port. The port will be capped flush with the floor following sampling. For the indoor air sampling, EPA will set up three small sampling devices in your residence for 24 hours. The sampling will involve one visit over each of three days at mutually convenient times. EPA will provide you with the results of the sampling when they become available.

In order to perform the testing, EPA is seeking consent to access your property. Enclosed you will find an access form, which we request you to sign to provide access for this purpose. Please

mail the signed form to David Rosoff, USEPA, 2890 Woodbridge Avenue, Building 209, Edison, New Jersey 08837. In the near future, an EPA representative will call you or visit your property to schedule a sampling event for the month of April.

Also enclosed is a fact sheet about vapor intrusion. Should you have any additional questions regarding this matter please contact me at 732-906-6879 or EPA's Community Involvement Coordinator, Pat Seppi, at 646-369-0068.

Sincerely,

David Rosoff
On-Scene Coordinator

cc: Andrew L. Confortini, USEPA
Ildefonso Acosta, USEPA
Michael VanItallie

INDOOR AIR QUALITY BUILDING SURVEY

Occupant/Building Name:_____
Date:_____

Address:_____
_____

Telephone No. Home_____ Work_____
Best time to contact_____

Completed by:_____

Canister #_____ Valve # _____
Time Started:_____ Time Stopped:_____
Location:_____
_____

Canister #_____ Valve # _____
Time Started:_____ Time Stopped:_____
Location:_____
_____

Canister #_____ Valve # _____
Time Started:_____ Time Stopped:_____
Location:_____
_____

Canister #_____ Valve # _____
Time Started:_____ Time Stopped:_____
Location:_____
_____

Daily Weather Conditions: Temperature _____ Relative Humidity _____
_____

Are you the ❑Owner, ❑ Renter, ❑Other (please specify)_____of this Home/Structure?

Total number of occupants/persons at this location?_____, Children under age 13 ____, Children age 13-18 _____ .

How long have you lived at this location? _____ .

Do you regularly use air fresheners? ❑Yes, ❑No.

Do you regularly use or work in a dry cleaning service (check only one box)? ❑Yes, use dry-cleaning regularly (at least weekly), ❑Yes, use dry-cleaning infrequently (monthly or less)? If yes, when was the last time you brought home dry cleaned clothes? _____
❑Yes, work at a dry cleaning service, ❑No

Does anyone in your home use solvents at work? ❑Yes, ❑No. If yes, are the work clothes washed at home? ❑Yes❑No

What is the source of your drinking water? ❑Public water supply, ❑Private well, ❑Other_____

Do you have a private well for purposes other than drinking? ❑Yes, ❑No

Do you have a septic system? ❑Yes, ❑No, ❑ Not used, ❑ Unknown
Do you have standing water outside your home (pond, ditch, swale)? ❑Yes, ❑No

Where is the washer/dryer located? ❑Basement, ❑Upstairs utility room, ❑Garage, ❑Other_____

Do you have air conditioning? Yes ❑ No ❑. If yes, please check the appropriate type(s) ❑Central air conditioning, ❑Window air conditioning unit(s), ❑Other ❑, please specify_____

Do you use any of the following? Room fans ❑, Ceiling fans ❑, Attic fan ❑

Water Heater Type: ❑Gas, ❑Electric, ❑Other_____

Water heater location: ❑Basement, ❑Upstairs utility room, ❑Garage, ❑Other_____.

What type of cooking appliance do you have? ❑Electric, ❑Gas, ❑Other_____.

Type of Home/Structure (check only one): ❑Single Family Home, ❑Duplex, ❑Condominium, ❑Townhouse, ❑office, ❑commercial, ❑industrial, ❑Other_____

Number of floors below grade: _____, at or above grade:_____

Does this structure have a ❑Basement, ❑Crawlspace or Slab?

Basement/Crawlspace size:_____ft3

Number of rooms in the basement: _____

Does anyone in your home use solvents at work? ❑Yes, ❑No. If yes, are the work clothes washed at home? ❑Yes❑No

What is the source of your drinking water? ❑Public water supply, ❑Private well, ❑Other_____

Do you have a private well for purposes other than drinking? ❑Yes, ❑No

Do you have a septic system? ❑Yes, ❑No, ❑ Not used, ❑ Unknown
Do you have standing water outside your home (pond, ditch, swale)? ❑Yes, ❑No

Where is the washer/dryer located? ❑Basement, ❑Upstairs utility room, ❑Garage, ❑Other_____

Do you have air conditioning? Yes ❑ No ❑. If yes, please check the appropriate type(s) ❑Central air conditioning, ❑Window air conditioning unit(s), ❑Other ❑, please specify_____

Do you use any of the following? Room fans ❑, Ceiling fans ❑, Attic fan ❑

Water Heater Type: ❑Gas, ❑Electric, ❑Other_____

Water heater location: ❑Basement, ❑Upstairs utility room, ❑Garage, ❑Other_____.

What type of cooking appliance do you have? ❑Electric, ❑Gas, ❑Other_____.

Type of Home/Structure (check only one): ❑Single Family Home, ❑Duplex, ❑Condominium, ❑Townhouse, ❑office, ❑commercial, ❑industrial, ❑Other_____

Number of floors below grade: _____, at or above grade:_____

Does this structure have a ❑Basement, ❑Crawlspace or Slab?

Basement/Crawlspace size:_____ft3

Number of rooms in the basement: _____

OUTSIDE SOURCES	Yes	No	Comments/Locations
Garbage dumpsters			
Heavy motor vehicle traffic			
Construction activities			
Nearby industries (identify)			
UST/AST (gasoline, heating fuel)			
BASEMENT SURVEY			
Wall construction (cinder block, poured concrete,sheet rock, paneling, etc.)	**Yes**	**No**	type: **condition:**
Floor Construction (earthen, slab, floating, etc)			type: **condition:**
Number of windows present on each wall and size			North: East: South: West:
Was basement painted recently? oil-base or latex paints			date: type of paint:
Is the basement ❑finished ❑or unfinished? If finished, how many rooms are in the basement?_____			
Does the basement have any of the following? (check all that apply) ❑, Sump ❑, Floor drain ❑, Other hole/opening in floor ❑ (describe)_____			**Notes:**
Describe the location of any above appurtenances:			**Notes:**
Do pipes connect to the sump? (french drain?)			
New flooring in basement?(list type - carpet, tile)			
Has glue been used for construction or hobbies?			
New furniture added to basement			type: date:
Staining on floors/walls			

	YES	NO	
Moisture visually present in the basement			
Pipes running through walls, floor (conduits-describe, give FID/PID/CGS readings)			
Odors detected by inspector			
Basement used as living space			
Time occupants spend in basement (hours/day/per person)			
Items stored in basement: solvents			
gasoline			
paint/thinners			
polishes/waxes			
insecticides			
kerosene			
household cleaning products			
mothballs			
other items?			

NOTES:

FIRST FLOOR SURVEY

	Yes	No	
Wall construction (cinder block, sheet rock, paneling, etc)			type: condition:
Was painting done recently? oil-base or latex?			date: type of paint:
New flooring on 1st floor? (list type - carpet, tile)			

	Yes	No	
Has glue been used for construction or hobbies?			
New furniture added to 1st floor? (list type - carpet. tile)			type: date:
Staining on floors/walls			
Pipes running through walls, floor (describe)			
Odors detected by inspector			
Items stored on this floor			
solvents			
gasoline			
paint/thinners			
polishes/waxes			
insecticides			
kerosene			
household cleaning products			
mothballs			
other items?			
NOTES:_____			

PERSONAL ACTIVITIES	**Yes**	**No**	
Does anyone in the building smoke?			
approx. number of tobacco products per day, per person			
List hobbies of Residents			
Any house pets?			

MISCELLANEOUS	Yes	No			
Have the occupants ever noticed unusual odors inside or outside the building ?			describe: location:		
Known spill outside or inside building (Specify location)					
Type of heating used in building oil - (identify the location and age of the storage tank)					
natural gas					
electric					
other (specify)					
Is the heating unit properly vented?					
Water damage or standing water in building (historic or current)					
Fire damage to building			date:		
Pest control applications			date:		
FIELD SCREENING RESULTS	**FID**	**PID**	**CGI**	**CO2**	**Rel. Hum**
Basement					
First Floor					
Additional Floors					
Other (specify)_____					
NOTES:					

NOTES:

CONSENT TO ACCESS

The purpose of this Consent to Access is for the U.S. Environmental Protection Agency (EPA) to obtain access to my property located at:

Address of Property: _____

_____

Block and Lot No.: _____

I understand that EPA is conducting an environmental investigation on my property, pursuant to its response and enforcement responsibilities under the Superfund law, also known as the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended 42 U.S.C. §§ 9601-9675.

I hereby consent to employees and authorized representatives of EPA to enter onto and move about my property at reasonable times, as mutually scheduled, in order to perform the following tasks:

1. Sub-slab soil gas sampling, including the installation of sampling ports into the basement floor or slab;

2. Indoor air sampling to measure the ambient air quality; and

3. Assessment and inventorying of containers and their contents as necessary to determine their potential impact to indoor air.

I understand that the sub-slab sampling will involve drilling a small hole through the concrete slab and the installing of a sampling port. I also understand that the port will be capped flush with the floor following sampling. I further consent to EPA releasing to the public all analytical results of any samples that EPA and its representatives collect or have collected on my property, as identified by my address.

I, the undersigned, am the owner of the property identified above or am authorized to represent the owner of the property.

_____ _____
Signature of Owner Date

_____ _____
Name (Please Print) Title (Please Print)

_____
Legal Owner (if corporation or other entity)

APPENDIX C

AIR DATA PACKAGES

CLP DATA ASSESSMENT
Functional Guidelines for Evaluating Organic Analysis

CASE No.: SDG No.: WS0605085C
LABORATORY: Air Toxics SITE: VIP
SAMPLES: 9 Air Samples, all 9 FULL SCAN
SAMPLER: Diane Salkie EPA

DATA ASSESSMENT

The current SOP HW-31 (Revision 6) April 2006, USEPA Region II Data Validation SOP for Statement of Work TO-15 for evaluating organic Ambient Air in Canisters have been applied plus qualification(s) outlined in the modified clause.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Russell Arnone Date: 06/14/2006

Verified By: N/A Date: ____/____/2006

CLP DATA ASSESSMENT

SDG# WS005

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. Leak Test Evaluation:

All canisters are leak tested prior to each sampling use. The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than 13.8 kPa (2 psig) over the 24 hour period.

No problems found for this qualification.

3. Canister Certification:

Canister certification involves two procedures: Blank Analysis and blank spike Analysis. The canister is "certified" if target analytes are < 0.2 ppv. For the spiked canister, the acceptable % difference for any target compound at a nominal 10 ppv concentration in humidified zero air is < 30%.

All of the canister certification forms do not state the certification level. The certification reports for canisters 4191 is for only 17 compounds, and this canisters reported for full scan (60 compounds). Canister certification missing for canister 912 (sample 0605085C-40A). The remainder of the canister certifications has full scan certification report, and are satisfactory.

4. Laboratory Control/Lab Control Duplicate Recovery: (LCS/LCSD)

The LCS/LCS Duplicate data is generated to determine the long term precision and accuracy of the analytical method. The LCS/LCS Duplicate may be used in conjunction with other QC criteria for additional qualification of data. The LCS is analyzed once per 24 hour analytical sequence and concurrently with the samples in the SDG.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced into

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the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than or equal five times (5X) the method blank concentration, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

No problems found for this qualification.

C) Tics "R" rejected

None.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be 30% for all Target analytes. %D must be 30% for all Target analytes. A value outside of these limits indicates

CLP DATA ASSESSMENT

potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

No problems found for this qualification.

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the most recent valid calibration standard area. The retention time of the internal standard must not vary more than ± 20 seconds from the latest daily (24-hour) calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "UJ". If the area count is < 25%, flag all non-detects as unusable "R".

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

8. COMPOUND IDENTIFICATION:

A) Air Volatile Samples:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

No problems found for this qualification.

10. FIELD DOCUMENTATION:

CLP DATA ASSESSMENT

Trip report is available.

11. OTHER PROBLEMS

Lab ID# 0605085C-33AA (Client sample ID 34746 duplicate). Tetrachloroethane on column value (57.8ppb) was above the initial calibration. This sample was diluted and diluted sample reported Lab ID# 0605085C-33A (Client sample ID 34746). Report tetrachloroethane (500ppbv or 3400 uG/m3) from sample 0605085C-33A. Report the remainder of the compounds using sample 0605085C-33AA.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

No problems found for this qualification.

CLP DATA ASSESSMENT
Functional Guidelines for Evaluating Organic Analysis

CASE No.: SDG No.: WS0605085D
LABORATORY: Air Toxics SITE: VIP
SAMPLES: 3 Air Samples, all 3 FULL SCAN
SAMPLER: Diane Salkie EPA

DATA ASSESSMENT

The current SOP HW-31 (Revision 6) April 2006, USEPA Region II Data Validation SOP for Statement of Work TO-15 for evaluating organic Ambient Air in Canisters have been applied plus qualification(s) outlined in the modified clause.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Russell Arnone Date: 06/15/2006

Verified By: N/A Date: ____/____/2006

CLP DATA ASSESSMENT

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. Leak Test Evaluation:

All canisters are leak tested prior to each sampling use. The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than 13.8 kPa (2 psig) over the 24 hour period.

No problems found for this qualification.

3. Canister Certification:

Canister certification involves two procedures: Blank Analysis and blank spike Analysis. The canister is "certified" if target analytes are < 0.2 ppv. For the spiked canister, the acceptable % difference for any target compound at a nominal 10 ppv concentration in humidified zero air is < 30%.

The canister certification forms are present, but all of the canister certification forms do not state the certification level.

4. Laboratory Control/Lab Control Duplicate Recovery: (LCS/LCSD)

The LCS/LCS Duplicate data is generated to determine the long term precision and accuracy of the analytical method. The LCS/LCS Duplicate may be used in conjunction with other QC criteria for additional qualification of data. The LCS is analyzed once per 24 hour analytical sequence and concurrently with the samples in the SDG.

No problems found for this qualification.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-

CLP DATA ASSESSMENT

contamination of samples during field operations. If the concentration of the analyte is less than or equal five times (5X) the method blank concentration, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

No problems found for this qualification.

C) Tics "R" rejected

None.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be 30% for all Target analytes. %D must be 30% for all Target analytes. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If

CLP DATA ASSESSMENT

%RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

No problems found for this qualification.

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the most recent valid calibration standard area. The retention time of the internal standard must not vary more than ± 20 seconds from the latest daily (24-hour) calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "UJ". If the area count is < 25%, flag all non-detects as unusable "R".

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

8. COMPOUND IDENTIFICATION:

A) Air Volatile Samples:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

No problems found for this qualification.

10. FIELD DOCUMENTATION:

Trip report is available.

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11. OTHER PROBLEMS

No problems found for this qualification.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

No problems found for this qualification.

CLP DATA ASSESSMENT
Functional Guidelines for Evaluating Organic Analysis

CASE No.: SDG No.: WS0605085A
LABORATORY: Air Toxics SITE: VIP
SAMPLES: 13 Air Samples: 1 FULL SCAN, 12 MODIFIED SCAN
SAMPLER: Diane Salkie EPA

DATA ASSESSMENT

The current SOP HW-31 (Revision 6) April 2006, USEPA Region II Data Validation SOP for Statement of Work TO-15 for evaluating organic Ambient Air in Canisters have been applied plus qualification(s) outlined in the modified clause.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Russell Arnone Date: 06/02/2006

Verified By: Date: 6/6/2006

CLP DATA ASSESSMENT

SDG# WS005

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. Leak Test Evaluation:

All canisters are leak tested prior to each sampling use. The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than 13.8 kPa (2 psig) over the 24 hour period.

No problems found for this qualification.

3. Canister Certification:

Canister certification involves two procedures: Blank Analysis and blank spike Analysis. The canister is "certified" if target analytes are < 0.2 ppv. For the spiked canister, the acceptable % difference for any target compound at a nominal 10 ppv concentration in humidified zero air is < 30%.

Only problem found, as noted in labs narrative is: the canisters for samples 33965, 34453, 11882, 9940, and 9940dup were certified for analysis via full scan at 0.1 and 0.5 ppbv base reporting limits rather than the SIM reporting limits required. Results between the SIM reporting limits and the level at which the canister was certified have been flagged as estimated. The corresponding samples are 0605085A-22A, 0605085A-30A, 0605085A-05A, 0605085A-44A, 0605085A-44AA.

4. Laboratory Control/Lab Control Duplicate Recovery: (LCS/LCSD)

The LCS/LCS Duplicate data is generated to determine the long term precision and accuracy of the analytical method. The LCS/LCS Duplicate may be used in conjunction with other QC criteria for additional qualification of data. The LCS is analyzed once per 24 hour analytical sequence and concurrently with the samples in the SDG.

LCS recovery greater than 130% for 1,2,4 trichlorobenzene (168%). LCSD recovery greater than 130% for 1,2,4 trichlorobenzene (210%) and hexachlorobenzene (136%). These two compounds apply to only full scan sample

CLP DATA ASSESSMENT

(0605085A-05A, canister 11882). Using professional judgment no qualifiers applied.

LCS and LCSD was not spiked with styrene and trans 1,3 dichloropropane. This applies to only full scan sample 0605085A-05A, and using professional judgment no qualifiers applied.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than or equal five times (5X) the method blank concentration, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

No problems found for this qualification.

C) Tics "R" rejected

None.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

CLP DATA ASSESSMENT

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be 30% for all Target analytes. %D must be 30% for all Target analytes. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

Percent Difference (%D) is -61.5% for 1,2,4 trichlorobenzene. This only applies to full scan sample number 0605085A-05A. Qualify with J, sample 0605085A-05A.

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the most recent valid calibration standard area. The retention time of the internal standard must not vary more than ± 20 seconds from the latest daily (24-hour) calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "UJ". If the area count is < 25%, flag all non-detects as unusable "R".

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

8. COMPOUND IDENTIFICATION:

A) Air Volatile Samples:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not

CLP DATA ASSESSMENT

an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

No problems found for this qualification.

10. FIELD DOCUMENTATION:

Trip report is available. Field duplicate QC have been determined.

11. OTHER PROBLEMS

Canister certification forms do not state the certification level. The level is stated in the narrative, but should be stated on the certifications.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

No problems.

CLP DATA ASSESSMENT
Functional Guidelines for Evaluating Organic Analysis

CASE No.: SDG No.: WS0605085B
LABORATORY: Air Toxics SITE: VIP
SAMPLES: 19 Air Samples: 19 FULL SCAN
SAMPLER: Diane Salkie EPA

DATA ASSESSMENT

The current SOP HW-31 (Revision 6) April 2006, USEPA Region II Data Validation SOP for Statement of Work TO-15 for evaluating organic Ambient Air in Canisters have been applied plus qualification(s) outlined in the modified clause.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material, "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Russell Arnone Date: 06/05/2006

Verified By: B Karras Date: 6/6/2006

CLP DATA ASSESSMENT

SDG# WS005

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. Leak Test Evaluation:

All canisters are leak tested prior to each sampling use. The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than 13.8 kPa (2 psig) over the 24 hour period.

No problems found for this qualification.

3. Canister Certification:

Canister certification involves two procedures: Blank Analysis and blank spike Analysis. The canister is "certified" if target analytes are < 0.2 ppv. For the spiked canister, the acceptable % difference for any target compound at a nominal 10 ppv concentration in humidified zero air is < 30%.

All of the canister certification forms do not state the certification level. The certification reports for canisters 05712, 13655, 13843, 24484, 32109, 33568, 34328 are for only 17 compounds, and these canisters reported for full scan (60 compounds). The remainder of the canister certifications have full scan certification report.

4. Laboratory Control/Lab Control Duplicate Recovery: (LCS/LCSD)

The LCS/LCS Duplicate data is generated to determine the long term precision and accuracy of the analytical method. The LCS/LCS Duplicate may be used in conjunction with other QC criteria for additional qualification of data. The LCS is analyzed once per 24 hour analytical sequence and concurrently with the samples in the SDG.

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are

CLP DATA ASSESSMENT

prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than or equal five times (5X) the method blank concentration, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

No problems found for this qualification.

B) Field or rinse blank contamination:

No problems found for this qualification.

C) Tics "R" rejected

None.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be 30% for all Target analytes. %D must be

CLP DATA ASSESSMENT

30% for all Target analytes. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

No problems found for this qualification.

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the most recent valid calibration standard area. The retention time of the internal standard must not vary more than ± 20 seconds from the latest daily (24-hour) calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "UJ". If the area count is < 25%, flag all non-detects as unusable "R".

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

8. COMPOUND IDENTIFICATION:

A) Air Volatile Samples:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

No problems found for this qualification.

10. FIELD DOCUMENTATION:

CLP DATA ASSESSMENT

Trip report is available.

11. OTHER PROBLEMS

Sample 0605085B-23A (canister 24928). Sample was diluted, and acetone value on column (60.3ppbv) was still above the initial calibration. Valued therefore is qualified estimated (J). Final reported value after dilution factor applied is 210J ppbv, or 500J ug/m3.

Canister 33568 (Lab ID 0605085B-19A) was received by laboratory with significant vacuum remaining in the canister. This was noted in the laboratory.
Canister 33881 (Lab ID 0605085B-21A) final pressure -11"Hg, and canister 04586 (Lab ID 0605085B-02A) final pressure -14 "HG, which are less than -10 inches required.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

No problems found for this qualification.

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

DATE: 06/08/06
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section (HWSS)/RSCC
TO: HWSS ESAT-TOPO

Attached is the following Non-RASData Package to be reviewed for Quality Assurance

SITE: VIP Cleaners **CASE #: N/A**

SDG#: 0605085C, 0605085D

SAMPLER: US EPA

		#SAMPLES	MATRIX
PROJ. CODE: RS	**SITE SPILL #: 02XN**		
LAB: Air Toxics	**OPERABLE UNIT: 01**	12	AIR
TURN-AROUND-TIME: 14 day			

CERCLIS ID # : **FRACTION:** VOCs

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	**Date/Time**	**Signature**	**Date/Time**
[signature]	6/8/06 3:15 pm	[signature]	6/8/06 3:15
[signature]	6/15/06 11AM	[signature]	6/15/06 11:00 am

UIP
06050850
06050850

SOP NO. HW-31

STANDARD OPERATING PROCEDURE

FOR

VALIDATING

VOLATILE ORGANIC ANALYSIS OF AMBIENT AIR IN CANISTER

BY METHOD TO-15

Revision 3, April 2006

By: George Karras Date: 4/5/06
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APPROVED BY: Robert Runyon Date: 4/5/06
Robert Runyon, Chief
Hazardous Waste Support Branch

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ SDG(s): 06050850, 06050850

SITE: VIP LAB: AirToxics

This Region II SOP document is based on Method TO-15: Determination of Volatile Organics Compounds (VOCs) in Air Collected in Specially-Prepared Canisters & Analyzed by Gas Chromatography/Mass Spectrometry, January 1999.

1.0 Data Completeness and Deliverables

1.1 Have any missing deliverables been received and added to the data package? [✓] ___ ___

ACTION: Contact lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effect under "Contract Problems/ Non-Compliance" section of data assessment report.

Cover Letter, Narrative, and Data Reporting Forms

2.1 Is the Lab. Narrative and Cover Page present? [✓] ___ ___

2.2 Is Case Number contained in the Narrative? [✓] ___ ___

2.3 Are the following Data Reporting Forms present?

Analysis Data Sheet [Form I/Equivalent] [✓] ___ ___

Tentatively Identified Compounds [Form I-TIC] [✓] ___ ___

Blank Summary [Form IV/Equivalent] [✓] ___ ___

Laboratory Control Sample Data Sheet [Form III/Equivalent] [✓] ___ ___

GC/MS Instrument Performance Check and Mass Calibration [Form V/Equivalent] [✓] ___ ___

Initial Calibration [Form VI/Equivalent] [✓] ___ ___

Continuing Calibration [Form VII/Equivalent] [✓] ___ ___

Internal Standard Area and RT Summary [Form VIII/Equivalent] [✓] ___ ___

	YES	NO	N/A
Canister Certification [Form IX/Equivalent]	✓		

3.0 **Canister Receipt/Log-in Sheet**

Receipt of each canister is recorded in a laboratory notebook dedicated to this use. The sample receipt/log-in sheet must demonstrate that the information on custody records, traffic reports, and sample tags agree for each sample.

	YES	NO	N/A
3.1 Do all info items agree with each sample ?	✓		

ACTION: If these documents are not consistent, contact Project officer or laboratory and attach a record of resolution.

4.0 **Traffic Reports and Laboratory Narrative**

	YES	NO	N/A
4.1 Are the Traffic Report Forms present for all samples?	✓		

ACTION: If no, contact lab for replacement of missing or illegible copies.

5.0 **Holding Times**

	YES	NO	N/A
5.1 Have any VOA technical holding times of 30 days, determined from the date of sample collection to the date of analysis, been exceeded?		✓	

NOTE: The contract requires that samples must be retained from verified time sample receipt (VTSR) until 45 days after delivery of a complete sample data package to the Agency.

VOA Table of Holding Time Violations

Sample ID	Sample Matrix	Date Lab Received	Date Analyzed

YES NO N/A

ACTION: If technical holding times have been exceeded, flag all results unusable ("R").

6.0 Leak Test Evaluation

6.1 All canisters are leak tested prior to each sampling use.
Form IX/Equivalent - summarizes the canister certification for each canister. The initial gauge pressure should be approximately 206 kPa (30 psi) with zero air.

Did the pressure test not vary by more than ± 13.8 kPa (± 2 psi) over the 24 hours period? ___ [✓] ___

ACTION: If the canister does not meet the leak-tight criteria all results should be flagged "R".

7.0 Canister Certification Form IX/Equivalent

1 Missing, canister-902

7.1 Blank Analysis

All canisters have to be checked after cleaning.

Were the target analytes < 0.2 ppbV? [✓] ___ ___

Note: Samples with large amount of non target analytes can be valid as long as the < 0.2 ppbV criterion is met for target analytes.

ACTION: If the lab failed to do so, it should be noted under contract non-compliance. The contamination Analytes should then be rejected "R".

7.2 Is the canister certification form provided, and the associated canister sample identification included? When contamination, included contamination detected (all raw data), analyte and reference mass spectra. [✓] ___ ___

ACTION: If no, have EPA project officer/TOPO contact laboratory for missing documents.

8.0 Laboratory Control Samples

8.1 Is an LCS Data Sheet (Form III/Equivalent)

	YES	NO	N/A
present and complete for each LCS?	[✓]		
8.2 Was an LCS prepared (10ppbv) and analyzed at the required frequency (once per 24 hour analytical sequence, and concurrently with the samples in the SDG)?	[✓]		
ACTION: Call lab for explanation/resubmittals. If missing deliverables or information is unavailable, document the effect in the data assessment.			
8.3 Are there any transcription/calculation errors between the raw data and Form III/Equivalent? Check LCS target compound recoveries.		[✓]	
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document the effects in the data assessment.			
8.4 Is the % recovery within 70-130 % for each LCS <u>target compound</u> reported on Form III/Equivalent?	[✓]		
ACTION: Professional judgement should be used to qualify the impact on sample data, if the recoveries are outside the given limits.			
8.5 Is the RT of <u>each reported LCS compound</u> within the windows established during the most recent valid calibration?	[✓]		
If the most recent calibration is the initial calibration use mid level standard (10 ppbv).			
ACTION: Professional judgement should be used to qualify sample data, if retention times differ by more than 20 seconds.			
8.6 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]		
ACTION: If not, see Sections 18.1 and 18.2.			
ACTION: Circle outliers in red.			
ACTION: 1. If any LCS compounds are outside the specified limits, the associated sample results for the <u>outlying compounds</u> should be qualified as indicated in			

YES NO N/A

Table 1 below.

2. If the absolute RT for any LCS compound is outside the established windows, then qualify positive results and non-detects in the associated environmental sample data for that LCS compound(s) (See Table 2). All non-LCS compounds should be qualified using professional judgement.

Laboratory Control Samples

TABLE 1

The following table summarizes the LCS criteria and the data qualification guidelines for all associated field samples.

LCS	NOT QUALIFIED	J	R
% RECOVERY			
ects	70 - 130%	< 70%, > 130%	
Non-detects	≥ 130%	50 - 69%	< 50%
ABSOLUTE RT OF LCS COMPOUNDS			
LCS Compounds in samples RT: (min)	± 0.33		> ± 0.33

9.0 GC/MS Instrument Performance Check

9.1 Are the GC/MS Instrument Performance Check Forms (Form V/Equivalent) present for Bromofluorobenzene (BFB)? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the 50 ng BFB provided for each twenty four hour shift? ☑ ___ ___

9.3 Has the instrument performance compound been analyzed for every twenty four hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample

YES NO N/A

analysis for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

9.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

9.8 Are the spectra of the mass calibration compound acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, or qualified.

10.0 Performance Evaluation Sample (Optional)

	YES	NO	N/A
10.1 The PE sample will assist the Agency in monitoring Contractor performance. The lab will not be informed as to which compounds are contained in the PE samples or the concentrations. Was a PE sample submitted from the Agency with each SDG?	[✓]	___	___
10.2 PE samples must be validated like environmental samples. There is no holding time for PE samples. If the data results do not comply with the Agencies' spike results use professional judgement together with other QC criteria in order to determine usability of the other data in the SDG. If the associated data was rejected because of PE results, the EPA technical project officer must be notified.			
10.3 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]	___	___

ACTION: If not, see Sections 18.1 and 18.2.

11.0 Laboratory Method Blanks

	YES	NO	N/A
11.1 Is an Analysis Data Sheet (Form IV/Equivalent) present and complete for each method blank?	[✓]	___	___
11.2 Frequency of analysis:			
Has a method blank analysis been reported per instrument for each 24-hour analytical sequence?	[✓]	___	___
Has a method blank been analyzed after the initial calibration or a valid calibratio check standard, and before the LCS, prior to sample analysis?	[✓]	___	___

ACTION: If any blank data are missing, call lab for explanation/resubmittals. If missing deliverables are unavailable, reject ("R") all positive data.

	YES	NO	N/A
11.3 Chromatography: review the blank raw data - chromatograms, quant reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	[✓]	___	___

ACTION: Use professional judgement to determine the effect on the data.

	YES	NO	N/A
11.4 Were the area response of each Internal Standards (IS) in the blank within ± 40% of the mean area response of the IS of the most recent valid calibration?	[✓]	___	___

	YES	NO	N/A
Were the RT of each IS within ± 0.33 min (20 sec.) between blanks & most recent valid calibration	[✓]	___	___

ACTION: If not, see section 18.1 and 18.2.

12.0 Blank Contamination

12.1 Do any method blanks have positive target and non-target VOA results ?	___	[✓]	___

ACTION: Use Table 2 below to qualify samples with target compound results also present in the associated blank. Use the largest value from all the associated method blanks if more than one method blank was run.

VOA Laboratory Blanks TABLE 2

SAMPLES	NOT QUALIFIED	U
Target compounds	> 5 x Blank Level	≤ 5 x Blank Level *

*** If sample result is also less than CRQL, report as not detected (U) at [CRQL]. Note that the dilution factor has to be taken into account when calculating the Blank Level.**

13.0 Target Compound Analytes

13.1 Are the Organic Analysis Data Sheets (Form I-, Equivalent), VOA chromatograms, and data system printouts present and complete with required header information for each of the following:			
a. Samples?	[✓]	___	___
b. Method blanks?	[✓]	___	___
c. Laboratory Control Sample (LCS)?	[✓]	___	___
d. Performance Evaluation Sample (PES)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

13.2 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[ ]	___	___
b. Resolution?	[ ]	___	___
c. Peak shape?	[ ]	___	___
d. Full-scale graph (attenuation)?	[ ]	___	___

	YES	NO	N/A
e. Other:	[ ]		
13.3 Were any electropositive displacement (negative peaks) or unusual peaks seen?		[ ]	
ACTION: Use professional judgement to determine the acceptability of the data. Address comments under "System Performance" section of data assessment.			
13.4 Is the sample component relative retention time (RRT) within ± 0.06 RRT units of the RRT of the standard component from the most recent continuing calibration?	[ ]		
NOTE: If the most recent calibration is a calibration curve, the mean RRT (RRT) should be used for comparison.			
ACTION: If the above criteria is not met, professional judgement should be used to qualify sample data.			
13.5 Was Nafion dryer used?		[ ]	
ACTION: In cases where Nafion tubing is used to dry the sample stream, polar target and non target compounds must not be reported.			
ACTION: Reject all polar compounds if reported as non detects. Polar compounds reported as positive hits should be flagged "J".			

14.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
14.1 Are all Tentatively Identified Compound Forms (Form I-TIC) present and are retention time, estimated concentration and "JN" qualifier listed corresponding to each TIC?	[ ]		
14.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following?			
a. Samples	[ ]		
b. Blanks	[ ]		
ACTION: If any TIC data are missing, take action specified in 1.1 above.			

	YES	NO	N/A
ACTION: Add "JN" qualifier if missing.			
14.3 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
14.4 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	___	✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Also, when a compound is not found in any blanks, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (e.g., Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Aldol Condensation Products, Solvent Preservatives, and related by products.

15.0 Initial Calibration and System Performance (Form VI/Equivalent)

15.1 Were each GC/MS system calibrated at 5 concentrations that span the monitoring range of interest in an initial calibration sequence to determine the sensitivity and the linearity of the GC/MS response for the target compounds?	[✓]	___	___
ACTION: If any calibration standard forms or raw data are missing, take action specified in section 1.1 above.			
15.2 Was the same volume introduced into the trap consistently for all field and QC-sample analyses?	[✓]	___	___
15.3 Were the area response (Y) at each calibration level within ± 40% of the mean area response (mean Y) over the initial calibration range for each Internal Standard?	[✓]	___	___

Did the laboratory tabulate the area response (Y) of the primary ions and the corresponding concen-

	YES	NO	N/A
tration for each compound and Internal Standard?	[✓]	___	___

ACTION: If the range exceeds ± 40% for particular compounds, flag these compounds "J" for positive and non-detects in the associated samples. If the %RSDs exceeds ± 90%, associated sample non-detect compounds should be rejected (R) and associated hits as estimate (J).

	YES	NO	N/A
15.4 Are the relative retention times (RRT) for each of the target compounds at each calibration level within ± 0.06 RRT units of the mean relative retention time for the compound?	[✓]	___	___

ACTION: If no, reject the associated sample compounds.

	YES	NO	N/A
15.5 Are all individual RRF and average RRFs ≥ 0.050?	[✓]	___	___

NOTE: For the following compounds the individual RRF and average RRF must be ≥ 0.01.

2-Butanone
Carbon disufide
Chlorethane
Chlormethane
1,2-Dibromoethane
1,2-Dichloropropane
1,4-Dioxane
1,2-Dibromo-3-chloropropane
Methylene chloride

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 9 compounds in 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

	YES	NO	N/A
15.6 Are response factors (RF) stable i.e. % Relative Standard Deviation (%RSD) ≤30.0% with at most two exceptions up to limit of ± 40%?	[✓]	___	___

ACTION: Circle all outliers in red.

ACTION: If %RSD > 30.0%, qualify associated positive results for that analytes "J" and non-detects

	YES	NO	N/A
are not qualified. When RSD > 90%, flag all non-detects for that analytes R (unusable) and associate positive values as estimate (J).			
NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.			
15.7 Are there any transcription/calculation errors in the reporting of average response factors (RRFs) or %RSDs? (Check at least 2 values, but if errors are found, check more.)		✓	
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effects in data assessment.			
15.8 Are the RT shift for each Internal Standard (IS) at each calibration level within 20s of the mean RT over the initial calibration range of each IS?	✓		

16.0 <u>Daily Calibration (Form VII/Equivalent)</u>

	YES	NO	N/A
16.1 Are the daily Calibration Forms (Form VII/Equivalent) present and complete for the volatile fraction?	✓		
16.2 Has a daily calibration standard (10 ppbv) been analyzed for every twenty four hours of sample analysis per instrument after the BFB tuning analysis?	✓		

ACTION: List below all sample analyses that were not within 24 hours of the daily calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no daily calibration standard has been analyzed within 24 hours of every sample analysis, call lab for explanation/resubmittal.
If daily calibration data are not available,

	YES	NO	N/A
flag all associated sample data as unuable ("R").			
16.3 Do any volatile compounds have a % Difference (% D) between the initial and daily RRFs which exceed the ± 30% criteria?		✓	
ACTION: Circle all outliers in red.			
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When % D is above 90%, reject non-detects as R) unusable and associated positive values (J).			
16.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %difference (%D) between initial and daily RRFs? (Check at least two values but if errors are found, check more.)		✓	
ACTION: Circle errors in red.			
ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance".			

17.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
17.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct average RRF of the initial calibration was used to calculate Form I results.	✓		
17.2 Are the reported detection limits adjusted to reflect sample dilutions?	✓		
ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance" of the data assessment.			
NOTE: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC accedence dictates the use of the higher CRQL data from the diluted sample analysis). Cross out "E" from the original analysis. Replace the concentrations in the original analysis with the ones from the diluted sample. Specify which Form I is to be used. Draw a red "X" across the entire			

	YES	NO	N/A
page of all Form I's that should not be used, including any in the summary package.			
17.3 Have any target compound concentrations exceeded the calibration range of the GC?		[✓]	
ACTION: If yes, flag as estimated ("J").			
17.4 Was more than one method of quantitation used to calculate sample results within a batch or 24 hr. analytical sequence?		[✓]	
17.5 Did the lab report the target compounds below CRQLs with the suffix "J"?	[✓]		
ACTION: When appropriate, include suffix "J".			

18.0 Internal Standard (Form VIII/Equivalent)

	YES	NO	N/A
18.1 Are the 3 internal standard areas (Form VIII) of every sample, LCS, PE, and blank within the upper and lower limits (+40% to -40%) for each continuing calibration or 10 ppbv level of initial calibration?	[✓]		

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION:
1. If the internal standard area count is outside the limit, flag all positive results quantitated with this internal standard with a "J."
2. Non-detects associated with IS area counts > 40% are not qualified.
3. If IS area is below the lower limit (< 40%), qualify all associated non-detects (U values) "J". If extremely low area counts are reported, (< 25%), or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

	YES	NO	N/A
18.2 Are the internal standard retention times in each sample, LCS, PE, and blank within 20 seconds of the corresponding retention times in the associated calibration standard?	✓		

ACTION: Professional judgement should be used to qualify sample data if the internal standard retention times differ by more than 20 seconds.

19.0 Mass Spectral Interpretation/Identification

19.1 Are the Organic Analysis Data Sheets present with required header information on each page, for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	✓		
b. Laboratory Control Samples?	✓		
c. Blanks?	✓		

19.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	✓		
b. Laboratory Control Samples	✓		
c. Blanks?	✓		

ACTION: If any data are missing, take action specified in 1.1 above.

19.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
a. Baseline stability?	✓		
b. Resolution?	✓		
c. Peak shape?	✓		
d. Full-scale graph (attenuation)?	✓		
e. Other: _____?			✓

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
19.4 Are the lab-generated standard mass spectra of the identified compounds present for each sample?	[✓]		

ACTION: If any mass spectra are missing, take action as specified in 1.1 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment.

19.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]		
19.6 Are all ions present in the reference standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]		
19.7 Do sample and reference standard relative ion intensities agree within ±20%?	[✓]		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 19.5, 19.6, and 19.7

20.0 Field Duplicates

20.1 Were any field duplicates submitted for VOA analysis?	[ ]		[✓]

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Note the RPD value in the data assessment.

YES NO N/A

DATA ASSESSMENT

This Data Assessment is based on USEPA Region II SOP HW- : Volatile Organics Analysis of Ambient Air in Canisters by Method TO-15, May 2004.

Case No. _____ **SDG No.** 06W5085C **LABORATORY:** Air Toxics

SITE : UIP

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U"(non-detects), "R" (unusable), or "N" (presumptive). All action is detailed on the following sheets.

The following facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error. In addition the "N" flag shows that the analysis indicates the presence of an analyte for which there is presumption evidence to make a "tentative identifiction."

All actions are detailed below and on the attached sheets:

Overall Assessment:

	YES	NO	N/A

Contract Non-Compliance:

Reviewer's Signature: _____ Date: 6 / 15 / 20 06

Verified By: _____ Date: ____/____/20__

RECEIVED
JUN 08 2006
HAZ. WASTE SUPPORT SEC.

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
Modified TO-15
US EPA Region II
Workorder# 0605085D

Three 6 Liter Summa Canister (100% Certified) samples were received on May 04, 2006. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The reported LCS for each daily batch has been derived from more than one analytical file.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified

b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

RECEIVED
JUN 08 2006
HAZ. WASTE SUPPORT SEC.

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
Modified TO-15
US EPA Region II
Workorder# 0605085C

Eight 6 Liter Summa Canister (100% Certified) and One 6 Liter Summa Canister (SIM Certified) samples were received on May 04, 2006. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 1.0 liter of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
ICAL %RSD acceptance criteria	+- 30% RSD with 2 compounds allowed out to < 40% RSD	30% RSD with 4 compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	</= 30% Difference with four allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request

Receiving Notes

The Chain of Custody contained incorrect method information for sample 4191. ATL proceeded with the analysis as per the original contract or verbal agreement.

Analytical Notes

The reported LCS and LCSD for each daily batch has been derived from more than one analytical file.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

DATE: 05/30/06
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section (HWSS)/RSCC
TO: HWSS ESAT-TOPO

Attached is the following Non-RASData Package to be reviewed for Quality Assurance

SITE: VIP Cleaners **CASE #: N/A**

SDG#: 0605085A, 0605085B

SAMPLER: US EPA

		#SAMPLES	MATRIX
PROJ. CODE: RS	**SITE SPILL #: 02XN**		
LAB: Air Toxics	**OPERABLE UNIT: 01**	31	AIR
TURN-AROUND-TIME: 14 day			

CERCLIS ID # : **FRACTION:** VOCs

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	**Date/Time**	**Signature**	**Date/Time**
[illegible]	6/1/06	[illegible]	6/1/06
[illegible]	1130 6/6/06	[illegible]	6/06/06 11 30 AM

SOP NO. HW-31

STANDARD OPERATING PROCEDURE

FOR

VALIDATING

VOLATILE ORGANIC ANALYSIS OF AMBIENT AIR IN CANISTER

BY METHOD TO-15

Revision 3, April 2006

By: _____ Date: 4/5/06
George Karras, Chemist
Hazardous Waste Support Section

By: _____ Date: 4/11/06
Avraham Teitz, Environmental Scientist
Air and Water QA Team

By: _____ Date: 4/5/06
Russell Arnone, Chemist
Hazardous Waste Support Section

CONCURRED BY: _____ Date: 4/5/06
Linda Mauel
Hazardous Waste Support Section

APPROVED BY: _____ Date: _____
Robert Runyon, Chief
Hazardous Waste Support Branch

	YES	NO	N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ SDG(s): 0605085A

SITE: VIP LAB: Airtoxics

This Region II SOP document is based on Method TO-15: Determination of Volatile Organics Compounds (VOCs) in Air Collected in Specially-Prepared Canisters & Analyzed by Gas Chromatography/Mass Spectrometry, January 1999.

1.0 Data Completeness and Deliverables

1.1 Have any missing deliverables been received and added to the data package?	[✓]		✓

ACTION: Contact lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effect under "Contract Problems/ Non-Compliance" section of data assessment report.

2.0 Cover Letter, Narrative, and Data Reporting Forms

2.1 Is the Lab. Narrative and Cover Page present?	[✓]		
2.2 Is Case Number contained in the Narrative?	[ ]	✓	
2.3 Are the following Data Reporting Forms present?			
Analysis Data Sheet [Form I/Equivalent]	[✓]		
Tentatively Identified Compounds [Form I-TIC]	[✓]		✓
Blank Summary [Form IV/Equivalent]	[✓]		
Laboratory Control Sample Data Sheet [Form III/Equivalent]	[✓]		
GC/MS Instrument Performance Check and Mass Calibration [Form V/Equivalent]	[✓]		
Initial Calibration [Form VI/Equivalent]	[✓]		
Continuing Calibration [Form VII/Equivalent]	[✓]		
Internal Standard Area and RT Summary [Form VIII/Equivalent]	[✓]		

	YES	NO	N/A
Canister Certification [Form IX/Equivalent]	[✓]	___	___

3.0 Canister Receipt/Log-in Sheet

Receipt of each canister is recorded in a laboratory notebook dedicated to this use. The sample receipt/log-in sheet must demonstrate that the information on custody records, traffic reports, and sample tags agree for each sample.

3.1 Do all info items agree with each sample ?	[✓]	___	___

ACTION: If these documents are not consistent, contact Project officer or laboratory and attach a record of resolution.

4.0 Traffic Reports and Laboratory Narrative

4.1 Are the Traffic Report Forms present for all samples?	[✓]	___	___

ACTION: If no, contact lab for replacement of missing or illegible copies.

5.0 Holding Times

5.1 Have any VOA technical holding times of 30 days, determined from the date of sample collection to the date of analysis, been exceeded?	___	[✓]	___

NOTE: The contract requires that samples must be retained from verified time sample receipt (VTSR) until 45 days after delivery of a complete sample data package to the Agency.

VOA Table of Holding Time Violations

Sample ID	Sample Matrix	Date Lab Received	Date Analyzed

YES NO N/A

ACTION: If technical holding times have been exceeded, flag all results unusable ("R").

6.0 Leak Test Evaluation

6.1 All canisters are leak tested prior to each sampling use.
Form IX/Equivalent - summarizes the canister certification for each canister. The initial gauge pressure should be approximately 206 kPa (30 psi) with zero air.

Did the pressure test not vary by more than ± 13.8 kPa (± 2 psi) over the 24 hours period? ___ [ ] ___

No record of

ACTION: If the canister does not meet the leak-tight criteria all results should be flagged "R".

7.0 Canister Certification Form IX/Equivalent

7.1 Blank Analysis

All canisters have to be checked after cleaning.

Were the target analytes < 0.2 ppbV? [✓] ___ ___

Note: Samples with large amount of non target analytes can be valid as long as the < 0.2 ppbV criterion is met for target analytes.

ACTION: If the lab failed to do so, it should be noted under contract non-compliance. The contamination Analytes should then be rejected "R".

7.2 Is the canister certification form provided, and the associated canister sample identification included? When contamination, included contamination detected (all raw data), analyte and reference mass spectra. [✓] ___ ___

ACTION: If no, have EPA project officer/TOPO contact laboratory for missing documents.

8.0 Laboratory Control Samples

8.1 Is an LCS Data Sheet (Form III/Equivalent)

	YES	NO	N/A
present and complete for each LCS?	[✓]	___	___
8.2 Was an LCS prepared (10ppbv) and analyzed at the required frequency (once per 24 hour analytical sequence, and concurrently with the samples in the SDG)?	[✓]	___	___

ACTION: Call lab for explanation/resubmittals. If missing deliverables or information is unavailable, document the effect in the data assessment.

	YES	NO	N/A
8.3 Are there any transcription/calculation errors between the raw data and Form III/Equivalent? Check LCS target compound recoveries.	___	[✓]	___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document the effects in the data assessment.

	YES	NO	N/A
8.4 Is the % recovery within 70-130 % for each LCS target compound reported on Form III/Equivalent?	[ ]	[✓]	___

LCS 1,2,4 Trichlorobenzene 108%

ACTION: Professional judgement should be used to qualify the impact on sample data, if the recoveries are outside the given limits.

LCSD 1,2,4 210% hexachlorobenz 136%

	YES	NO	N/A
8.5 Is the RT of each reported LCS compound within the windows established during the most recent valid calibration?	[✓]	___	___

If the most recent calibration is the initial calibration use mid level standard (10 ppbv).

ACTION: Professional judgement should be used to qualify sample data, if retention times differ by more than 20 seconds.

	YES	NO	N/A
8.6 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]	___	___

ACTION: If not, see Sections 18.1 and 18.2.

ACTION: Circle outliers in red.

ACTION: 1. If any LCS compounds are outside the specified limits, the associated sample results for the outlying compounds should be qualified as indicated in

YES NO N/A

Table 1 below.

2. If the absolute RT for any LCS compound is outside the established windows, then qualify positive results and non-detects in the associated environmental sample data for that LCS compound(s) (See Table 2). All non-LCS compounds should be qualified using professional judgement.

Laboratory Control Samples

TABLE 1

The following table summarizes the LCS criteria and the data qualification guidelines for all associated field samples.

LCS	NOT QUALIFIED	J	R
% RECOVERY			
Detects	70 - 130%	< 70%, > 130%	
Non-detects	≥ 130%	50 - 69%	< 50%
ABSOLUTE RT OF LCS COMPOUNDS			
LCS Compounds in samples RT: (min)	± 0.33		> ± 0.33

9.0 GC/MS Instrument Performance Check

9.1 Are the GC/MS Instrument Performance Check Forms (Form V/Equivalent) present for Bromofluorobenzene (BFB)? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the 50 ng BFB provided for each twenty four hour shift? [✓] ___ ___

9.3 Has the instrument performance compound been analyzed for every twenty four hours of sample analysis per instrument? [✓] ___ ___

ACTION: List date, time, instrument ID, and sample

YES NO N/

analysis for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

9.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

9.8 Are the spectra of the mass calibration compound acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, or qualified.

10.0 **Performance Evaluation Sample (Optional)**

	YES	NO	N/A
10.1 The PE sample will assist the Agency in monitoring Contractor performance. The lab will not be informed as to which compounds are contained in the PE samples or the concentrations. Was a PE sample submitted from the Agency with each SDG?	[✓]	___	___
10.2 PE samples must be validated like environmental samples. There is no holding time for PE samples. If the data results do not comply with the Agencies' spike results use professional judgement together with other QC criteria in order to determine usability of the other data in the SDG. If the associated data was rejected because of PE results, the EPA technical project officer must be notified.			
10.3 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]	___	___

ACTION: If not, see Sections 18.1 and 18.2.

11.0 Laboratory Method Blanks

11.1 Is an Analysis Data Sheet (Form IV/Equivalent) present and complete for each method blank?	[✓]	___	___
11.2 Frequency of analysis:			
Has a method blank analysis been reported per instrument for each 24-hour analytical sequence?	[✓]	___	___
Has a method blank been analyzed after the initial calibration or a valid calibratio check standard, and before the LCS, prior to sample analysis?	[✓]	___	___

ACTION: If any blank data are missing, call lab for explanation/resubmittals. If missing deliverables are unavailable, reject ("R") all positive data.

11.3 Chromatography: review the blank raw data - chromatograms, quant reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	[✓]	___	___

ACTION: Use professional judgement to determine the effect on the data.

11.4 Were the area response of each Internal Standards (IS) in the blank within ± 40% of the mean area response of the IS of the most recent valid calibration?	[✓]	___	___

	YES	NO	N/
Were the RT of each IS within ± 0.33 min (20 sec.) between blanks & most recent valid calibration	[✓]	___	___

ACTION: If not, see section 18.1 and 18.2.

12.0 Blank Contamination

12.1 Do any method blanks have positive target and non-target VOA results ?	___	[✓]	___

ACTION: Use Table 2 below to qualify samples with target compound results also present in the associated blank. Use the largest value from all the associated method blanks if more than one method blank was run.

VOA Laboratory Blanks TABLE 2

SAMPLES	NOT QUALIFIED	U
Target compounds	> 5 x Blank Level	≤ 5 x Blank Level *

*** If sample result is also less than CRQL, report as not detected (U) at [CRQL]. Note that the dilution factor has to be taken into account when calculating the Blank Level.**

13.0 Target Compound Analytes

13.1 Are the Organic Analysis Data Sheets (Form I-, Equivalent), VOA chromatograms, and data system printouts present and complete with required header information for each of the following:			
a. Samples?	[✓]	___	___
b. Method blanks?	[✓]	___	___
c. Laboratory Control Sample (LCS)?	[✓]	___	___
d. Performance Evaluation Sample (PES)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

13.2 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph (attenuation)?	[✓]	___	___

	YES	NO	N/A
e. Other:	[ ]	✓	
13.3 Were any electropositive displacement (negative peaks) or unusual peaks seen?		[✓]	

ACTION: Use professional judgement to determine the acceptability of the data. Address comments under "System Performance" section of data assessment.

13.4 Is the sample component relative retention time (RRT) within ± 0.06 RRT units of the RRT of the standard component from the most recent continuing calibration?	[✓]		

NOTE: If the most recent calibration is a calibration curve, the mean RRT (RRT) should be used for comparison.

ACTION: If the above criteria is not met, professional judgement should be used to qualify sample data.

13.5 Was Nafion dryer used?		[✓]	

ACTION: In cases where Nafion tubing is used to dry the sample stream, polar target and non target compounds must not be reported.

ACTION: Reject all polar compounds if reported as non detects. Polar compounds reported as positive hits should be flagged "J".

14.0 Tentatively Identified Compounds (TIC)

14.1 Are all Tentatively Identified Compound Forms (Form I-TIC) present and are retention time, estimated concentration and "JN" qualifier listed corresponding to each TIC?	[ ]		✓
14.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following?			
a. Samples	[ ]		✓
b. Blanks	[ ]		✓

ACTION: If any TIC data are missing, take action specified in 1.1 above.

YES NO N/A

ACTION: Add "JN" qualifier if missing.

14.3 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum? [ ] ___ ___

14.4 Do TIC and "best match" standard relative ion intensities agree within 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Also, when a compound is not found in any blanks, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (e.g., Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Aldol Condensation Products, Solvent Preservatives, and related by products.

15.0 Initial Calibration and System Performance (Form VI/Equivalent)

15.1 Were each GC/MS system calibrated at 5 concentrations that span the monitoring range of interest in an initial calibration sequence to determine the sensitivity and the linearity of the GC/MS response for the target compounds? [✓] ___ ___

ACTION: If any calibration standard forms or raw data are missing, take action specified in section 1.1 above.

15.2 Was the same volume introduced into the trap consistently for all field and QC-sample analyses? [✓] ___ ___

15.3 Were the area response (Y) at each calibration level within ± 40% of the mean area response (mean Y) over the initial calibration range for each Internal Standard? [✓] ___ ___

Did the laboratory tabulate the area response (Y) of the primary ions and the corresponding concen-

	YES	NO	N/A
tration for each compound and Internal Standard?	[✓]	___	___

ACTION: If the range exceeds ± 40% for particular compounds, flag these compounds "J" for positive and non-detects in the associated samples. If the %RSDs exceeds ± 90%, associated sample non-detect compounds should be rejected (R) and associated hits as estimate (J).

15.4 Are the relative retention times (RRT) for each of the target compounds at each calibration level within ± 0.06 RRT units of the mean relative retention time for the compound?	[✓]	___	___

ACTION: If no, reject the associated sample compounds.

15.5 Are all individual RRF and average RRFs ≥ 0.050?	[✓]	___	___

NOTE: For the following compounds the individual RRF and average RRF must be ≥ 0.01.

2-Butanone
Carbon disufide
Chlorethane
Chlormethane
1,2-Dibromoethane
1,2-Dichloropropane
1,4-Dioxane
1,2-Dibromo-3-chloropropane
Methylene chloride

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 9 compounds in 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

15.6 Are response factors (RF) stable i.e. % Relative Standard Deviation (%RSD) ≤30.0% with at most two exceptions up to limit of ± 40%?	[ ]	___	___

ACTION: Circle all outliers in red.

ACTION: If %RSD > 30.0%, qualify associated positive results for that analytes "J" and non-detects

YES NO N/

are not qualified. When RSD > 90%, flag all non-detects for that analytes R (unusable) and associate positive values as estimate (J).

NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.

15.7 Are there any transcription/calculation errors in the reporting of average response factors (RRFs) or %RSDs? (Check at least 2 values, but if errors are found, check more.) ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effects in data assessment.

15.8 Are the RT shift for each Internal Standard (IS) at each calibration level within 20s of the mean RT over the initial calibration range of each IS? [✓] ___ ___

16.0 Daily Calibration (Form VII/Equivalent)

NO Recovery

16.1 Are the daily Calibration Forms (Form VII/Equivalent) present and complete for the volatile fraction? [✓] ___ ___

16.2 Has a daily calibration standard (10 ppbv) been analyzed for every twenty four hours of sample analysis per instrument after the BFB tuning analysis? [✓] ___ ___

ACTION: List below all sample analyses that were not within 24 hours of the daily calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no daily calibration standard has been analyzed within 24 hours of every sample analysis, call lab for explanation/resubmittal.
If daily calibration data are not available,

	YES	NO	N/A
flag all associated sample data as unuable ("R").			
16.3 Do any volatile compounds have a % Difference (% D) between the initial and daily RRFs which exceed the ± 30% criteria?	✓	[ ]	
ACTION: Circle all outliers in red.	1,2,4 Trichlorobenzen ~~100%~~ ~~162%~~ -61.5		
ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When % D is above 90%, reject non-detects as R) unusable and associated positive values (J).	1,2,4		
16.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %difference (%D) between initial and daily RRFs? (Check at least two values but if errors are found, check more.)		[✓]	
ACTION: Circle errors in red.			
ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance".			

17.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
17.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct average RRF of the initial calibration was used to calculate Form I results.	[ ]		
17.2 Are the reported detection limits adjusted to reflect sample dilutions?	[ ]		

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance" of the data assessment.

NOTE: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC accedence dictates the use of the higher CRQL data from the diluted sample analysis). Cross out "E" from the original analysis. Replace the concentrations in the original analysis with the ones from the diluted sample. Specify which Form I is to be used. Draw a red "X" across the entire

	YES	NO	N/A
page of all Form I's that should not be used, including any in the summary package.			
17.3 Have any target compound concentrations exceeded the calibration range of the GC?	___	[✓]	___
ACTION: If yes, flag as estimated ("J").			
17.4 Was more than one method of quantitation used to calculate sample results within a batch or 24 hr. analytical sequence?	___	[✓]	___
17.5 Did the lab report the target compounds below CRQLs with the suffix "J"?	[✓]	___	___
ACTION: When appropriate, include suffix "J".			

18.0 Internal Standard (Form VIII/Equivalent)

	YES	NO	N/A
18.1 Are the 3 internal standard areas (Form VIII) of every sample, LCS, PE, and blank within the upper and lower limits (+40% to -40%) for each continuing calibration or 10 ppbv level of initial calibration?	[✓]	___	___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION:

1. If the internal standard area count is outside the limit, flag all positive results quantitated with this internal standard with a "J."
2. Non-detects associated with IS area counts > 40% are not qualified.
3. If IS area is below the lower limit (< 40%), qualify all associated non-detects (U values) "J". If extremely low area counts are reported, (< 25%), or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

	YES	NO	N/A
18.2 Are the internal standard retention times in each sample, LCS, PE, and blank within 20 seconds of the corresponding retention times in the associated calibration standard?	[✓]	___	___

ACTION: Professional judgement should be used to qualify sample data if the internal standard retention times differ by more than 20 seconds.

19.0 Mass Spectral Interpretation/Identification

	YES	NO	N/A
19.1 Are the Organic Analysis Data Sheets present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples?	[✓]	___	___
c. Blanks?	[✓]	___	___
19.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples	[✓]	___	___
c. Blanks?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

	YES	NO	N/A
19.3 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph (attenuation)?	[✓]	___	___
e. Other: _____?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
19.4 Are the lab-generated standard mass spectra of the identified compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 1.1 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment.

19.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
19.6 Are all ions present in the reference standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
19.7 Do sample and reference standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 19.5, 19.6, and 19.7

20.0 Field Duplicates

20.1 Were any field duplicates submitted for VOA analysis?	[✓]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Note the RPD value in the data assessment.

YES NO N/A

DATA ASSESSMENT

This Data Assessment is based on USEPA Region II SOP HW- : Volatile Organics Analysis of Ambient Air in Canisters by Method TO-15, May 2004.

Case No. _____ **SDG No.** 06050850A **LABORATORY:** AirToxics

SITE : UIP

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U"(non-detects), "R" (unusable), or "N" (presumptive). All action is detailed on the following sheets.

The following facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error. In addition the "N" flag shows that the analysis indicates the presence of an analyte for which there is presumption evidence to make a "tentative identifiction."

All actions are detailed below and on the attached sheets:

Overall Assessment:

YES NO N/

Contract Non-Compliance:

Reviewer's Signature: _____ Date: 6 / 2 /2006

Verified By: _____ Date: ____/____/20__

UIP
B

SOP NO. HW-31

STANDARD OPERATING PROCEDURE

FOR

VALIDATING

VOLATILE ORGANIC ANALYSIS OF AMBIENT AIR IN CANISTER

BY METHOD TO-15

Revision 3, April 2006

By: George Karras Date: 4/5/06
George Karras, Chemist
Hazardous Waste Support Section

By: Avraham Teitz Date: 4/11/06
Avraham Teitz, Environmental Scientist
Air and Water QA Team

By: Russell Arnone Date: 4/5/06
Russell Arnone, Chemist
Hazardous Waste Support Section

CONCURRED BY: Linda M. Mauel Date: 4/5/06
Linda Mauel
Hazardous Waste Support Section

APPROVED BY: Robert Runyon Date: 4/7/06
Robert Runyon, Chief
Hazardous Waste Support Branch

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ SDG(s): 0605085B

SITE: VIP LAB: Air Toxics

This Region II SOP document is based on Method TO-15: Determination of Volatile Organics Compounds (VOCs) in Air Collected in Specially-Prepared Canisters & Analyzed by Gas Chromatography/Mass Spectrometry, January 1999.

1.0 Data Completeness and Deliverables

1.1 Have any missing deliverables been received and added to the data package? [✓] ___ ___

ACTION: Contact lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effect under "Contract Problems/ Non-Compliance" section of data assessment report.

2.0 Cover Letter, Narrative, and Data Reporting Forms

2.1 Is the Lab. Narrative and Cover Page present? [✓] ___ ___

2.2 Is Case Number contained in the Narrative? [✓] ___ ___

2.3 Are the following Data Reporting Forms present?

Analysis Data Sheet [Form I/Equivalent] [✓] ___ ___

Tentatively Identified Compounds [Form I-TIC] [✓] ___ ___

Blank Summary [Form IV/Equivalent] [✓] ___ ___

Laboratory Control Sample Data Sheet [Form III/Equivalent] [✓] ___ ___

GC/MS Instrument Performance Check and Mass Calibration [Form V/Equivalent] [✓] ___ ___

Initial Calibration [Form VI/Equivalent] [✓] ___ ___

Continuing Calibration [Form VII/Equivalent] [✓] ___ ___

Internal Standard Area and RT Summary [Form VIII/Equivalent] [✓] ___ ___

	YES	NO	N/A
Canister Certification [Form IX/Equivalent]	[✓]	___	___

3.0 **Canister Receipt/Log-in Sheet**

Receipt of each canister is recorded in a laboratory notebook dedicated to this use. The sample receipt/log-in sheet must demonstrate that the information on custody records, traffic reports, and sample tags agree for each sample.

3.1 Do all info items agree with each sample ?	[✓]	___	___

ACTION: If these documents are not consistent, contact Project officer or laboratory and attach a record of resolution.

4.0 **Traffic Reports and Laboratory Narrative**

4.1 Are the Traffic Report Forms present for all samples?	[✓]	___	___

ACTION: If no, contact lab for replacement of missing or illegible copies.

5.0 **Holding Times**

5.1 Have any VOA technical holding times of 30 days, determined from the date of sample collection to the date of analysis, been exceeded?	___	[✓]	___

NOTE: The contract requires that samples must be retained from verified time sample receipt (VTSR) until 45 days after delivery of a complete sample data package to the Agency.

VOA Table of Holding Time Violations

Sample ID	Sample Matrix	Date Lab Received	Date Analyzed

YES NO N/A

ACTION: If technical holding times have been exceeded, flag all results unusable ("R").

6.0 Leak Test Evaluation

6.1 All canisters are leak tested prior to each sampling use.
Form IX/Equivalent - summarizes the canister certification for each canister. The initial gauge pressure should be approximately 206 kPa (30 psi) with zero air.

Did the pressure test not vary by more than ± 13.8 kPa (± 2 psi) over the 24 hours period? ___ [✓] ___

ACTION: If the canister does not meet the leak-tight criteria all results should be flagged "R".

7.0 Canister Certification Form IX/Equivalent

7.1 Blank Analysis

All canisters have to be checked after cleaning.

Were the target analytes < 0.2 ppbV? [✓] ___ ___

Note: Samples with large amount of non target analytes can be valid as long as the < 0.2 ppbV criterion is met for target analytes.

ACTION: If the lab failed to do so, it should be noted under contract non-compliance. The contamination Analytes should then be rejected "R".

7.2 Is the canister certification form provided, and the associated canister sample identification included? When contamination, included contamination detected (all raw data), analyte and reference mass spectra. [✓] ___ ___

ACTION: If no, have EPA project officer/TOPO contact laboratory for missing documents.

8.0 Laboratory Control Samples

8.1 Is an LCS Data Sheet (Form III/Equivalent)

	YES	NO	N/A
present and complete for each LCS?	[✓]		
8.2 Was an LCS prepared (10ppbv) and analyzed at the required frequency (once per 24 hour analytical sequence, and concurrently with the samples in the SDG)?	[✓]		

ACTION: Call lab for explanation/resubmittals. If missing deliverables or information is unavailable, document the effect in the data assessment.

	YES	NO	N/A
8.3 Are there any transcription/calculation errors between the raw data and Form III/Equivalent? Check LCS target compound recoveries.		[✓]	

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document the effects in the data assessment.

	YES	NO	N/A
8.4 Is the % recovery within 70-130 % for each LCS <u>target compound</u> reported on Form III/Equivalent?	[✓]		

ACTION: Professional judgement should be used to qualify the impact on sample data, if the recoveries are outside the given limits.

	YES	NO	N/A
8.5 Is the RT of <u>each reported LCS compound</u> within the windows established during the most recent valid calibration?	[✓]		

If the most recent calibration is the initial calibration use mid level standard (10 ppbv).

ACTION: Professional judgement should be used to qualify sample data, if retention times differ by more than 20 seconds.

	YES	NO	N/A
8.6 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]		

ACTION: If not, see Sections 18.1 and 18.2.

ACTION: Circle outliers in red.

ACTION: 1. If any LCS compounds are outside the specified limits, the associated sample results for the <u>outlying compounds</u> should be qualified as indicated in

YES NO N/A

Table 1 below.

2. If the absolute RT for any LCS compound is outside the established windows, then qualify positive results and non-detects in the associated environmental sample data for that LCS compound(s) (See Table 2). All non-LCS compounds should be qualified using professional judgement.

Laboratory Control Samples

TABLE 1

The following table summarizes the LCS criteria and the data qualification guidelines for all associated field samples.

LCS	NOT QUALIFIED	J	R
% RECOVERY			
Detects	70 - 130%	< 70%, > 130%	
Non-detects	≥ 130%	50 - 69%	< 50%
ABSOLUTE RT OF LCS COMPOUNDS			
LCS Compounds in samples RT: (min)	± 0.33		> ± 0.33

9.0 GC/MS Instrument Performance Check

9.1 Are the GC/MS Instrument Performance Check Forms (Form V/Equivalent) present for Bromofluorobenzene (BFB)? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the 50 ng BFB provided for each twenty four hour shift? [✓] ___ ___

9.3 Has the instrument performance compound been analyzed for every twenty four hours of sample analysis per instrument? [✓] ___ ___

ACTION: List date, time, instrument ID, and sample

	YES	NO	N/A
analysis for which no associated GC/MS tuning data are available.			

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
9.4 Have the ion abundances been normalized to m/z 95?	[✓]		

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

	YES	NO	N/A
9.5 Have the ion abundance criteria been met for each instrument used?	[✓]		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

	YES	NO	N/A
9.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		[✓]	
9.7 Have the appropriate number of significant figures (two) been reported?	[✓]		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
9.8 Are the spectra of the mass calibration compound acceptable?	[✓]		

ACTION: Use professional judgement to determine whether associated data should be accepted, or qualified.

10.0 Performance Evaluation Sample (Optional)

	YES	NO	N/A
10.1 The PE sample will assist the Agency in monitoring Contractor performance. The lab will not be informed as to which compounds are contained in the PE samples or the concentrations. Was a PE sample submitted from the Agency with each SDG?	[ ]	___	✓
10.2 PE samples must be validated like environmental samples. There is no holding time for PE samples. If the data results do not comply with the Agencies' spike results use professional judgement together with other QC criteria in order to determine usability of the other data in the SDG. If the associated data was rejected because of PE results, the EPA technical project officer must be notified.			
10.3 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[ ]	___	✓

ACTION: If not, see Sections 18.1 and 18.2.

11.0 Laboratory Method Blanks

11.1 Is an Analysis Data Sheet (Form IV/Equivalent) present and complete for each method blank?	✓	___	___
11.2 Frequency of analysis:			
Has a method blank analysis been reported per instrument for each 24-hour analytical sequence?	[✓]	___	___
Has a method blank been analyzed after the initial calibration or a valid calibratio check standard, and before the LCS, prior to sample analysis?	[✓]	___	___

ACTION: If any blank data are missing, call lab for explanation/resubmittals. If missing deliverables are unavailable, reject ("R") all positive data.

11.3 Chromatography: review the blank raw data - chromatograms, quant reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	✓	___	___

ACTION: Use professional judgement to determine the effect on the data.

11.4 Were the area response of each Internal Standards (IS) in the blank within ± 40% of the mean area response of the IS of the most recent valid calibration?	✓	___	___

	YES	NO	N/A
Were the RT of each IS within ± 0.33 min (20 sec.) between blanks & most recent valid calibration	[✓]	___	___

ACTION: If not, see section 18.1 and 18.2.

12.0 Blank Contamination

12.1 Do any method blanks have positive target and non-target VOA results ?	___	[✓]	___

ACTION: Use Table 2 below to qualify samples with target compound results also present in the associated blank. Use the largest value from all the associated method blanks if more than one method blank was run.

VOA Laboratory Blanks TABLE 2

SAMPLES	NOT QUALIFIED	U
Target compounds	> 5 x Blank Level	≤ 5 x Blank Level *

*** If sample result is also less than CRQL, report as not detected (U) at [CRQL]. Note that the dilution factor has to be taken into account when calculating the Blank Level.**

13.0 Target Compound Analytes

13.1 Are the Organic Analysis Data Sheets (Form I-, Equivalent), VOA chromatograms, and data system printouts present and complete with required header information for each of the following:			
a. Samples?	[✓]	___	___
b. Method blanks?	[✓]	___	___
c. Laboratory Control Sample (LCS)?	[✓]	___	___
d. Performance Evaluation Sample (PES)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

13.2 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph (attenuation)?	[✓]	___	___

	YES	NO	N/A
e. Other:	[✓]		
13.3 Were any electropositive displacement (negative peaks) or unusual peaks seen?		[✓]	

ACTION: Use professional judgement to determine the acceptability of the data. Address comments under "System Performance" section of data assessment.

13.4 Is the sample component relative retention time (RRT) within ± 0.06 RRT units of the RRT of the standard component from the most recent continuing calibration?	[✓]		

NOTE: If the most recent calibration is a calibration curve, the mean RRT (RRT) should be used for comparison.

ACTION: If the above criteria is not met, professional judgement should be used to qualify sample data.

13.5 Was Nafion dryer used?		[✓]	

ACTION: In cases where Nafion tubing is used to dry the sample stream, polar target and non target compounds must not be reported.

ACTION: Reject all polar compounds if reported as non detects. Polar compounds reported as positive hits should be flagged "J".

14.0 Tentatively Identified Compounds (TIC)

14.1 Are all Tentatively Identified Compound Forms (Form I-TIC) present and are retention time, estimated concentration and "JN" qualifier listed corresponding to each TIC?	[✓]		
14.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following?			
a. Samples	[✓]		
b. Blanks	[✓]		

ACTION: If any TIC data are missing, take action specified in 1.1 above.

	YES	NO	N/A
ACTION: Add "JN" qualifier if missing.			
14.3 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	✓
14.4 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	___	___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Also, when a compound is not found in any blanks, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (e.g., Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Aldol Condensation Products, Solvent Preservatives, and related by products.

15.0 Initial Calibration and System Performance (Form VI/Equivalent)

15.1 Were each GC/MS system calibrated at 5 concentrations that span the monitoring range of interest in an initial calibration sequence to determine the sensitivity and the linearity of the GC/MS response for the target compounds?	[✓]	___	___

ACTION: If any calibration standard forms or raw data are missing, take action specified in section 1.1 above.

15.2 Was the same volume introduced into the trap consistently for all field and QC-sample analyses?	[✓]	___	___
15.3 Were the area response (Y) at each calibration level within ± 40% of the mean area response (mean Y) over the initial calibration range for each Internal Standard?	[✓]	___	___

Did the laboratory tabulate the area response (Y) of the primary ions and the corresponding concen-

	YES	NO	N/A
tration for each compound and/Internal Standard?	[✓]	___	___

ACTION: If the range exceeds ± 40% for particular compounds, flag these compounds "J" for positive and non-detects in the associated samples. If the %RSDs exceeds ± 90%, associated sample non-detect compounds should be rejected (R) and associated hits as estimate (J).

15.4 Are the relative retention times (RRT) for each of the target compounds at each calibration level within ± 0.06 RRT units of the mean relative retention time for the compound?	[✓]	___	___

ACTION: If no, reject the associated sample compounds.

15.5 Are all individual RRF and average RRFs ≥ 0.050?	[✓]	___	___

NOTE: For the following compounds the individual RRF and average RRF must be ≥ 0.01.

2-Butanone
Carbon disufide
Chlorethane
Chlormethane
1,2-Dibromoethane
1,2-Dichloropropane
1,4-Dioxane
1,2-Dibromo-3-chloropropane
Methylene chloride

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 9 compounds in 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

15.6 Are response factors (RF) stable i.e. % Relative Standard Deviation (%RSD) ≤30.0% with at most two exceptions up to limit of ± 40%?	[✓]	___	___

ACTION: Circle all outliers in red.

ACTION: If %RSD > 30.0%, qualify associated positive results for that analytes "J" and non-detects

	YES	NO	N/A
are not qualified. When RSD > 90%, flag all non-detects for that analytes R (unusable) and associate positive values as estimate (J).			
NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.			
15.7 Are there any transcription/calculation errors in the reporting of average response factors (RRFs) or %RSDs? (Check at least 2 values, but if errors are found, check more.)	___	[✓]	___
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effects in data assessment.			
15.8 Are the RT shift for each Internal Standard (IS) at each calibration level within 20s of the mean RT over the initial calibration range of each IS?	[✓]	___	___

16.0 Daily Calibration (Form VII/Equivalent)

	YES	NO	N/A
16.1 Are the daily Calibration Forms (Form VII/Equivalent) present and complete for the volatile fraction?	[✓]	___	___
16.2 Has a daily calibration standard (10 ppbv) been analyzed for every twenty four hours of sample analysis per instrument after the BFB tuning analysis?	[✓]	___	___

ACTION: List below all sample analyses that were not within 24 hours of the daily calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no daily calibration standard has been analyzed within 24 hours of every sample analysis, call lab for explanation/resubmittal.
If daily calibration data are not available,

	YES	NO	N/A
flag all associated sample data as unuable ("R").			
16.3 Do any volatile compounds have a % Difference (% D) between the initial and daily RRFs which exceed the ± 30% criteria?		[✓]	

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When % D is above 90%, reject non-detects as R) unusable and associated positive values (J).

16.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %difference (%D) between initial and daily RRFs? (Check at least two values but if errors are found, check more.)		[✓]	

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance".

17.0 Compound Quantitation and Reported Detection Limits

17.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct average RRF of the initial calibration was used to calculate Form I results.	[✓]		
17.2 Are the reported detection limits adjusted to reflect sample dilutions?	[✓]		

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance" of the data assessment.

NOTE: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC accedence dictates the use of the higher CRQL data from the diluted sample analysis). Cross out "E" from the original analysis. Replace the concentrations in the original analysis with the ones from the diluted sample. Specify which Form I is to be used. Draw a red "X" across the entire

	YES	NO	N/A
page of all Form I's that should not be used, including any in the summary package.			
17.3 Have any target compound concentrations exceeded the calibration range of the GC?	✓	R ✓	
ACTION: If yes, flag as estimated ("J").			
17.4 Was more than one method of quantitation used to calculate sample results within a batch or 24 hr. analytical sequence?		✓	
17.5 Did the lab report the target compounds below CRQLs with the suffix "J"?	✓		
ACTION: When appropriate, include suffix "J".			

18.0 Internal Standard (Form VIII/Equivalent)

18.1 Are the 3 internal standard areas (Form VIII) of every sample, LCS, PE, and blank within the upper and lower limits (+40% to -40%) for each continuing calibration or 10 ppbv level of initial calibration?	✓		

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION:

1. If the internal standard area count is outside the limit, flag all positive results quantitated with this internal standard with a "J."
2. Non-detects associated with IS area counts > 40% are not qualified.
3. If IS area is below the lower limit (< 40%), qualify all associated non-detects (U values) "J". If extremely low area counts are reported, (< 25%), or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

	YES	NO	N/A
18.2 Are the internal standard retention times in each sample, LCS, PE, and blank within 20 seconds of the corresponding retention times in the associated calibration standard?	[✓]	___	___

ACTION: Professional judgement should be used to qualify sample data if the internal standard retention times differ by more than 20 seconds.

19.0 Mass Spectral Interpretation/Identification

19.1 Are the Organic Analysis Data Sheets present with required header information on each page, for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples?	[✓]	___	___
c. Blanks?	[✓]	___	___

19.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples	[✓]	___	___
c. Blanks?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

19.3 Is chromatographic performance acceptable with respect to:

	YES	NO	N/A
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph (attenuation)?	[✓]	___	___
e. Other: _____?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
19.4 Are the lab-generated standard mass spectra of the identified compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 1.1 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment.

19.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
19.6 Are all ions present in the reference standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
19.7 Do sample and reference standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 19.5, 19.6, and 19.7

20.0 Field Duplicates

20.1 Were any field duplicates submitted for VOA analysis?	[ ]	___	✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Note the RPD value in the data assessment.

YES NO N/A

DATA ASSESSMENT

This Data Assessment is based on USEPA Region II SOP HW- : Volatile Organics Analysis of Ambient Air in Canisters by Method TO-15, May 2004.

Case No. _____ **SDG No.** 0605085B **LABORATORY:** Air Toxics

SITE : VIP

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "N" (presumptive). All action is detailed on the following sheets.

The following facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error. In addition the "N" flag shows that the analysis indicates the presence of an analyte for which there is presumption evidence to make a "tentative identifiction."

All actions are detailed below and on the attached sheets:

Overall Assessment:

YES NO N/A

Contract Non-Compliance:

Reviewer's Signature: _____ Date: 6 / 6 /20 06

Verified By: _____ Date: ____/____/20__

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

RECEIVED
MAY 30 2006
HAZ. WASTE SUPPORT SEC.

LABORATORY NARRATIVE
Modified TO-15 SIM
US EPA Region II
Workorder# 0605085A

Nine 6 Liter Summa Canister (SIM Certified) and Four 6 Liter Summa Canister (100% Certified) samples were received on May 04, 2006. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode. The method involves concentrating up to 0.5 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) information for samples 2177 and 39426 did not match the information on the canisters with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the samples.

The Chain of Custody contained incorrect method information for samples 11882, 33965, 34453, and 9940. ATL proceeded with the analysis as per the original contract or verbal agreement.

Analytical Notes

Sample 11882 was processed with an extended SIM analyte list to more closely resemble the longer full scan analysis which was requested on the COC. While the initial analysis met the laboratory data quality requirements for the shorter SIM list, the additional compounds were not evaluated for quality compliance at the time of sample analysis and are flagged as appropriate. Additionally, Styrene and trans-1,3-Dichloropropene were not spiked in the Laboratory Control Sample.

All Quality Control Limit failures and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

The canisters for samples 33965, 34453, 11882, 9940 and 9940 Duplicate were certified for analysis via full scan at 0.1 and 0.5 ppbv base reporting limits rather than the SIM reporting limits required for this work order. Results between the SIM reporting limit and the level at which the canister was certified have been flagged as estimated.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

RECEIVED
MAY 30 2006
HAZ. WASTE SUPPORT SEC.

LABORATORY NARRATIVE
Modified TO-15 Low Level
US EPA Region II
Workorder# 0605085B

Twelve 6 Liter Summa Canister (100% Certified) and seven 6 Liter Summa Canister (SIM Certified) samples were received on May 04, 2006. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 1.0 liter of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
ICAL %RSD acceptance criteria	+- 30% RSD with 2 compounds allowed out to < 40% RSD	30% RSD with 4 compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	</= 30% Difference with four allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request

Receiving Notes

The Chain of Custody (COC) information for sample 34125 did not match the information on the canister with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the samples.

Sample 33568 was received with significant vacuum remaining in the canister. The discrepancy was noted in the Sample Receipt Confirmation email/fax. The residual canister vacuum resulted in elevated reporting limits.

The Chain of Custody contained incorrect method information for samples 05712, 13655, 13843, 24484, 32109, 33568, and 34328. ATL proceeded with the analysis as per the original contract or verbal agreement.

Analytical Notes

The reported LCS for each daily batch has been derived from more than one analytical file.

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34399

Lab ID#: 0605085C-28A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051014	Date of Collection:	5/3/06
Dil. Factor:	1.71	Date of Analysis:	5/10/06 09:57 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.17	0.70	0.84	3.4
Freon 114	0.17	Not Detected	1.2	Not Detected
Chloromethane	0.17	0.17	0.35	0.36
Vinyl Chloride	0.17	Not Detected	0.44	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Bromomethane	0.17	Not Detected	0.66	Not Detected
Chloroethane	0.17	Not Detected	0.45	Not Detected
Freon 11	0.17	0.36	0.96	2.0
Ethanol	0.86	24	1.6	46
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.68	Not Detected
Acetone	0.86	14	2.0	32
2-Propanol	0.86	1.2	2.1	2.9
Carbon Disulfide	0.86	Not Detected	2.7	Not Detected
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.86	Not Detected	3.1	Not Detected
trans-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Hexane	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.17	Not Detected	0.69	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.86	Not Detected	2.5	Not Detected
cis-1,2-Dichloroethene	0.17	Not Detected	0.68	Not Detected
Tetrahydrofuran	0.86	Not Detected	2.5	Not Detected
Chloroform	0.17	Not Detected	0.83	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Cyclohexane	0.86	Not Detected	2.9	Not Detected
Carbon Tetrachloride	0.17	Not Detected	1.1	Not Detected
Benzene	0.17	Not Detected	0.55	Not Detected
1,2-Dichloroethane	0.17	Not Detected	0.69	Not Detected
Heptane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.17	Not Detected	0.92	Not Detected
1,2-Dichloropropane	0.17	Not Detected	0.79	Not Detected
1,4-Dioxane	0.86	Not Detected	3.1	Not Detected
Bromodichloromethane	0.86	Not Detected	5.7	Not Detected
cis-1,3-Dichloropropene	0.17	Not Detected	0.78	Not Detected
4-Methyl-2-pentanone	0.86	Not Detected	3.5	Not Detected
Toluene	0.17	Not Detected	0.64	Not Detected
trans-1,3-Dichloropropene	0.17	Not Detected	0.78	Not Detected
1,1,2-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Tetrachloroethene	0.17	7.7	1.2	52
2-Hexanone	0.86	Not Detected	3.5	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34399

Lab ID#: 0605085C-28A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051014	Date of Collection:	5/3/06
Dil. Factor:	1.71	Date of Analysis:	5/10/06 09:57 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.86	Not Detected	7.3	Not Detected
1,2-Dibromoethane (EDB)	0.17	Not Detected	1.3	Not Detected
Chlorobenzene	0.17	Not Detected	0.79	Not Detected
Ethyl Benzene	0.17	Not Detected	0.74	Not Detected
m,p-Xylene	0.17	Not Detected	0.74	Not Detected
o-Xylene	0.17	Not Detected	0.74	Not Detected
Styrene	0.17	Not Detected	0.73	Not Detected
Bromoform	0.86	Not Detected	8.8	Not Detected
Cumene	0.86	Not Detected	4.2	Not Detected
1,1,2,2-Tetrachloroethane	0.17	Not Detected	1.2	Not Detected
Propylbenzene	0.86	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.86	Not Detected	4.2	Not Detected
1,3,5-Trimethylbenzene	0.17	Not Detected	0.84	Not Detected
1,2,4-Trimethylbenzene	0.17	Not Detected	0.84	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.17	Not Detected	0.88	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.86	Not Detected	6.3	Not Detected
Hexachlorobutadiene	0.86	Not Detected	9.1	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34440

Lab ID#: 0605085C-29A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7050921	Date of Collection:	5/2/06
Dil. Factor:	1.49	Date of Analysis:	5/10/06 07:42 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.15	7.9	0.74	39
Freon 114	0.15	Not Detected	1.0	Not Detected
Chloromethane	0.15	0.14 J	0.31	0.30 J
Vinyl Chloride	0.15	Not Detected	0.38	Not Detected
1,3-Butadiene	0.74	Not Detected	1.6	Not Detected
Bromomethane	0.15	Not Detected	0.58	Not Detected
Chloroethane	0.15	Not Detected	0.39	Not Detected
Freon 11	0.15	0.28	0.84	1.6
Ethanol	0.74	1.6	1.4	3.1
Freon 113	0.15	Not Detected	1.1	Not Detected
1,1-Dichloroethene	0.15	Not Detected	0.59	Not Detected
Acetone	0.74	5.0	1.8	12
2-Propanol	0.74	Not Detected	1.8	Not Detected
Carbon Disulfide	0.74	Not Detected	2.3	Not Detected
Methylene Chloride	0.30	Not Detected	1.0	Not Detected
Methyl tert-butyl ether	0.74	Not Detected	2.7	Not Detected
trans-1,2-Dichloroethene	0.74	Not Detected	3.0	Not Detected
Hexane	0.74	Not Detected	2.6	Not Detected
1,1-Dichloroethane	0.15	Not Detected	0.60	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.74	Not Detected	2.2	Not Detected
cis-1,2-Dichloroethene	0.15	Not Detected	0.59	Not Detected
Tetrahydrofuran	0.74	Not Detected	2.2	Not Detected
Chloroform	0.15	Not Detected	0.73	Not Detected
1,1,1-Trichloroethane	0.15	Not Detected	0.81	Not Detected
Cyclohexane	0.74	Not Detected	2.6	Not Detected
Carbon Tetrachloride	0.15	Not Detected	0.94	Not Detected
Benzene	0.15	Not Detected	0.48	Not Detected
1,2-Dichloroethane	0.15	Not Detected	0.60	Not Detected
Heptane	0.74	Not Detected	3.0	Not Detected
Trichloroethene	0.15	0.89	0.80	4.8
1,2-Dichloropropane	0.15	Not Detected	0.69	Not Detected
1,4-Dioxane	0.74	Not Detected	2.7	Not Detected
Bromodichloromethane	0.74	Not Detected	5.0	Not Detected
cis-1,3-Dichloropropene	0.15	Not Detected	0.68	Not Detected
4-Methyl-2-pentanone	0.74	Not Detected	3.0	Not Detected
Toluene	0.15	0.57	0.56	2.2
trans-1,3-Dichloropropene	0.15	Not Detected	0.68	Not Detected
1,1,2-Trichloroethane	0.15	Not Detected	0.81	Not Detected
Tetrachloroethene	0.15	1.2	1.0	8.0
2-Hexanone	0.74	Not Detected	3.0	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34440

Lab ID#: 0605085C-29A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7050921	Date of Collection:	5/2/06
Dil. Factor:	1.49	Date of Analysis:	5/10/06 07:42 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.74	Not Detected	6.3	Not Detected
1,2-Dibromoethane (EDB)	0.15	Not Detected	1.1	Not Detected
Chlorobenzene	0.15	Not Detected	0.68	Not Detected
Ethyl Benzene	0.15	Not Detected	0.65	Not Detected
m,p-Xylene	0.15	0.24	0.65	1.0
o-Xylene	0.15	Not Detected	0.65	Not Detected
Styrene	0.15	Not Detected	0.63	Not Detected
Bromoform	0.74	Not Detected	7.7	Not Detected
Cumene	0.74	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.15	Not Detected	1.0	Not Detected
Propylbenzene	0.74	Not Detected	3.7	Not Detected
4-Ethyltoluene	0.74	Not Detected	3.7	Not Detected
1,3,5-Trimethylbenzene	0.15	Not Detected	0.73	Not Detected
1,2,4-Trimethylbenzene	0.15	Not Detected	0.73	Not Detected
1,3-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
1,4-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
alpha-Chlorotoluene	0.15	Not Detected	0.77	Not Detected
1,2-Dichlorobenzene	0.15	Not Detected	0.90	Not Detected
1,2,4-Trichlorobenzene	0.74	Not Detected	5.5	Not Detected
Hexachlorobutadiene	0.74	Not Detected	7.9	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	105	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34730

Lab ID#: 0605085C-32A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051012	Date of Collection:	5/2/06
Dil. Factor:	2.48	Date of Analysis:	5/10/06 08:33 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.25	0.58	1.2	2.9
Freon 114	0.25	Not Detected	1.7	Not Detected
Chloromethane	0.25	Not Detected	0.51	Not Detected
Vinyl Chloride	0.25	Not Detected	0.63	Not Detected
1,3-Butadiene	1.2	Not Detected	2.7	Not Detected
Bromomethane	0.25	Not Detected	0.96	Not Detected
Chloroethane	0.25	Not Detected	0.65	Not Detected
Freon 11	0.25	0.32	1.4	1.8
Ethanol	1.2	Not Detected	2.3	Not Detected
Freon 113	0.25	Not Detected	1.9	Not Detected
1,1-Dichloroethene	0.25	Not Detected	0.98	Not Detected
Acetone	1.2	6.6	2.9	16
2-Propanol	1.2	Not Detected	3.0	Not Detected
Carbon Disulfide	1.2	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.5	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.9	Not Detected
Hexane	1.2	Not Detected	4.4	Not Detected
1,1-Dichloroethane	0.25	Not Detected	1.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.2	Not Detected	3.6	Not Detected
cis-1,2-Dichloroethene	0.25	Not Detected	0.98	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.6	Not Detected
Chloroform	0.25	Not Detected	1.2	Not Detected
1,1,1-Trichloroethane	0.25	Not Detected	1.4	Not Detected
Cyclohexane	1.2	Not Detected	4.3	Not Detected
Carbon Tetrachloride	0.25	Not Detected	1.6	Not Detected
Benzene	0.25	Not Detected	0.79	Not Detected
1,2-Dichloroethane	0.25	Not Detected	1.0	Not Detected
Heptane	1.2	Not Detected	5.1	Not Detected
Trichloroethene	0.25	Not Detected	1.3	Not Detected
1,2-Dichloropropane	0.25	Not Detected	1.1	Not Detected
1,4-Dioxane	1.2	Not Detected	4.5	Not Detected
Bromodichloromethane	1.2	Not Detected	8.3	Not Detected
cis-1,3-Dichloropropene	0.25	Not Detected	1.1	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	5.1	Not Detected
Toluene	0.25	8.5	0.93	32
trans-1,3-Dichloropropene	0.25	Not Detected	1.1	Not Detected
1,1,2-Trichloroethane	0.25	Not Detected	1.4	Not Detected
Tetrachloroethene	0.25	75	1.7	510
2-Hexanone	1.2	Not Detected	5.1	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34730

Lab ID#: 0605085C-32A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051012	Date of Collection:	5/2/06
Dil. Factor:	2.48	Date of Analysis:	5/10/06 08:33 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	0.25	Not Detected	1.9	Not Detected
Chlorobenzene	0.25	Not Detected	1.1	Not Detected
Ethyl Benzene	0.25	0.66	1.1	2.9
m,p-Xylene	0.25	0.77	1.1	3.3
o-Xylene	0.25	0.39	1.1	1.7
Styrene	0.25	Not Detected	1.0	Not Detected
Bromoform	1.2	Not Detected	13	Not Detected
Cumene	1.2	Not Detected	6.1	Not Detected
1,1,2,2-Tetrachloroethane	0.25	Not Detected	1.7	Not Detected
Propylbenzene	1.2	Not Detected	6.1	Not Detected
4-Ethyltoluene	1.2	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	0.25	Not Detected	1.2	Not Detected
1,2,4-Trimethylbenzene	0.25	Not Detected	1.2	Not Detected
1,3-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
1,4-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
alpha-Chlorotoluene	0.25	Not Detected	1.3	Not Detected
1,2-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
1,2,4-Trichlorobenzene	1.2	Not Detected	9.2	Not Detected
Hexachlorobutadiene	1.2	Not Detected	13	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34746 - ONY report tetrachloroethene from this sample

Lab ID#: 0605085C-33A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051017	Date of Collection:	5/3/06
Dil. Factor:	17.5	Date of Analysis:	5/11/06 01:14 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.8	Not Detected	8.6	Not Detected
Freon 114	1.8	Not Detected	12	Not Detected
Chloromethane	1.8	Not Detected	3.6	Not Detected
Vinyl Chloride	1.8	Not Detected	4.5	Not Detected
1,3-Butadiene	8.8	Not Detected	19	Not Detected
Bromomethane	1.8	Not Detected	6.8	Not Detected
Chloroethane	1.8	Not Detected	4.6	Not Detected
Freon 11	1.8	Not Detected	9.8	Not Detected
Ethanol	8.8	Not Detected	16	Not Detected
Freon 113	1.8	Not Detected	13	Not Detected
1,1-Dichloroethene	1.8	Not Detected	6.9	Not Detected
Acetone	8.8	14	21	32
2-Propanol	8.8	Not Detected	22	Not Detected
Carbon Disulfide	8.8	Not Detected	27	Not Detected
Methylene Chloride	3.5	Not Detected	12	Not Detected
Methyl tert-butyl ether	8.8	Not Detected	32	Not Detected
trans-1,2-Dichloroethene	8.8	Not Detected	35	Not Detected
Hexane	8.8	Not Detected	31	Not Detected
1,1-Dichloroethane	1.8	Not Detected	7.1	Not Detected
2-Butanone (Methyl Ethyl Ketone)	8.8	Not Detected	26	Not Detected
cis-1,2-Dichloroethene	1.8	2.4	6.9	9.4
Tetrahydrofuran	8.8	Not Detected	26	Not Detected
Chloroform	1.8	Not Detected	8.5	Not Detected
1,1,1-Trichloroethane	1.8	Not Detected	9.5	Not Detected
Cyclohexane	8.8	Not Detected	30	Not Detected
Carbon Tetrachloride	1.8	Not Detected	11	Not Detected
Benzene	1.8	Not Detected	5.6	Not Detected
1,2-Dichloroethane	1.8	Not Detected	7.1	Not Detected
Heptane	8.8	Not Detected	36	Not Detected
Trichloroethene	1.8	23	9.4	120
1,2-Dichloropropane	1.8	Not Detected	8.1	Not Detected
1,4-Dioxane	8.8	Not Detected	32	Not Detected
Bromodichloromethane	8.8	Not Detected	59	Not Detected
cis-1,3-Dichloropropene	1.8	Not Detected	7.9	Not Detected
4-Methyl-2-pentanone	8.8	Not Detected	36	Not Detected
Toluene	1.8	1.9	6.6	7.2
trans-1,3-Dichloropropene	1.8	Not Detected	7.9	Not Detected
1,1,2-Trichloroethane	1.8	Not Detected	9.5	Not Detected
Tetrachloroethene	1.8	500	12	3400
2-Hexanone	8.8	Not Detected	36	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34746

Lab ID#: 0605085C-33A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051017	Date of Collection:	5/3/06
Dil. Factor:	17.5	Date of Analysis:	5/11/06 01:14 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	8.8	Not Detected	74	Not Detected
1,2-Dibromoethane (EDB)	1.8	Not Detected	13	Not Detected
Chlorobenzene	1.8	Not Detected	8.0	Not Detected
Ethyl Benzene	1.8	Not Detected	7.6	Not Detected
m,p-Xylene	1.8	Not Detected	7.6	Not Detected
o-Xylene	1.8	Not Detected	7.6	Not Detected
Styrene	1.8	Not Detected	7.4	Not Detected
Bromoform	8.8	Not Detected	90	Not Detected
Cumene	8.8	Not Detected	43	Not Detected
1,1,2,2-Tetrachloroethane	1.8	Not Detected	12	Not Detected
Propylbenzene	8.8	Not Detected	43	Not Detected
4-Ethyltoluene	8.8	Not Detected	43	Not Detected
1,3,5-Trimethylbenzene	1.8	Not Detected	8.6	Not Detected
1,2,4-Trimethylbenzene	1.8	Not Detected	8.6	Not Detected
1,3-Dichlorobenzene	1.8	Not Detected	10	Not Detected
1,4-Dichlorobenzene	1.8	Not Detected	10	Not Detected
alpha-Chlorotoluene	1.8	Not Detected	9.0	Not Detected
1,2-Dichlorobenzene	1.8	Not Detected	10	Not Detected
1,2,4-Trichlorobenzene	8.8	Not Detected	65	Not Detected
Hexachlorobutadiene	8.8	Not Detected	93	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

only use
tetrachloroethene
from 34746

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34746 Duplicate do not use for tetrachloroethene.

Lab ID#: 0605085C-33AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051015	Date of Collection:	5/3/06
Dil. Factor:	8.75	Date of Analysis:	5/10/06 11:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.88	Not Detected	4.3	Not Detected
Freon 114	0.88	Not Detected	6.1	Not Detected
Chloromethane	0.88	0.84 J	1.8	1.7 J
Vinyl Chloride	0.88	Not Detected	2.2	Not Detected
1,3-Butadiene	4.4	Not Detected	9.7	Not Detected
Bromomethane	0.88	Not Detected	3.4	Not Detected
Chloroethane	0.88	Not Detected	2.3	Not Detected
Freon 11	0.88	Not Detected	4.9	Not Detected
Ethanol	4.4	7.9	8.2	15
Freon 113	0.88	Not Detected	6.7	Not Detected
1,1-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Acetone	4.4	15	10	36
2-Propanol	4.4	Not Detected	11	Not Detected
Carbon Disulfide	4.4	Not Detected	14	Not Detected
Methylene Chloride	1.8	Not Detected	6.1	Not Detected
Methyl tert-butyl ether	4.4	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	4.4	Not Detected	17	Not Detected
Hexane	4.4	Not Detected	15	Not Detected
1,1-Dichloroethane	0.88	Not Detected	3.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.4	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	0.88	2.6	3.5	10
Tetrahydrofuran	4.4	Not Detected	13	Not Detected
Chloroform	0.88	Not Detected	4.3	Not Detected
1,1,1-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Cyclohexane	4.4	Not Detected	15	Not Detected
Carbon Tetrachloride	0.88	Not Detected	5.5	Not Detected
Benzene	0.88	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.88	Not Detected	3.5	Not Detected
Heptane	4.4	Not Detected	18	Not Detected
Trichloroethene	0.88	23	4.7	120
1,2-Dichloropropane	0.88	Not Detected	4.0	Not Detected
1,4-Dioxane	4.4	Not Detected	16	Not Detected
Bromodichloromethane	4.4	Not Detected	29	Not Detected
cis-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
4-Methyl-2-pentanone	4.4	Not Detected	18	Not Detected
Toluene	0.88	1.8	3.3	7.0
trans-1,3-Dichloropropene	0.88	Not Detected	4.0	Not Detected
1,1,2-Trichloroethane	0.88	Not Detected	4.8	Not Detected
Tetrachloroethene	0.88	510 E	5.9	3400 E
2-Hexanone	4.4	Not Detected	18	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34746 Duplicate

Lab ID#: 0605085C-33AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051015	Date of Collection:	5/3/06
Dil. Factor:	8.75	Date of Analysis:	5/10/06 11:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	4.4	Not Detected	37	Not Detected
1,2-Dibromoethane (EDB)	0.88	Not Detected	6.7	Not Detected
Chlorobenzene	0.88	Not Detected	4.0	Not Detected
Ethyl Benzene	0.88	Not Detected	3.8	Not Detected
m,p-Xylene	0.88	Not Detected	3.8	Not Detected
o-Xylene	0.88	Not Detected	3.8	Not Detected
Styrene	0.88	Not Detected	3.7	Not Detected
Bromoform	4.4	Not Detected	45	Not Detected
Cumene	4.4	Not Detected	22	Not Detected
1,1,2,2-Tetrachloroethane	0.88	Not Detected	6.0	Not Detected
Propylbenzene	4.4	Not Detected	22	Not Detected
4-Ethyltoluene	4.4	Not Detected	22	Not Detected
1,3,5-Trimethylbenzene	0.88	Not Detected	4.3	Not Detected
1,2,4-Trimethylbenzene	0.88	1.4	4.3	6.8
1,3-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,4-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
alpha-Chlorotoluene	0.88	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.88	Not Detected	5.3	Not Detected
1,2,4-Trichlorobenzene	4.4	Not Detected	32	Not Detected
Hexachlorobutadiene	4.4	Not Detected	47	Not Detected

J = Estimated value.
E = Exceeds instrument calibration range.
Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	104	70-130

Do Not use tetrachloroethene in 34746 duplicate. Use 34746 duplicate for the rest of the compounds.

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 4191

Lab ID#: 0605085C-38A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051018	Date of Collection:	5/3/06
Dil. Factor:	10.7	Date of Analysis:	5/11/06 02:05 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.1	Not Detected	5.3	Not Detected
Freon 114	1.1	Not Detected	7.5	Not Detected
Chloromethane	1.1	Not Detected	2.2	Not Detected
Vinyl Chloride	1.1	Not Detected	2.7	Not Detected
1,3-Butadiene	5.4	Not Detected	12	Not Detected
Bromomethane	1.1	Not Detected	4.2	Not Detected
Chloroethane	1.1	Not Detected	2.8	Not Detected
Freon 11	1.1	Not Detected	6.0	Not Detected
Ethanol	5.4	6.7	10	13
Freon 113	1.1	Not Detected	8.2	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.2	Not Detected
Acetone	5.4	5.4	13	13
2-Propanol	5.4	Not Detected	13	Not Detected
Carbon Disulfide	5.4	Not Detected	17	Not Detected
Methylene Chloride	2.1	Not Detected	7.4	Not Detected
Methyl tert-butyl ether	5.4	Not Detected	19	Not Detected
trans-1,2-Dichloroethene	5.4	Not Detected	21	Not Detected
Hexane	5.4	Not Detected	19	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.3	Not Detected
2-Butanone (Methyl Ethyl Ketone)	5.4	Not Detected	16	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.2	Not Detected
Tetrahydrofuran	5.4	Not Detected	16	Not Detected
Chloroform	1.1	Not Detected	5.2	Not Detected
1,1,1-Trichloroethane	1.1	1.9	5.8	10
Cyclohexane	5.4	Not Detected	18	Not Detected
Carbon Tetrachloride	1.1	Not Detected	6.7	Not Detected
Benzene	1.1	Not Detected	3.4	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.3	Not Detected
Heptane	5.4	Not Detected	22	Not Detected
Trichloroethene	1.1	11	5.8	58
1,2-Dichloropropane	1.1	Not Detected	4.9	Not Detected
1,4-Dioxane	5.4	Not Detected	19	Not Detected
Bromodichloromethane	5.4	Not Detected	36	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	4.8	Not Detected
4-Methyl-2-pentanone	5.4	Not Detected	22	Not Detected
Toluene	1.1	Not Detected	4.0	Not Detected
trans-1,3-Dichloropropene	1.1	Not Detected	4.8	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	5.8	Not Detected
Tetrachloroethene	1.1	250	7.2	1700
2-Hexanone	5.4	Not Detected	22	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 4191

Lab ID#: 0605085C-38A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051018	Date of Collection:	5/3/06
Dil. Factor:	10.7	Date of Analysis:	5/11/06 02:05 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	5.4	Not Detected	46	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.2	Not Detected
Chlorobenzene	1.1	Not Detected	4.9	Not Detected
Ethyl Benzene	1.1	Not Detected	4.6	Not Detected
m,p-Xylene	1.1	Not Detected	4.6	Not Detected
o-Xylene	1.1	Not Detected	4.6	Not Detected
Styrene	1.1	Not Detected	4.6	Not Detected
Bromoform	5.4	Not Detected	55	Not Detected
Cumene	5.4	Not Detected	26	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.3	Not Detected
Propylbenzene	5.4	Not Detected	26	Not Detected
4-Ethyltoluene	5.4	Not Detected	26	Not Detected
1,3,5-Trimethylbenzene	1.1	Not Detected	5.3	Not Detected
1,2,4-Trimethylbenzene	1.1	Not Detected	5.2	Not Detected
1,3-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.5	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
1,2,4-Trichlorobenzene	5.4	Not Detected	40	Not Detected
Hexachlorobutadiene	5.4	Not Detected	57	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	106	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 4324

Lab ID#: 0605085C-39A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051026	Date of Collection:	5/2/06
Dil. Factor:	1.52	Date of Analysis:	5/11/06 09:48 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.15	0.81	0.75	4.0
Freon 114	0.15	Not Detected	1.1	Not Detected
Chloromethane	0.15	Not Detected	0.31	Not Detected
Vinyl Chloride	0.15	Not Detected	0.39	Not Detected
1,3-Butadiene	0.76	Not Detected	1.7	Not Detected
Bromomethane	0.15	Not Detected	0.59	Not Detected
Chloroethane	0.15	Not Detected	0.40	Not Detected
Freon 11	0.15	0.39	0.85	2.2
Ethanol	0.76	Not Detected	1.4	Not Detected
Freon 113	0.15	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.15	Not Detected	0.60	Not Detected
Acetone	0.76	1.9	1.8	4.4
2-Propanol	0.76	Not Detected	1.9	Not Detected
Carbon Disulfide	0.76	Not Detected	2.4	Not Detected
Methylene Chloride	0.30	Not Detected	1.0	Not Detected
Methyl tert-butyl ether	0.76	Not Detected	2.7	Not Detected
trans-1,2-Dichloroethene	0.76	Not Detected	3.0	Not Detected
Hexane	0.76	Not Detected	2.7	Not Detected
1,1-Dichloroethane	0.15	Not Detected	0.62	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.76	Not Detected	2.2	Not Detected
cis-1,2-Dichloroethene	0.15	Not Detected	0.60	Not Detected
Tetrahydrofuran	0.76	Not Detected	2.2	Not Detected
Chloroform	0.15	Not Detected	0.74	Not Detected
1,1,1-Trichloroethane	0.15	Not Detected	0.83	Not Detected
Cyclohexane	0.76	Not Detected	2.6	Not Detected
Carbon Tetrachloride	0.15	Not Detected	0.96	Not Detected
Benzene	0.15	Not Detected	0.48	Not Detected
1,2-Dichloroethane	0.15	Not Detected	0.62	Not Detected
Heptane	0.76	Not Detected	3.1	Not Detected
Trichloroethene	0.15	Not Detected	0.82	Not Detected
1,2-Dichloropropane	0.15	Not Detected	0.70	Not Detected
1,4-Dioxane	0.76	Not Detected	2.7	Not Detected
Bromodichloromethane	0.76	Not Detected	5.1	Not Detected
cis-1,3-Dichloropropene	0.15	Not Detected	0.69	Not Detected
4-Methyl-2-pentanone	0.76	Not Detected	3.1	Not Detected
Toluene	0.15	0.15	0.57	0.57
trans-1,3-Dichloropropene	0.15	Not Detected	0.69	Not Detected
1,1,2-Trichloroethane	0.15	Not Detected	0.83	Not Detected
Tetrachloroethene	0.15	1.5	1.0	10
2-Hexanone	0.76	Not Detected	3.1	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 4324

Lab ID#: 0605085C-39A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051026	Date of Collection:	5/2/06
Dil. Factor:	1.52	Date of Analysis:	5/11/06 09:48 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.76	Not Detected	6.5	Not Detected
1,2-Dibromoethane (EDB)	0.15	Not Detected	1.2	Not Detected
Chlorobenzene	0.15	Not Detected	0.70	Not Detected
Ethyl Benzene	0.15	Not Detected	0.66	Not Detected
m,p-Xylene	0.15	Not Detected	0.66	Not Detected
o-Xylene	0.15	Not Detected	0.66	Not Detected
Styrene	0.15	0.27	0.65	1.1
Bromoform	0.76	Not Detected	7.8	Not Detected
Cumene	0.76	Not Detected	3.7	Not Detected
1,1,2,2-Tetrachloroethane	0.15	Not Detected	1.0	Not Detected
Propylbenzene	0.76	Not Detected	3.7	Not Detected
4-Ethyltoluene	0.76	Not Detected	3.7	Not Detected
1,3,5-Trimethylbenzene	0.15	Not Detected	0.75	Not Detected
1,2,4-Trimethylbenzene	0.15	Not Detected	0.75	Not Detected
1,3-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
1,4-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
alpha-Chlorotoluene	0.15	Not Detected	0.79	Not Detected
1,2-Dichlorobenzene	0.15	Not Detected	0.91	Not Detected
1,2,4-Trichlorobenzene	0.76	Not Detected	5.6	Not Detected
Hexachlorobutadiene	0.76	Not Detected	8.1	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 902

Lab ID#: 0605085C-40A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051022	Date of Collection:	5/3/06
Dil. Factor:	16.8	Date of Analysis:	5/11/06 05:53 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.7	Not Detected	8.3	Not Detected
Freon 114	1.7	Not Detected	12	Not Detected
Chloromethane	1.7	Not Detected	3.5	Not Detected
Vinyl Chloride	1.7	Not Detected	4.3	Not Detected
1,3-Butadiene	8.4	Not Detected	18	Not Detected
Bromomethane	1.7	Not Detected	6.5	Not Detected
Chloroethane	1.7	Not Detected	4.4	Not Detected
Freon 11	1.7	Not Detected	9.4	Not Detected
Ethanol	8.4	Not Detected	16	Not Detected
Freon 113	1.7	Not Detected	13	Not Detected
1,1-Dichloroethene	1.7	Not Detected	6.7	Not Detected
Acetone	8.4	Not Detected	20	Not Detected
2-Propanol	8.4	Not Detected	21	Not Detected
Carbon Disulfide	8.4	Not Detected	26	Not Detected
Methylene Chloride	3.4	Not Detected	12	Not Detected
Methyl tert-butyl ether	8.4	Not Detected	30	Not Detected
trans-1,2-Dichloroethene	8.4	Not Detected	33	Not Detected
Hexane	8.4	Not Detected	30	Not Detected
1,1-Dichloroethane	1.7	Not Detected	6.8	Not Detected
2-Butanone (Methyl Ethyl Ketone)	8.4	Not Detected	25	Not Detected
cis-1,2-Dichloroethene	1.7	Not Detected	6.7	Not Detected
Tetrahydrofuran	8.4	Not Detected	25	Not Detected
Chloroform	1.7	Not Detected	8.2	Not Detected
1,1,1-Trichloroethane	1.7	Not Detected	9.2	Not Detected
Cyclohexane	8.4	Not Detected	29	Not Detected
Carbon Tetrachloride	1.7	Not Detected	10	Not Detected
Benzene	1.7	Not Detected	5.4	Not Detected
1,2-Dichloroethane	1.7	Not Detected	6.8	Not Detected
Heptane	8.4	Not Detected	34	Not Detected
Trichloroethene	1.7	1.6 J	9.0	8.7 J
1,2-Dichloropropane	1.7	Not Detected	7.8	Not Detected
1,4-Dioxane	8.4	Not Detected	30	Not Detected
Bromodichloromethane	8.4	Not Detected	56	Not Detected
cis-1,3-Dichloropropene	1.7	Not Detected	7.6	Not Detected
4-Methyl-2-pentanone	8.4	Not Detected	34	Not Detected
Toluene	1.7	Not Detected	6.3	Not Detected
trans-1,3-Dichloropropene	1.7	Not Detected	7.6	Not Detected
1,1,2-Trichloroethane	1.7	Not Detected	9.2	Not Detected
Tetrachloroethene	1.7	450	11	3000
2-Hexanone	8.4	Not Detected	34	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 902

Lab ID#: 0605085C-40A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051022	Date of Collection:	5/3/06
Dil. Factor:	16.8	Date of Analysis:	5/11/06 05:53 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	8.4	Not Detected	72	Not Detected
1,2-Dibromoethane (EDB)	1.7	Not Detected	13	Not Detected
Chlorobenzene	1.7	Not Detected	7.7	Not Detected
Ethyl Benzene	1.7	Not Detected	7.3	Not Detected
m,p-Xylene	1.7	Not Detected	7.3	Not Detected
o-Xylene	1.7	Not Detected	7.3	Not Detected
Styrene	1.7	Not Detected	7.2	Not Detected
Bromoform	8.4	Not Detected	87	Not Detected
Cumene	8.4	Not Detected	41	Not Detected
1,1,2,2-Tetrachloroethane	1.7	Not Detected	12	Not Detected
Propylbenzene	8.4	Not Detected	41	Not Detected
4-Ethyltoluene	8.4	Not Detected	41	Not Detected
1,3,5-Trimethylbenzene	1.7	Not Detected	8.2	Not Detected
1,2,4-Trimethylbenzene	1.7	Not Detected	8.2	Not Detected
1,3-Dichlorobenzene	1.7	Not Detected	10	Not Detected
1,4-Dichlorobenzene	1.7	Not Detected	10	Not Detected
alpha-Chlorotoluene	1.7	Not Detected	8.7	Not Detected
1,2-Dichlorobenzene	1.7	Not Detected	10	Not Detected
1,2,4-Trichlorobenzene	8.4	Not Detected	62	Not Detected
Hexachlorobutadiene	8.4	Not Detected	90	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	106	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 912

Lab ID#: 0605085C-41A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051024	Date of Collection:	5/3/06
Dil. Factor:	6.44	Date of Analysis:	5/11/06 08:17 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.64	0.63 J	3.2	3.1 J
Freon 114	0.64	Not Detected	4.5	Not Detected
Chloromethane	0.64	Not Detected	1.3	Not Detected
Vinyl Chloride	0.64	Not Detected	1.6	Not Detected
1,3-Butadiene	3.2	Not Detected	7.1	Not Detected
Bromomethane	0.64	Not Detected	2.5	Not Detected
Chloroethane	0.64	Not Detected	1.7	Not Detected
Freon 11	0.64	Not Detected	3.6	Not Detected
Ethanol	3.2	Not Detected	6.1	Not Detected
Freon 113	0.64	Not Detected	4.9	Not Detected
1,1-Dichloroethene	0.64	Not Detected	2.6	Not Detected
Acetone	3.2	Not Detected	7.6	Not Detected
2-Propanol	3.2	Not Detected	7.9	Not Detected
Carbon Disulfide	3.2	Not Detected	10	Not Detected
Methylene Chloride	1.3	Not Detected	4.5	Not Detected
Methyl tert-butyl ether	3.2	Not Detected	12	Not Detected
trans-1,2-Dichloroethene	3.2	Not Detected	13	Not Detected
Hexane	3.2	Not Detected	11	Not Detected
1,1-Dichloroethane	0.64	Not Detected	2.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	3.2	Not Detected	9.5	Not Detected
cis-1,2-Dichloroethene	0.64	Not Detected	2.6	Not Detected
Tetrahydrofuran	3.2	Not Detected	9.5	Not Detected
Chloroform	0.64	Not Detected	3.1	Not Detected
1,1,1-Trichloroethane	0.64	Not Detected	3.5	Not Detected
Cyclohexane	3.2	Not Detected	11	Not Detected
Carbon Tetrachloride	0.64	Not Detected	4.0	Not Detected
Benzene	0.64	Not Detected	2.0	Not Detected
1,2-Dichloroethane	0.64	Not Detected	2.6	Not Detected
Heptane	3.2	Not Detected	13	Not Detected
Trichloroethene	0.64	0.76	3.5	4.1
1,2-Dichloropropane	0.64	Not Detected	3.0	Not Detected
1,4-Dioxane	3.2	Not Detected	12	Not Detected
Bromodichloromethane	3.2	Not Detected	22	Not Detected
cis-1,3-Dichloropropene	0.64	Not Detected	2.9	Not Detected
4-Methyl-2-pentanone	3.2	Not Detected	13	Not Detected
Toluene	0.64	Not Detected	2.4	Not Detected
trans-1,3-Dichloropropene	0.64	Not Detected	2.9	Not Detected
1,1,2-Trichloroethane	0.64	Not Detected	3.5	Not Detected
Tetrachloroethene	0.64	100	4.4	690
2-Hexanone	3.2	Not Detected	13	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 912

Lab ID#: 0605085C-41A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051024	Date of Collection:	5/3/06
Dil. Factor:	6.44	Date of Analysis:	5/11/06 08:17 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	3.2	Not Detected	27	Not Detected
1,2-Dibromoethane (EDB)	0.64	Not Detected	4.9	Not Detected
Chlorobenzene	0.64	Not Detected	3.0	Not Detected
Ethyl Benzene	0.64	Not Detected	2.8	Not Detected
m,p-Xylene	0.64	Not Detected	2.8	Not Detected
o-Xylene	0.64	Not Detected	2.8	Not Detected
Styrene	0.64	Not Detected	2.7	Not Detected
Bromoform	3.2	Not Detected	33	Not Detected
Cumene	3.2	Not Detected	16	Not Detected
1,1,2,2-Tetrachloroethane	0.64	Not Detected	4.4	Not Detected
Propylbenzene	3.2	Not Detected	16	Not Detected
4-Ethyltoluene	3.2	Not Detected	16	Not Detected
1,3,5-Trimethylbenzene	0.64	Not Detected	3.2	Not Detected
1,2,4-Trimethylbenzene	0.64	Not Detected	3.2	Not Detected
1,3-Dichlorobenzene	0.64	Not Detected	3.9	Not Detected
1,4-Dichlorobenzene	0.64	Not Detected	3.9	Not Detected
alpha-Chlorotoluene	0.64	Not Detected	3.3	Not Detected
1,2-Dichlorobenzene	0.64	Not Detected	3.9	Not Detected
1,2,4-Trichlorobenzene	3.2	Not Detected	24	Not Detected
Hexachlorobutadiene	3.2	Not Detected	34	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	105	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 915

Lab ID#: 0605085C-42A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051021	Date of Collection:	5/3/06
Dil. Factor:	2.80	Date of Analysis:	5/11/06 05:03 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.28	0.68	1.4	3.3
Freon 114	0.28	Not Detected	2.0	Not Detected
Chloromethane	0.28	Not Detected	0.58	Not Detected
Vinyl Chloride	0.28	Not Detected	0.72	Not Detected
1,3-Butadiene	1.4	Not Detected	3.1	Not Detected
Bromomethane	0.28	Not Detected	1.1	Not Detected
Chloroethane	0.28	Not Detected	0.74	Not Detected
Freon 11	0.28	0.33	1.6	1.9
Ethanol	1.4	1.5	2.6	2.8
Freon 113	0.28	Not Detected	2.1	Not Detected
1,1-Dichloroethene	0.28	Not Detected	1.1	Not Detected
Acetone	1.4	3.9	3.3	9.2
2-Propanol	1.4	Not Detected	3.4	Not Detected
Carbon Disulfide	1.4	Not Detected	4.4	Not Detected
Methylene Chloride	0.56	Not Detected	1.9	Not Detected
Methyl tert-butyl ether	1.4	Not Detected	5.0	Not Detected
trans-1,2-Dichloroethene	1.4	Not Detected	5.6	Not Detected
Hexane	1.4	Not Detected	4.9	Not Detected
1,1-Dichloroethane	0.28	Not Detected	1.1	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.4	Not Detected	4.1	Not Detected
cis-1,2-Dichloroethene	0.28	Not Detected	1.1	Not Detected
Tetrahydrofuran	1.4	Not Detected	4.1	Not Detected
Chloroform	0.28	0.64	1.4	3.1
1,1,1-Trichloroethane	0.28	Not Detected	1.5	Not Detected
Cyclohexane	1.4	Not Detected	4.8	Not Detected
Carbon Tetrachloride	0.28	11	1.8	68
Benzene	0.28	Not Detected	0.89	Not Detected
1,2-Dichloroethane	0.28	Not Detected	1.1	Not Detected
Heptane	1.4	Not Detected	5.7	Not Detected
Trichloroethene	0.28	2.7	1.5	14
1,2-Dichloropropane	0.28	Not Detected	1.3	Not Detected
1,4-Dioxane	1.4	Not Detected	5.0	Not Detected
Bromodichloromethane	1.4	Not Detected	9.4	Not Detected
cis-1,3-Dichloropropene	0.28	Not Detected	1.3	Not Detected
4-Methyl-2-pentanone	1.4	Not Detected	5.7	Not Detected
Toluene	0.28	Not Detected	1.0	Not Detected
trans-1,3-Dichloropropene	0.28	Not Detected	1.3	Not Detected
1,1,2-Trichloroethane	0.28	Not Detected	1.5	Not Detected
Tetrachloroethene	0.28	70	1.9	470
2-Hexanone	1.4	Not Detected	5.7	Not Detected

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 915

Lab ID#: 0605085C-42A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051021	Date of Collection:	5/3/06
Dil. Factor:	2.80	Date of Analysis:	5/11/06 05:03 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.4	Not Detected	12	Not Detected
1,2-Dibromoethane (EDB)	0.28	Not Detected	2.2	Not Detected
Chlorobenzene	0.28	Not Detected	1.3	Not Detected
Ethyl Benzene	0.28	Not Detected	1.2	Not Detected
m,p-Xylene	0.28	Not Detected	1.2	Not Detected
o-Xylene	0.28	Not Detected	1.2	Not Detected
Styrene	0.28	Not Detected	1.2	Not Detected
Bromoform	1.4	Not Detected	14	Not Detected
Cumene	1.4	Not Detected	6.9	Not Detected
1,1,2,2-Tetrachloroethane	0.28	Not Detected	1.9	Not Detected
Propylbenzene	1.4	Not Detected	6.9	Not Detected
4-Ethyltoluene	1.4	Not Detected	6.9	Not Detected
1,3,5-Trimethylbenzene	0.28	Not Detected	1.4	Not Detected
1,2,4-Trimethylbenzene	0.28	Not Detected	1.4	Not Detected
1,3-Dichlorobenzene	0.28	Not Detected	1.7	Not Detected
1,4-Dichlorobenzene	0.28	Not Detected	1.7	Not Detected
alpha-Chlorotoluene	0.28	Not Detected	1.4	Not Detected
1,2-Dichlorobenzene	0.28	Not Detected	1.7	Not Detected
1,2,4-Trichlorobenzene	1.4	Not Detected	10	Not Detected
Hexachlorobutadiene	1.4	Not Detected	15	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34475

Lab ID#: 0605085D-31A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051612	Date of Collection:	5/3/06
Dil. Factor:	43.8	Date of Analysis:	5/16/06 06:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	22	Not Detected	110	Not Detected
Freon 114	22	Not Detected	150	Not Detected
Chloromethane	88	Not Detected	180	Not Detected
Vinyl Chloride	22	Not Detected	56	Not Detected
1,3-Butadiene	22	Not Detected	48	Not Detected
Bromomethane	22	Not Detected	85	Not Detected
Chloroethane	22	Not Detected	58	Not Detected
Freon 11	22	Not Detected	120	Not Detected
Ethanol	88	Not Detected	160	Not Detected
Freon 113	22	Not Detected	170	Not Detected
1,1-Dichloroethene	22	Not Detected	87	Not Detected
Acetone	88	Not Detected	210	Not Detected
2-Propanol	88	Not Detected	220	Not Detected
Carbon Disulfide	22	Not Detected	68	Not Detected
3-Chloropropene	88	Not Detected	270	Not Detected
Methylene Chloride	22	Not Detected	76	Not Detected
Methyl tert-butyl ether	22	Not Detected	79	Not Detected
trans-1,2-Dichloroethene	22	40	87	160
Hexane	22	Not Detected	77	Not Detected
1,1-Dichloroethane	22	Not Detected	89	Not Detected
2-Butanone (Methyl Ethyl Ketone)	22	Not Detected	64	Not Detected
cis-1,2-Dichloroethene	22	3100	87	12000
Tetrahydrofuran	22	Not Detected	64	Not Detected
Chloroform	22	Not Detected	110	Not Detected
1,1,1-Trichloroethane	22	Not Detected	120	Not Detected
Cyclohexane	22	Not Detected	75	Not Detected
Carbon Tetrachloride	22	Not Detected	140	Not Detected
2,2,4-Trimethylpentane	22	Not Detected	100	Not Detected
Benzene	22	Not Detected	70	Not Detected
1,2-Dichloroethane	22	Not Detected	89	Not Detected
Heptane	22	Not Detected	90	Not Detected
Trichloroethene	22	500	120	2700
1,2-Dichloropropane	22	Not Detected	100	Not Detected
1,4-Dioxane	88	Not Detected	320	Not Detected
Bromodichloromethane	22	Not Detected	150	Not Detected
cis-1,3-Dichloropropene	22	Not Detected	99	Not Detected
4-Methyl-2-pentanone	22	Not Detected	90	Not Detected
Toluene	22	Not Detected	82	Not Detected
trans-1,3-Dichloropropene	22	Not Detected	99	Not Detected
1,1,2-Trichloroethane	22	Not Detected	120	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34475

Lab ID#: 0605085D-31A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051612	Date of Collection:	5/3/06
Dil. Factor:	43.8	Date of Analysis:	5/16/06 06:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	22	6500	150	44000
2-Hexanone	88	Not Detected	360	Not Detected
Dibromochloromethane	22	Not Detected	190	Not Detected
1,2-Dibromoethane (EDB)	22	Not Detected	170	Not Detected
Chlorobenzene	22	Not Detected	100	Not Detected
Ethyl Benzene	22	Not Detected	95	Not Detected
m,p-Xylene	22	Not Detected	95	Not Detected
o-Xylene	22	Not Detected	95	Not Detected
Styrene	22	Not Detected	93	Not Detected
Bromoform	22	Not Detected	230	Not Detected
Cumene	22	Not Detected	110	Not Detected
1,1,2,2-Tetrachloroethane	22	Not Detected	150	Not Detected
Propylbenzene	22	Not Detected	110	Not Detected
4-Ethyltoluene	22	Not Detected	110	Not Detected
1,3,5-Trimethylbenzene	22	Not Detected	110	Not Detected
1,2,4-Trimethylbenzene	22	Not Detected	110	Not Detected
1,3-Dichlorobenzene	22	Not Detected	130	Not Detected
1,4-Dichlorobenzene	22	Not Detected	130	Not Detected
alpha-Chlorotoluene	22	Not Detected	110	Not Detected
1,2-Dichlorobenzene	22	Not Detected	130	Not Detected
1,2,4-Trichlorobenzene	88	Not Detected	650	Not Detected
Hexachlorobutadiene	88	Not Detected	930	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	96	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34475 Duplicate

Lab ID#: 0605085D-31AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051613	Date of Collection:	5/3/06
Dil. Factor:	43.8	Date of Analysis:	5/16/06 07:20 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	22	Not Detected	110	Not Detected
Freon 114	22	Not Detected	150	Not Detected
Chloromethane	88	Not Detected	180	Not Detected
Vinyl Chloride	22	Not Detected	56	Not Detected
1,3-Butadiene	22	Not Detected	48	Not Detected
Bromomethane	22	Not Detected	85	Not Detected
Chloroethane	22	Not Detected	58	Not Detected
Freon 11	22	Not Detected	120	Not Detected
Ethanol	88	Not Detected	160	Not Detected
Freon 113	22	Not Detected	170	Not Detected
1,1-Dichloroethene	22	Not Detected	87	Not Detected
Acetone	88	Not Detected	210	Not Detected
2-Propanol	88	Not Detected	220	Not Detected
Carbon Disulfide	22	Not Detected	68	Not Detected
3-Chloropropene	88	Not Detected	270	Not Detected
Methylene Chloride	22	Not Detected	76	Not Detected
Methyl tert-butyl ether	22	Not Detected	79	Not Detected
trans-1,2-Dichloroethene	22	38	87	150
Hexane	22	Not Detected	77	Not Detected
1,1-Dichloroethane	22	Not Detected	89	Not Detected
2-Butanone (Methyl Ethyl Ketone)	22	Not Detected	64	Not Detected
cis-1,2-Dichloroethene	22	3200	87	12000
Tetrahydrofuran	22	Not Detected	64	Not Detected
Chloroform	22	Not Detected	110	Not Detected
1,1,1-Trichloroethane	22	Not Detected	120	Not Detected
Cyclohexane	22	Not Detected	75	Not Detected
Carbon Tetrachloride	22	Not Detected	140	Not Detected
2,2,4-Trimethylpentane	22	Not Detected	100	Not Detected
Benzene	22	Not Detected	70	Not Detected
1,2-Dichloroethane	22	Not Detected	89	Not Detected
Heptane	22	Not Detected	90	Not Detected
Trichloroethene	22	510	120	2800
1,2-Dichloropropane	22	Not Detected	100	Not Detected
1,4-Dioxane	88	Not Detected	320	Not Detected
Bromodichloromethane	22	Not Detected	150	Not Detected
cis-1,3-Dichloropropene	22	Not Detected	99	Not Detected
4-Methyl-2-pentanone	22	Not Detected	90	Not Detected
Toluene	22	Not Detected	82	Not Detected
trans-1,3-Dichloropropene	22	Not Detected	99	Not Detected
1,1,2-Trichloroethane	22	Not Detected	120	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34475 Duplicate

Lab ID#: 0605085D-31AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051613	Date of Collection:	5/3/06
Dil. Factor:	43.8	Date of Analysis:	5/16/06 07:20 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	22	6700	150	45000
2-Hexanone	88	Not Detected	360	Not Detected
Dibromochloromethane	22	Not Detected	190	Not Detected
1,2-Dibromoethane (EDB)	22	Not Detected	170	Not Detected
Chlorobenzene	22	Not Detected	100	Not Detected
Ethyl Benzene	22	Not Detected	95	Not Detected
m,p-Xylene	22	Not Detected	95	Not Detected
o-Xylene	22	Not Detected	95	Not Detected
Styrene	22	Not Detected	93	Not Detected
Bromoform	22	Not Detected	230	Not Detected
Cumene	22	Not Detected	110	Not Detected
1,1,2,2-Tetrachloroethane	22	Not Detected	150	Not Detected
Propylbenzene	22	Not Detected	110	Not Detected
4-Ethyltoluene	22	Not Detected	110	Not Detected
1,3,5-Trimethylbenzene	22	Not Detected	110	Not Detected
1,2,4-Trimethylbenzene	22	Not Detected	110	Not Detected
1,3-Dichlorobenzene	22	Not Detected	130	Not Detected
1,4-Dichlorobenzene	22	Not Detected	130	Not Detected
alpha-Chlorotoluene	22	Not Detected	110	Not Detected
1,2-Dichlorobenzene	22	Not Detected	130	Not Detected
1,2,4-Trichlorobenzene	88	Not Detected	650	Not Detected
Hexachlorobutadiene	88	Not Detected	930	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 35154

Lab ID#: 0605085D-34A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051614	Date of Collection:	5/3/06
Dil. Factor:	42.0	Date of Analysis:	5/16/06 08:08 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	21	Not Detected	100	Not Detected
Freon 114	21	Not Detected	150	Not Detected
Chloromethane	84	Not Detected	170	Not Detected
Vinyl Chloride	21	Not Detected	54	Not Detected
1,3-Butadiene	21	Not Detected	46	Not Detected
Bromomethane	21	Not Detected	82	Not Detected
Chloroethane	21	Not Detected	55	Not Detected
Freon 11	21	Not Detected	120	Not Detected
Ethanol	84	160	160	300
Freon 113	21	Not Detected	160	Not Detected
1,1-Dichloroethene	21	Not Detected	83	Not Detected
Acetone	84	Not Detected	200	Not Detected
2-Propanol	84	Not Detected	210	Not Detected
Carbon Disulfide	21	Not Detected	65	Not Detected
3-Chloropropene	84	Not Detected	260	Not Detected
Methylene Chloride	21	Not Detected	73	Not Detected
Methyl tert-butyl ether	21	Not Detected	76	Not Detected
trans-1,2-Dichloroethene	21	Not Detected	83	Not Detected
Hexane	21	Not Detected	74	Not Detected
1,1-Dichloroethane	21	Not Detected	85	Not Detected
2-Butanone (Methyl Ethyl Ketone)	21	Not Detected	62	Not Detected
cis-1,2-Dichloroethene	21	41	83	160
Tetrahydrofuran	21	Not Detected	62	Not Detected
Chloroform	21	Not Detected	100	Not Detected
1,1,1-Trichloroethane	21	Not Detected	110	Not Detected
Cyclohexane	21	Not Detected	72	Not Detected
Carbon Tetrachloride	21	Not Detected	130	Not Detected
2,2,4-Trimethylpentane	21	Not Detected	98	Not Detected
Benzene	21	Not Detected	67	Not Detected
1,2-Dichloroethane	21	Not Detected	85	Not Detected
Heptane	21	Not Detected	86	Not Detected
Trichloroethene	21	200	110	1100
1,2-Dichloropropane	21	Not Detected	97	Not Detected
1,4-Dioxane	84	Not Detected	300	Not Detected
Bromodichloromethane	21	Not Detected	140	Not Detected
cis-1,3-Dichloropropene	21	Not Detected	95	Not Detected
4-Methyl-2-pentanone	21	Not Detected	86	Not Detected
Toluene	21	Not Detected	79	Not Detected
trans-1,3-Dichloropropene	21	Not Detected	95	Not Detected
1,1,2-Trichloroethane	21	Not Detected	110	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 35154

Lab ID#: 0605085D-34A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051614	Date of Collection:	5/3/06
Dil. Factor:	42.0	Date of Analysis:	5/16/06 08:08 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	21	6700	140	45000
2-Hexanone	84	Not Detected	340	Not Detected
Dibromochloromethane	21	Not Detected	180	Not Detected
1,2-Dibromoethane (EDB)	21	Not Detected	160	Not Detected
Chlorobenzene	21	Not Detected	97	Not Detected
Ethyl Benzene	21	Not Detected	91	Not Detected
m,p-Xylene	21	Not Detected	91	Not Detected
o-Xylene	21	Not Detected	91	Not Detected
Styrene	21	Not Detected	89	Not Detected
Bromoform	21	Not Detected	220	Not Detected
Cumene	21	Not Detected	100	Not Detected
1,1,2,2-Tetrachloroethane	21	Not Detected	140	Not Detected
Propylbenzene	21	Not Detected	100	Not Detected
4-Ethyltoluene	21	Not Detected	100	Not Detected
1,3,5-Trimethylbenzene	21	Not Detected	100	Not Detected
1,2,4-Trimethylbenzene	21	Not Detected	100	Not Detected
1,3-Dichlorobenzene	21	Not Detected	130	Not Detected
1,4-Dichlorobenzene	21	Not Detected	130	Not Detected
alpha-Chlorotoluene	21	Not Detected	110	Not Detected
1,2-Dichlorobenzene	21	Not Detected	130	Not Detected
1,2,4-Trichlorobenzene	84	Not Detected	620	Not Detected
Hexachlorobutadiene	84	Not Detected	900	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	96	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 35172

Lab ID#: 0605085D-35A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051615	Date of Collection:	5/3/06
Dil. Factor:	40.2	Date of Analysis:	5/16/06 08:46 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	20	Not Detected	99	Not Detected
Freon 114	20	Not Detected	140	Not Detected
Chloromethane	80	Not Detected	170	Not Detected
Vinyl Chloride	20	Not Detected	51	Not Detected
1,3-Butadiene	20	Not Detected	44	Not Detected
Bromomethane	20	Not Detected	78	Not Detected
Chloroethane	20	Not Detected	53	Not Detected
Freon 11	20	Not Detected	110	Not Detected
Ethanol	80	Not Detected	150	Not Detected
Freon 113	20	Not Detected	150	Not Detected
1,1-Dichloroethene	20	Not Detected	80	Not Detected
Acetone	80	Not Detected	190	Not Detected
2-Propanol	80	Not Detected	200	Not Detected
Carbon Disulfide	20	Not Detected	62	Not Detected
3-Chloropropene	80	Not Detected	250	Not Detected
Methylene Chloride	20	Not Detected	70	Not Detected
Methyl tert-butyl ether	20	Not Detected	72	Not Detected
trans-1,2-Dichloroethene	20	41	80	160
Hexane	20	Not Detected	71	Not Detected
1,1-Dichloroethane	20	Not Detected	81	Not Detected
2-Butanone (Methyl Ethyl Ketone)	20	Not Detected	59	Not Detected
cis-1,2-Dichloroethene	20	3100	80	12000
Tetrahydrofuran	20	Not Detected	59	Not Detected
Chloroform	20	Not Detected	98	Not Detected
1,1,1-Trichloroethane	20	Not Detected	110	Not Detected
Cyclohexane	20	Not Detected	69	Not Detected
Carbon Tetrachloride	20	Not Detected	130	Not Detected
2,2,4-Trimethylpentane	20	Not Detected	94	Not Detected
Benzene	20	Not Detected	64	Not Detected
1,2-Dichloroethane	20	Not Detected	81	Not Detected
Heptane	20	Not Detected	82	Not Detected
Trichloroethene	20	500	110	2700
1,2-Dichloropropane	20	Not Detected	93	Not Detected
1,4-Dioxane	80	Not Detected	290	Not Detected
Bromodichloromethane	20	Not Detected	130	Not Detected
cis-1,3-Dichloropropene	20	Not Detected	91	Not Detected
4-Methyl-2-pentanone	20	Not Detected	82	Not Detected
Toluene	20	Not Detected	76	Not Detected
trans-1,3-Dichloropropene	20	Not Detected	91	Not Detected
1,1,2-Trichloroethane	20	Not Detected	110	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 35172

Lab ID#: 0605085D-35A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	i051615	Date of Collection:	5/3/06
Dil. Factor:	40.2	Date of Analysis:	5/16/06 08:46 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	20	6600	140	45000
2-Hexanone	80	Not Detected	330	Not Detected
Dibromochloromethane	20	Not Detected	170	Not Detected
1,2-Dibromoethane (EDB)	20	Not Detected	150	Not Detected
Chlorobenzene	20	Not Detected	92	Not Detected
Ethyl Benzene	20	Not Detected	87	Not Detected
m,p-Xylene	20	Not Detected	87	Not Detected
o-Xylene	20	Not Detected	87	Not Detected
Styrene	20	Not Detected	86	Not Detected
Bromoform	20	Not Detected	210	Not Detected
Cumene	20	Not Detected	99	Not Detected
1,1,2,2-Tetrachloroethane	20	Not Detected	140	Not Detected
Propylbenzene	20	Not Detected	99	Not Detected
4-Ethyltoluene	20	Not Detected	99	Not Detected
1,3,5-Trimethylbenzene	20	Not Detected	99	Not Detected
1,2,4-Trimethylbenzene	20	Not Detected	99	Not Detected
1,3-Dichlorobenzene	20	Not Detected	120	Not Detected
1,4-Dichlorobenzene	20	Not Detected	120	Not Detected
alpha-Chlorotoluene	20	Not Detected	100	Not Detected
1,2-Dichlorobenzene	20	Not Detected	120	Not Detected
1,2,4-Trichlorobenzene	80	Not Detected	600	Not Detected
Hexachlorobutadiene	80	Not Detected	860	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	102	70-130
4-Bromofluorobenzene	96	70-130

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 11882

Lab ID#: 0605085A-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050914	Date of Collection:	5/2/06
Dil. Factor:	1.68	Date of Analysis:	5/9/06 08:53 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
Trichloroethene	0.034	Not Detected	0.18	Not Detected
Freon 12	0.034	0.83	0.17	4.1
Chloromethane	0.084	Not Detected	0.17	Not Detected
1,3-Butadiene	0.17	Not Detected	0.37	Not Detected
Bromomethane	0.084	Not Detected	0.33	Not Detected
Chloroethane	0.084	Not Detected	0.22	Not Detected
Freon 11	0.034	0.30	0.19	1.7
Freon 113	0.034	0.076 J	0.26	0.58
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
Acetone	0.84	1.5	2.0	3.6
Carbon Disulfide	0.17	0.18 J	0.52	0.55
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.17	Not Detected	0.60	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Hexane	0.17	Not Detected	0.59	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.17	Not Detected	0.50	Not Detected
Chloroform	0.034	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.034	Not Detected	0.21	Not Detected
Benzene	0.084	Not Detected	0.27	Not Detected
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Heptane	0.17	Not Detected	0.69	Not Detected
1,2-Dichloropropane	0.034	Not Detected	0.16	Not Detected
1,4-Dioxane	0.17	Not Detected	0.60	Not Detected
Bromodichloromethane	0.17	Not Detected	1.1	Not Detected
cis-1,3-Dichloropropene	0.034	Not Detected	0.15	Not Detected
4-Methyl-2-pentanone	0.17	Not Detected	0.69	Not Detected
Toluene	0.034	0.062 J	0.13	0.23
trans-1,3-Dichloropropene	0.034	Not Detected	0.15	Not Detected
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	2.4	0.23	16
2-Hexanone	0.17	Not Detected	0.69	Not Detected
Dibromochloromethane	0.17	Not Detected	1.4	Not Detected
1,2-Dibromoethane (EDB)	0.034	Not Detected	0.26	Not Detected
Chlorobenzene	0.034	Not Detected	0.15	Not Detected
Ethyl Benzene	0.034	Not Detected	0.14	Not Detected
m,p-Xylene	0.067	Not Detected	0.29	Not Detected
o-Xylene	0.034	Not Detected	0.14	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 11882

Lab ID#: 0605085A-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050914	Date of Collection:	5/2/06
Dil. Factor:	1.68	Date of Analysis:	5/9/06 08:53 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Styrene	0.034	Not Detected	0.14	Not Detected
Bromoform	0.17	Not Detected	1.7	Not Detected
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
4-Ethyltoluene	0.17	Not Detected	0.82	Not Detected
1,3,5-Trimethylbenzene	0.034	Not Detected	0.16	Not Detected
1,2,4-Trimethylbenzene	0.034	Not Detected	0.16	Not Detected
1,3-Dichlorobenzene	0.034	Not Detected	0.20	Not Detected
1,4-Dichlorobenzene	0.034	0.042 J	0.20	0.25 J
alpha-Chlorotoluene	0.17	Not Detected	0.87	Not Detected
1,2-Dichlorobenzene	0.034	Not Detected	0.20	Not Detected
1,2,4-Trichlorobenzene	0.17	Not Detected J	1.2	Not Detected J
Hexachlorobutadiene	0.17	Not Detected	1.8	Not Detected
Freon 114	0.034	Not Detected	0.23	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	93	70-130
4-Bromofluorobenzene	97	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13999

Lab ID#: 0605085A-09A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**6050915**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**1.75**	**Date of Analysis:**	**5/9/06 09:48 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.018	Not Detected	0.045	Not Detected
1,1-Dichloroethene	0.018	Not Detected	0.069	Not Detected
1,1-Dichloroethane	0.035	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.035	4.1	0.14	16
1,1,1-Trichloroethane	0.035	Not Detected	0.19	Not Detected
Benzene	0.088	0.43	0.28	1.4
1,2-Dichloroethane	0.035	Not Detected	0.14	Not Detected
Trichloroethene	0.035	0.83	0.19	4.4
Toluene	0.035	7.0	0.13	26
1,1,2-Trichloroethane	0.035	Not Detected	0.19	Not Detected
Tetrachloroethene	0.035	25	0.24	170
Ethyl Benzene	0.035	0.62	0.15	2.7
m,p-Xylene	0.070	1.4	0.30	6.2
o-Xylene	0.035	0.61	0.15	2.6
1,1,2,2-Tetrachloroethane	0.035	Not Detected	0.24	Not Detected
trans-1,2-Dichloroethene	0.18	Not Detected	0.69	Not Detected
Methyl tert-butyl ether	0.18	0.17 J	0.63	0.62 J

J = Estimated value.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	109	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 14038

Lab ID#: 0605085A-10A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**6050916**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**1.68**	**Date of Analysis:**	**5/9/06 11:56 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
1,1,1-Trichloroethane	0.034	0.15	0.18	0.80
Benzene	0.084	0.36	0.27	1.2
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	0.049	0.18	0.26
Toluene	0.034	2.9	0.13	11
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	1.9	0.23	13
Ethyl Benzene	0.034	0.26	0.14	1.2
m,p-Xylene	0.067	0.90	0.29	3.9
o-Xylene	0.034	0.28	0.14	1.2
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	0.17	0.60	0.61

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 2177

Lab ID#: 0605085A-12A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050917	Date of Collection:	5/3/06
Dil. Factor:	2.68	Date of Analysis:	5/10/06 12:39 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.027	Not Detected	0.068	Not Detected
1,1-Dichloroethene	0.027	Not Detected	0.11	Not Detected
1,1-Dichloroethane	0.054	Not Detected	0.22	Not Detected
cis-1,2-Dichloroethene	0.054	Not Detected	0.21	Not Detected
1,1,1-Trichloroethane	0.054	Not Detected	0.29	Not Detected
Benzene	0.13	0.44	0.43	1.4
1,2-Dichloroethane	0.054	Not Detected	0.22	Not Detected
Trichloroethene	0.054	Not Detected	0.29	Not Detected
Toluene	0.054	0.66	0.20	2.5
1,1,2-Trichloroethane	0.054	Not Detected	0.29	Not Detected
Tetrachloroethene	0.054	1.0	0.36	7.2
Ethyl Benzene	0.054	0.14	0.23	0.61
m,p-Xylene	0.11	0.59	0.46	2.5
o-Xylene	0.054	0.26	0.23	1.1
1,1,2,2-Tetrachloroethane	0.054	Not Detected	0.37	Not Detected
trans-1,2-Dichloroethene	0.27	Not Detected	1.1	Not Detected
Methyl tert-butyl ether	0.27	Not Detected	0.97	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	106	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 23887

Lab ID#: 0605085A-15A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050926	Date of Collection:	5/3/06
Dil. Factor:	1.00	Date of Analysis:	5/10/06 08:15 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	89	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33965

Lab ID#: 0605085A-22A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050918	Date of Collection:	5/2/06
Dil. Factor:	1.61	Date of Analysis:	5/10/06 01:17 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.064	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.13	Not Detected
1,1,1-Trichloroethane	0.032	0.051 J	0.18	0.28
Benzene	0.080	0.094 J	0.26	0.30
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	Not Detected	0.17	Not Detected
Toluene	0.032	0.15 J	0.12	0.57
1,1,2-Trichloroethane	0.032	Not Detected	0.18	Not Detected
Tetrachloroethene	0.032	5.9	0.22	40
Ethyl Benzene	0.032	Not Detected	0.14	Not Detected
m,p-Xylene	0.064	Not Detected	0.28	Not Detected
o-Xylene	0.032	Not Detected	0.14	Not Detected
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.58	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	93	70-130
4-Bromofluorobenzene	107	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34373

Lab ID#: 0605085A-27A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050919	Date of Collection:	5/3/06
Dil. Factor:	1.68	Date of Analysis:	5/10/06 02:09 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Benzene	0.084	0.29	0.27	0.93
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	Not Detected	0.18	Not Detected
Toluene	0.034	0.67	0.13	2.5
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	0.28	0.23	1.9
Ethyl Benzene	0.034	0.089	0.14	0.39
m,p-Xylene	0.067	0.23	0.29	1.0
o-Xylene	0.034	0.080	0.14	0.35
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	Not Detected	0.60	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	99	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34453

Lab ID#: 0605085A-30A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050920	Date of Collection:	5/3/06
Dil. Factor:	1.68	Date of Analysis:	5/10/06 02:52 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	2.2	0.13	8.6
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Benzene	0.084	0.38	0.27	1.2
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	0.55	0.18	3.0
Toluene	0.034	27	0.13	100
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	32	0.23	220
Ethyl Benzene	0.034	0.27	0.14	1.2
m,p-Xylene	0.067	0.65	0.29	2.8
o-Xylene	0.034	0.32	0.14	1.4
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	0.20 J	0.60	0.70 J

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	105	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 4084

Lab ID#: 0605085A-37A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**6050922**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**2.06**	**Date of Analysis:**	**5/10/06 04:32 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.021	Not Detected	0.053	Not Detected
1,1-Dichloroethene	0.021	Not Detected	0.082	Not Detected
1,1-Dichloroethane	0.041	Not Detected	0.17	Not Detected
cis-1,2-Dichloroethene	0.041	1.9	0.16	7.4
1,1,1-Trichloroethane	0.041	Not Detected	0.22	Not Detected
Benzene	0.10	0.37	0.33	1.2
1,2-Dichloroethane	0.041	Not Detected	0.17	Not Detected
Trichloroethene	0.041	0.51	0.22	2.8
Toluene	0.041	24	0.16	91
1,1,2-Trichloroethane	0.041	Not Detected	0.22	Not Detected
Tetrachloroethene	0.041	29	0.28	200
Ethyl Benzene	0.041	0.24	0.18	1.0
m,p-Xylene	0.082	0.56	0.36	2.4
o-Xylene	0.041	0.25	0.18	1.1
1,1,2,2-Tetrachloroethane	0.041	Not Detected	0.28	Not Detected
trans-1,2-Dichloroethene	0.21	Not Detected	0.82	Not Detected
Methyl tert-butyl ether	0.21	Not Detected	0.74	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	108	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 9403

Lab ID#: 0605085A-43A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050923	Date of Collection:	5/3/06
Dil. Factor:	1.58	Date of Analysis:	5/10/06 05:23 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Benzene	0.079	0.30	0.25	0.98
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	0.075	0.17	0.40
Toluene	0.032	1.7	0.12	6.6
1,1,2-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Tetrachloroethene	0.032	8.6	0.21	59
Ethyl Benzene	0.032	0.16	0.14	0.67
m,p-Xylene	0.063	0.48	0.27	2.1
o-Xylene	0.032	0.25	0.14	1.1
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Methyl tert-butyl ether	0.16	0.19	0.57	0.69

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	101	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 9403 Duplicate

Lab ID#: 0605085A-43AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**6050924**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**1.58**	**Date of Analysis:**	**5/10/06 06:14 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Benzene	0.079	0.32	0.25	1.0
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	0.078	0.17	0.42
Toluene	0.032	1.8	0.12	6.9
1,1,2-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Tetrachloroethene	0.032	8.2	0.21	56
Ethyl Benzene	0.032	0.16	0.14	0.69
m,p-Xylene	0.063	0.46	0.27	2.0
o-Xylene	0.032	0.24	0.14	1.1
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Methyl tert-butyl ether	0.16	0.19	0.57	0.70

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	111	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 9940

Lab ID#: 0605085A-44A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050927	Date of Collection:	5/3/06
Dil. Factor:	1.68	Date of Analysis:	5/10/06 08:55 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	0.045 J	0.13	0.18 J
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Benzene	0.084	0.30	0.27	0.97
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	0.068 J	0.18	0.36 J
Toluene	0.034	4.9	0.13	18
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	2.8	0.23	19
Ethyl Benzene	0.034	0.72	0.14	3.1
m,p-Xylene	0.067	3.0	0.29	13
o-Xylene	0.034	0.66	0.14	2.9
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	0.18 J	0.60	0.63 J

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	111	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 9940 Duplicate

Lab ID#: 0605085A-44AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**605092B**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**1.68**	**Date of Analysis:**	**5/10/06 09:59 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	0.041 J	0.13	0.16 J
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Benzene	0.084	0.32	0.27	1.0
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	0.066 J	0.18	0.36 J
Toluene	0.034	5.1	0.13	19
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	2.9	0.23	19
Ethyl Benzene	0.034	0.71	0.14	3.1
m,p-Xylene	0.067	3.0	0.29	13
o-Xylene	0.034	0.68	0.14	3.0
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	0.18 J	0.60	0.63 J

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	93	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	106	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 39426

Lab ID#: 0605085A-36A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**6050921**	**Date of Collection: 5/3/06**	
Dil. Factor:	**1.64**	**Date of Analysis: 5/10/06 03:33 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.016	Not Detected	0.042	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.065	Not Detected
1,1-Dichloroethane	0.033	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.033	Not Detected	0.13	Not Detected
1,1,1-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Benzene	0.082	0.30	0.26	0.96
1,2-Dichloroethane	0.033	Not Detected	0.13	Not Detected
Trichloroethene	0.033	0.034	0.18	0.18
Toluene	0.033	1.0	0.12	3.9
1,1,2-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Tetrachloroethene	0.033	1.3	0.22	8.6
Ethyl Benzene	0.033	0.13	0.14	0.55
m,p-Xylene	0.066	0.34	0.28	1.5
o-Xylene	0.033	0.13	0.14	0.55
1,1,2,2-Tetrachloroethane	0.033	Not Detected	0.22	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Methyl tert-butyl ether	0.16	0.20	0.59	0.72

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	96	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	105	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

4508

Client Sample ID: 04586

Lab ID#: 0605085B-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051111**	**Date of Collection: 5/2/06**	
Dil. Factor:	**2.51**	**Date of Analysis: 5/11/06 06:36 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.25	0.60	1.2	3.0
Freon 114	0.25	Not Detected	1.8	Not Detected
Chloromethane	0.25	1.2	0.52	2.4
Vinyl Chloride	0.25	Not Detected	0.64	Not Detected
1,3-Butadiene	1.2	Not Detected	2.8	Not Detected
Bromomethane	0.25	Not Detected	0.97	Not Detected
Chloroethane	0.25	Not Detected	0.66	Not Detected
Freon 11	0.25	0.34	1.4	1.9
Ethanol	1.2	57	2.4	110
Freon 113	0.25	Not Detected	1.9	Not Detected
1,1-Dichloroethene	0.25	Not Detected	1.0	Not Detected
Acetone	1.2	11	3.0	26
2-Propanol	1.2	99	3.1	240
Carbon Disulfide	1.2	Not Detected	3.9	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	1.2	Not Detected	4.5	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	5.0	Not Detected
Hexane	1.2	Not Detected	4.4	Not Detected
1,1-Dichloroethane	0.25	Not Detected	1.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.2	Not Detected	3.7	Not Detected
cis-1,2-Dichloroethene	0.25	Not Detected	1.0	Not Detected
Tetrahydrofuran	1.2	3.7	3.7	11
Chloroform	0.25	Not Detected	1.2	Not Detected
1,1,1-Trichloroethane	0.25	Not Detected	1.4	Not Detected
Cyclohexane	1.2	Not Detected	4.3	Not Detected
Carbon Tetrachloride	0.25	Not Detected	1.6	Not Detected
Benzene	0.25	0.47	0.80	1.5
1,2-Dichloroethane	0.25	Not Detected	1.0	Not Detected
Heptane	1.2	Not Detected	5.1	Not Detected
Trichloroethene	0.25	Not Detected	1.3	Not Detected
1,2-Dichloropropane	0.25	Not Detected	1.2	Not Detected
1,4-Dioxane	1.2	Not Detected	4.5	Not Detected
Bromodichloromethane	1.2	Not Detected	8.4	Not Detected
cis-1,3-Dichloropropene	0.25	Not Detected	1.1	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	5.1	Not Detected
Toluene	0.25	0.73	0.94	2.8
trans-1,3-Dichloropropene	0.25	Not Detected	1.1	Not Detected
1,1,2-Trichloroethane	0.25	Not Detected	1.4	Not Detected
Tetrachloroethene	0.25	Not Detected	1.7	Not Detected
2-Hexanone	1.2	Not Detected	5.1	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 04586

Lab ID#: 0605085B-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051111	Date of Collection:	5/2/06
Dil. Factor:	2.51	Date of Analysis:	5/11/06 06:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.2	Not Detected	11	Not Detected
1,2-Dibromoethane (EDB)	0.25	Not Detected	1.9	Not Detected
Chlorobenzene	0.25	Not Detected	1.2	Not Detected
Ethyl Benzene	0.25	Not Detected	1.1	Not Detected
m,p-Xylene	0.25	0.69	1.1	3.0
o-Xylene	0.25	Not Detected	1.1	Not Detected
Styrene	0.25	Not Detected	1.1	Not Detected
Bromoform	1.2	Not Detected	13	Not Detected
Cumene	1.2	Not Detected	6.2	Not Detected
1,1,2,2-Tetrachloroethane	0.25	Not Detected	1.7	Not Detected
Propylbenzene	1.2	Not Detected	6.2	Not Detected
4-Ethyltoluene	1.2	Not Detected	6.2	Not Detected
1,3,5-Trimethylbenzene	0.25	Not Detected	1.2	Not Detected
1,2,4-Trimethylbenzene	0.25	Not Detected	1.2	Not Detected
1,3-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
1,4-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
alpha-Chlorotoluene	0.25	Not Detected	1.3	Not Detected
1,2-Dichlorobenzene	0.25	Not Detected	1.5	Not Detected
1,2,4-Trichlorobenzene	1.2	Not Detected	9.3	Not Detected
Hexachlorobutadiene	1.2	Not Detected	13	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05359

Lab ID#: 0605085B-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051113**	**Date of Collection: 5/3/06**	
Dil. Factor:	**1.68**	**Date of Analysis: 5/11/06 08:09 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.17	0.68	0.83	3.4
Freon 114	0.17	Not Detected	1.2	Not Detected
Chloromethane	0.17	0.78	0.35	1.6
Vinyl Chloride	0.17	Not Detected	0.43	Not Detected
1,3-Butadiene	0.84	Not Detected	1.8	Not Detected
Bromomethane	0.17	Not Detected	0.65	Not Detected
Chloroethane	0.17	Not Detected	0.44	Not Detected
Freon 11	0.17	0.36	0.94	2.0
Ethanol	0.84	16	1.6	30
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Acetone	0.84	6.3	2.0	15
2-Propanol	0.84	1.2	2.1	2.9
Carbon Disulfide	0.84	2.2	2.6	6.9
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.84	Not Detected	3.0	Not Detected
trans-1,2-Dichloroethene	0.84	Not Detected	3.3	Not Detected
Hexane	0.84	1.7	3.0	6.0
1,1-Dichloroethane	0.17	Not Detected	0.68	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.84	4.0	2.5	12
cis-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Tetrahydrofuran	0.84	Not Detected	2.5	Not Detected
Chloroform	0.17	Not Detected	0.82	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Carbon Tetrachloride	0.17	Not Detected	1.0	Not Detected
Benzene	0.17	0.50	0.54	1.6
1,2-Dichloroethane	0.17	Not Detected	0.68	Not Detected
Heptane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.17	Not Detected	0.90	Not Detected
1,2-Dichloropropane	0.17	Not Detected	0.78	Not Detected
1,4-Dioxane	0.84	Not Detected	3.0	Not Detected
Bromodichloromethane	0.84	Not Detected	5.6	Not Detected
cis-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
4-Methyl-2-pentanone	0.84	2.1	3.4	8.7
Toluene	0.17	3.4	0.63	13
trans-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
1,1,2-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Tetrachloroethene	0.17	0.89	1.1	6.0
2-Hexanone	0.84	Not Detected	3.4	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05359

Lab ID#: 0605085B-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051113	Date of Collection:	5/3/06
Dil. Factor:	1.68	Date of Analysis:	5/11/06 08:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.84	Not Detected	7.2	Not Detected
1,2-Dibromoethane (EDB)	0.17	Not Detected	1.3	Not Detected
Chlorobenzene	0.17	Not Detected	0.77	Not Detected
Ethyl Benzene	0.17	0.24	0.73	1.0
m,p-Xylene	0.17	0.66	0.73	2.9
o-Xylene	0.17	0.27	0.73	1.2
Styrene	0.17	Not Detected	0.72	Not Detected
Bromoform	0.84	Not Detected	8.7	Not Detected
Cumene	0.84	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.17	Not Detected	1.2	Not Detected
Propylbenzene	0.84	Not Detected	4.1	Not Detected
4-Ethyltoluene	0.84	Not Detected	4.1	Not Detected
1,3,5-Trimethylbenzene	0.17	0.16 J	0.82	0.80 J
1,2,4-Trimethylbenzene	0.17	0.41	0.82	2.0
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.17	Not Detected	0.87	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.84	Not Detected	6.2	Not Detected
Hexachlorobutadiene	0.84	Not Detected	9.0	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05359 Duplicate

Lab ID#: 0605085B-03AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051112**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**4.20**	**Date of Analysis:**	**5/11/06 07:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.42	0.69	2.1	3.4
Freon 114	0.42	Not Detected	2.9	Not Detected
Chloromethane	0.42	1.1	0.87	2.3
Vinyl Chloride	0.42	Not Detected	1.1	Not Detected
1,3-Butadiene	2.1	Not Detected	4.6	Not Detected
Bromomethane	0.42	Not Detected	1.6	Not Detected
Chloroethane	0.42	Not Detected	1.1	Not Detected
Freon 11	0.42	Not Detected	2.4	Not Detected
Ethanol	2.1	16	4.0	30
Freon 113	0.42	Not Detected	3.2	Not Detected
1,1-Dichloroethene	0.42	Not Detected	1.7	Not Detected
Acetone	2.1	6.7	5.0	16
2-Propanol	2.1	Not Detected	5.2	Not Detected
Carbon Disulfide	2.1	2.2	6.5	6.9
Methylene Chloride	0.84	Not Detected	2.9	Not Detected
Methyl tert-butyl ether	2.1	Not Detected	7.6	Not Detected
trans-1,2-Dichloroethene	2.1	Not Detected	8.3	Not Detected
Hexane	2.1	Not Detected	7.4	Not Detected
1,1-Dichloroethane	0.42	Not Detected	1.7	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.1	4.2	6.2	12
cis-1,2-Dichloroethene	0.42	Not Detected	1.7	Not Detected
Tetrahydrofuran	2.1	Not Detected	6.2	Not Detected
Chloroform	0.42	Not Detected	2.0	Not Detected
1,1,1-Trichloroethane	0.42	Not Detected	2.3	Not Detected
Cyclohexane	2.1	Not Detected	7.2	Not Detected
Carbon Tetrachloride	0.42	Not Detected	2.6	Not Detected
Benzene	0.42	0.65	1.3	2.1
1,2-Dichloroethane	0.42	Not Detected	1.7	Not Detected
Heptane	2.1	Not Detected	8.6	Not Detected
Trichloroethene	0.42	Not Detected	2.2	Not Detected
1,2-Dichloropropane	0.42	Not Detected	1.9	Not Detected
1,4-Dioxane	2.1	Not Detected	7.6	Not Detected
Bromodichloromethane	2.1	Not Detected	14	Not Detected
cis-1,3-Dichloropropene	0.42	Not Detected	1.9	Not Detected
4-Methyl-2-pentanone	2.1	2.3	8.6	9.4
Toluene	0.42	3.5	1.6	13
trans-1,3-Dichloropropene	0.42	Not Detected	1.9	Not Detected
1,1,2-Trichloroethane	0.42	Not Detected	2.3	Not Detected
Tetrachloroethene	0.42	0.92	2.8	6.2
2-Hexanone	2.1	Not Detected	8.6	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05359 Duplicate

Lab ID#: 0605085B-03AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051112	Date of Collection:	5/3/06
Dil. Factor:	4.20	Date of Analysis:	5/11/06 07:14 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	2.1	Not Detected	18	Not Detected
1,2-Dibromoethane (EDB)	0.42	Not Detected	3.2	Not Detected
Chlorobenzene	0.42	Not Detected	1.9	Not Detected
Ethyl Benzene	0.42	Not Detected	1.8	Not Detected
m,p-Xylene	0.42	0.74	1.8	3.2
o-Xylene	0.42	Not Detected	1.8	Not Detected
Styrene	0.42	Not Detected	1.8	Not Detected
Bromoform	2.1	Not Detected	22	Not Detected
Cumene	2.1	Not Detected	10	Not Detected
1,1,2,2-Tetrachloroethane	0.42	Not Detected	2.9	Not Detected
Propylbenzene	2.1	Not Detected	10	Not Detected
4-Ethyltoluene	2.1	Not Detected	10	Not Detected
1,3,5-Trimethylbenzene	0.42	Not Detected	2.1	Not Detected
1,2,4-Trimethylbenzene	0.42	0.44	2.1	2.2
1,3-Dichlorobenzene	0.42	Not Detected	2.5	Not Detected
1,4-Dichlorobenzene	0.42	Not Detected	2.5	Not Detected
alpha-Chlorotoluene	0.42	Not Detected	2.2	Not Detected
1,2-Dichlorobenzene	0.42	Not Detected	2.5	Not Detected
1,2,4-Trichlorobenzene	2.1	Not Detected	16	Not Detected
Hexachlorobutadiene	2.1	Not Detected	22	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	105	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05712

Lab ID#: 0605085B-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051114	Date of Collection:	5/2/06
Dil. Factor:	2.36	Date of Analysis:	5/11/06 08:51 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.24	0.58	1.2	2.9
Freon 114	0.24	Not Detected	1.6	Not Detected
Chloromethane	0.24	0.94	0.49	1.9
Vinyl Chloride	0.24	Not Detected	0.60	Not Detected
1,3-Butadiene	1.2	Not Detected	2.6	Not Detected
Bromomethane	0.24	Not Detected	0.92	Not Detected
Chloroethane	0.24	Not Detected	0.62	Not Detected
Freon 11	0.24	0.32	1.3	1.8
Ethanol	1.2	4.5	2.2	8.4
Freon 113	0.24	Not Detected	1.8	Not Detected
1,1-Dichloroethene	0.24	Not Detected	0.94	Not Detected
Acetone	1.2	36	2.8	86
2-Propanol	1.2	1.8	2.9	4.3
Carbon Disulfide	1.2	1.2	3.7	3.7
Methylene Chloride	0.47	Not Detected	1.6	Not Detected
Methyl tert-butyl ether	1.2	1.2	4.2	4.5
trans-1,2-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Hexane	1.2	Not Detected	4.2	Not Detected
1,1-Dichloroethane	0.24	Not Detected	0.96	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.2	Not Detected	3.5	Not Detected
cis-1,2-Dichloroethene	0.24	Not Detected	0.94	Not Detected
Tetrahydrofuran	1.2	Not Detected	3.5	Not Detected
Chloroform	0.24	Not Detected	1.2	Not Detected
1,1,1-Trichloroethane	0.24	Not Detected	1.3	Not Detected
Cyclohexane	1.2	Not Detected	4.1	Not Detected
Carbon Tetrachloride	0.24	Not Detected	1.5	Not Detected
Benzene	0.24	0.54	0.75	1.7
1,2-Dichloroethane	0.24	Not Detected	0.96	Not Detected
Heptane	1.2	Not Detected	4.8	Not Detected
Trichloroethene	0.24	Not Detected	1.3	Not Detected
1,2-Dichloropropane	0.24	Not Detected	1.1	Not Detected
1,4-Dioxane	1.2	Not Detected	4.2	Not Detected
Bromodichloromethane	1.2	Not Detected	7.9	Not Detected
cis-1,3-Dichloropropene	0.24	Not Detected	1.1	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	4.8	Not Detected
Toluene	0.24	4.5	0.89	17
trans-1,3-Dichloropropene	0.24	Not Detected	1.1	Not Detected
1,1,2-Trichloroethane	0.24	Not Detected	1.3	Not Detected
Tetrachloroethene	0.24	0.62	1.6	4.2
2-Hexanone	1.2	Not Detected	4.8	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 05712

Lab ID#: 0605085B-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051114**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**2.36**	**Date of Analysis:**	**5/11/06 08:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	0.24	Not Detected	1.8	Not Detected
Chlorobenzene	0.24	Not Detected	1.1	Not Detected
Ethyl Benzene	0.24	0.30	1.0	1.3
m,p-Xylene	0.24	0.82	1.0	3.5
o-Xylene	0.24	0.35	1.0	1.5
Styrene	0.24	Not Detected	1.0	Not Detected
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.8	Not Detected
1,1,2,2-Tetrachloroethane	0.24	Not Detected	1.6	Not Detected
Propylbenzene	1.2	Not Detected	5.8	Not Detected
4-Ethyltoluene	1.2	Not Detected	5.8	Not Detected
1,3,5-Trimethylbenzene	0.24	Not Detected	1.2	Not Detected
1,2,4-Trimethylbenzene	0.24	0.42	1.2	2.0
1,3-Dichlorobenzene	0.24	Not Detected	1.4	Not Detected
1,4-Dichlorobenzene	0.24	Not Detected	1.4	Not Detected
alpha-Chlorotoluene	0.24	Not Detected	1.2	Not Detected
1,2-Dichlorobenzene	0.24	Not Detected	1.4	Not Detected
1,2,4-Trichlorobenzene	1.2	Not Detected	8.8	Not Detected
Hexachlorobutadiene	1.2	Not Detected	12	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	106	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13655

Lab ID#: 0605085B-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051216**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**134**	**Date of Analysis:**	**5/12/06 09:24 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	13	Not Detected	66	Not Detected
Freon 114	13	Not Detected	94	Not Detected
Chloromethane	13	Not Detected	28	Not Detected
Vinyl Chloride	13	Not Detected	34	Not Detected
1,3-Butadiene	67	Not Detected	150	Not Detected
Bromomethane	13	Not Detected	52	Not Detected
Chloroethane	13	Not Detected	35	Not Detected
Freon 11	13	Not Detected	75	Not Detected
Ethanol	67	Not Detected	130	Not Detected
Freon 113	13	Not Detected	100	Not Detected
1,1-Dichloroethene	13	Not Detected	53	Not Detected
Acetone	67	Not Detected	160	Not Detected
2-Propanol	67	Not Detected	160	Not Detected
Carbon Disulfide	67	Not Detected	210	Not Detected
Methylene Chloride	27	Not Detected	93	Not Detected
Methyl tert-butyl ether	67	Not Detected	240	Not Detected
trans-1,2-Dichloroethene	67	Not Detected	260	Not Detected
Hexane	67	Not Detected	240	Not Detected
1,1-Dichloroethane	13	Not Detected	54	Not Detected
2-Butanone (Methyl Ethyl Ketone)	67	Not Detected	200	Not Detected
cis-1,2-Dichloroethene	13	100	53	410
Tetrahydrofuran	67	Not Detected	200	Not Detected
Chloroform	13	Not Detected	65	Not Detected
1,1,1-Trichloroethane	13	Not Detected	73	Not Detected
Cyclohexane	67	Not Detected	230	Not Detected
Carbon Tetrachloride	13	Not Detected	84	Not Detected
Benzene	13	Not Detected	43	Not Detected
1,2-Dichloroethane	13	Not Detected	54	Not Detected
Heptane	67	Not Detected	270	Not Detected
Trichloroethene	13	150	72	830
1,2-Dichloropropane	13	Not Detected	62	Not Detected
1,4-Dioxane	67	Not Detected	240	Not Detected
Bromodichloromethane	67	Not Detected	450	Not Detected
cis-1,3-Dichloropropene	13	Not Detected	61	Not Detected
4-Methyl-2-pentanone	67	Not Detected	270	Not Detected
Toluene	13	Not Detected	50	Not Detected
trans-1,3-Dichloropropene	13	Not Detected	61	Not Detected
1,1,2-Trichloroethane	13	Not Detected	73	Not Detected
Tetrachloroethene	13	4300	91	29000
2-Hexanone	67	Not Detected	270	Not Detected

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13655

Lab ID#: 0605085B-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051216	Date of Collection:	5/3/06
Dil. Factor:	134	Date of Analysis:	5/12/06 09:24 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	67	Not Detected	570	Not Detected
1,2-Dibromoethane (EDB)	13	Not Detected	100	Not Detected
Chlorobenzene	13	Not Detected	62	Not Detected
Ethyl Benzene	13	Not Detected	58	Not Detected
m,p-Xylene	13	Not Detected	58	Not Detected
o-Xylene	13	Not Detected	58	Not Detected
Styrene	13	Not Detected	57	Not Detected
Bromoform	67	Not Detected	690	Not Detected
Cumene	67	Not Detected	330	Not Detected
1,1,2,2-Tetrachloroethane	13	Not Detected	92	Not Detected
Propylbenzene	67	Not Detected	330	Not Detected
4-Ethyltoluene	67	Not Detected	330	Not Detected
1,3,5-Trimethylbenzene	13	Not Detected	66	Not Detected
1,2,4-Trimethylbenzene	13	Not Detected	66	Not Detected
1,3-Dichlorobenzene	13	Not Detected	80	Not Detected
1,4-Dichlorobenzene	13	Not Detected	80	Not Detected
alpha-Chlorotoluene	13	Not Detected	69	Not Detected
1,2-Dichlorobenzene	13	Not Detected	80	Not Detected
1,2,4-Trichlorobenzene	67	Not Detected	500	Not Detected
Hexachlorobutadiene	67	Not Detected	710	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	100	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13843

Lab ID#: 0605085B-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051115**	**Date of Collection: 5/3/06**	
Dil. Factor:	**1.64**	**Date of Analysis: 5/11/06 09:30 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.16	0.66	0.81	3.2
Freon 114	0.16	Not Detected	1.1	Not Detected
Chloromethane	0.16	Not Detected	0.34	Not Detected
Vinyl Chloride	0.16	Not Detected	0.42	Not Detected
1,3-Butadiene	0.82	Not Detected	1.8	Not Detected
Bromomethane	0.16	Not Detected	0.64	Not Detected
Chloroethane	0.16	Not Detected	0.43	Not Detected
Freon 11	0.16	0.63	0.92	3.6
Ethanol	0.82	Not Detected	1.5	Not Detected
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Acetone	0.82	1.5	1.9	3.5
2-Propanol	0.82	Not Detected	2.0	Not Detected
Carbon Disulfide	0.82	Not Detected	2.6	Not Detected
Methylene Chloride	0.33	Not Detected	1.1	Not Detected
Methyl tert-butyl ether	0.82	Not Detected	3.0	Not Detected
trans-1,2-Dichloroethene	0.82	Not Detected	3.2	Not Detected
Hexane	0.82	Not Detected	2.9	Not Detected
1,1-Dichloroethane	0.16	Not Detected	0.66	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.82	Not Detected	2.4	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Tetrahydrofuran	0.82	Not Detected	2.4	Not Detected
Chloroform	0.16	Not Detected	0.80	Not Detected
1,1,1-Trichloroethane	0.16	0.40	0.89	2.2
Cyclohexane	0.82	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.16	Not Detected	1.0	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
1,2-Dichloroethane	0.16	Not Detected	0.66	Not Detected
Heptane	0.82	Not Detected	3.4	Not Detected
Trichloroethene	0.16	Not Detected	0.88	Not Detected
1,2-Dichloropropane	0.16	Not Detected	0.76	Not Detected
1,4-Dioxane	0.82	Not Detected	3.0	Not Detected
Bromodichloromethane	0.82	Not Detected	5.5	Not Detected
cis-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
4-Methyl-2-pentanone	0.82	Not Detected	3.4	Not Detected
Toluene	0.16	Not Detected	0.62	Not Detected
trans-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
1,1,2-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Tetrachloroethene	0.16	2.5	1.1	17
2-Hexanone	0.82	Not Detected	3.4	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13843

Lab ID#: 0605085B-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051115	Date of Collection:	5/3/06
Dil. Factor:	1.64	Date of Analysis:	5/11/06 09:30 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.82	Not Detected	7.0	Not Detected
1,2-Dibromoethane (EDB)	0.16	Not Detected	1.3	Not Detected
Chlorobenzene	0.16	Not Detected	0.76	Not Detected
Ethyl Benzene	0.16	Not Detected	0.71	Not Detected
m,p-Xylene	0.16	Not Detected	0.71	Not Detected
o-Xylene	0.16	Not Detected	0.71	Not Detected
Styrene	0.16	Not Detected	0.70	Not Detected
Bromoform	0.82	Not Detected	8.5	Not Detected
Cumene	0.82	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.16	Not Detected	1.1	Not Detected
Propylbenzene	0.82	Not Detected	4.0	Not Detected
4-Ethyltoluene	0.82	Not Detected	4.0	Not Detected
1,3,5-Trimethylbenzene	0.16	Not Detected	0.81	Not Detected
1,2,4-Trimethylbenzene	0.16	Not Detected	0.81	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
alpha-Chlorotoluene	0.16	Not Detected	0.85	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,2,4-Trichlorobenzene	0.82	Not Detected	6.1	Not Detected
Hexachlorobutadiene	0.82	Not Detected	8.7	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	105	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13853

Lab ID#: 0605085B-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051116**	**Date of Collection: 5/2/06**	
Dil. Factor:	**1.68**	**Date of Analysis: 5/11/06 11:19 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.17	0.71	0.83	3.5
Freon 114	0.17	Not Detected	1.2	Not Detected
Chloromethane	0.17	1.0	0.35	2.1
Vinyl Chloride	0.17	Not Detected	0.43	Not Detected
1,3-Butadiene	0.84	Not Detected	1.8	Not Detected
Bromomethane	0.17	Not Detected	0.65	Not Detected
Chloroethane	0.17	Not Detected	0.44	Not Detected
Freon 11	0.17	0.33	0.94	1.8
Ethanol	0.84	3.6	1.6	6.9
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Acetone	0.84	7.1	2.0	17
2-Propanol	0.84	Not Detected	2.1	Not Detected
Carbon Disulfide	0.84	Not Detected	2.6	Not Detected
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.84	1.6	3.0	5.9
trans-1,2-Dichloroethene	0.84	Not Detected	3.3	Not Detected
Hexane	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.17	Not Detected	0.68	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.84	Not Detected	2.5	Not Detected
cis-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Tetrahydrofuran	0.84	Not Detected	2.5	Not Detected
Chloroform	0.17	Not Detected	0.82	Not Detected
1,1,1-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Carbon Tetrachloride	0.17	Not Detected	1.0	Not Detected
Benzene	0.17	0.50	0.54	1.6
1,2-Dichloroethane	0.17	Not Detected	0.68	Not Detected
Heptane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.17	Not Detected	0.90	Not Detected
1,2-Dichloropropane	0.17	Not Detected	0.78	Not Detected
1,4-Dioxane	0.84	Not Detected	3.0	Not Detected
Bromodichloromethane	0.84	Not Detected	5.6	Not Detected
cis-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
4-Methyl-2-pentanone	0.84	Not Detected	3.4	Not Detected
Toluene	0.17	1.9	0.63	7.3
trans-1,3-Dichloropropene	0.17	Not Detected	0.76	Not Detected
1,1,2-Trichloroethane	0.17	Not Detected	0.92	Not Detected
Tetrachloroethene	0.17	0.37	1.1	2.5
2-Hexanone	0.84	Not Detected	3.4	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 13853

Lab ID#: 0605085B-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051116	Date of Collection:	5/2/06
Dil. Factor:	1.68	Date of Analysis:	5/11/06 11:19 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.84	Not Detected	7.2	Not Detected
1,2-Dibromoethane (EDB)	0.17	Not Detected	1.3	Not Detected
Chlorobenzene	0.17	Not Detected	0.77	Not Detected
Ethyl Benzene	0.17	0.29	0.73	1.2
m,p-Xylene	0.17	0.83	0.73	3.6
o-Xylene	0.17	0.32	0.73	1.4
Styrene	0.17	Not Detected	0.72	Not Detected
Bromoform	0.84	Not Detected	8.7	Not Detected
Cumene	0.84	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.17	Not Detected	1.2	Not Detected
Propylbenzene	0.84	Not Detected	4.1	Not Detected
4-Ethyltoluene	0.84	Not Detected	4.1	Not Detected
1,3,5-Trimethylbenzene	0.17	Not Detected	0.82	Not Detected
1,2,4-Trimethylbenzene	0.17	0.37	0.82	1.8
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.17	Not Detected	0.87	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.84	Not Detected	6.2	Not Detected
Hexachlorobutadiene	0.84	Not Detected	9.0	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	105	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 14885

Lab ID#: 0605085B-11A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051117**	**Date of Collection: 5/2/06**	
Dil. Factor:	**2.68**	**Date of Analysis: 5/12/06 12:15 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.27	0.63	1.3	3.1
Freon 114	0.27	Not Detected	1.9	Not Detected
Chloromethane	0.27	0.60	0.55	1.2
Vinyl Chloride	0.27	Not Detected	0.68	Not Detected
1,3-Butadiene	1.3	Not Detected	3.0	Not Detected
Bromomethane	0.27	Not Detected	1.0	Not Detected
Chloroethane	0.27	Not Detected	0.71	Not Detected
Freon 11	0.27	0.31	1.5	1.7
Ethanol	1.3	4.9	2.5	9.2
Freon 113	0.27	Not Detected	2.0	Not Detected
1,1-Dichloroethene	0.27	Not Detected	1.1	Not Detected
Acetone	1.3	110 E	3.2	270 E
2-Propanol	1.3	1.9	3.3	4.7
Carbon Disulfide	1.3	Not Detected	4.2	Not Detected
Methylene Chloride	0.54	1.1	1.9	3.8
Methyl tert-butyl ether	1.3	Not Detected	4.8	Not Detected
trans-1,2-Dichloroethene	1.3	Not Detected	5.3	Not Detected
Hexane	1.3	Not Detected	4.7	Not Detected
1,1-Dichloroethane	0.27	Not Detected	1.1	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.3	3.6	4.0	11
cis-1,2-Dichloroethene	0.27	Not Detected	1.1	Not Detected
Tetrahydrofuran	1.3	Not Detected	4.0	Not Detected
Chloroform	0.27	Not Detected	1.3	Not Detected
1,1,1-Trichloroethane	0.27	Not Detected	1.5	Not Detected
Cyclohexane	1.3	Not Detected	4.6	Not Detected
Carbon Tetrachloride	0.27	Not Detected	1.7	Not Detected
Benzene	0.27	0.50	0.86	1.6
1,2-Dichloroethane	0.27	Not Detected	1.1	Not Detected
Heptane	1.3	Not Detected	5.5	Not Detected
Trichloroethene	0.27	Not Detected	1.4	Not Detected
1,2-Dichloropropane	0.27	Not Detected	1.2	Not Detected
1,4-Dioxane	1.3	Not Detected	4.8	Not Detected
Bromodichloromethane	1.3	Not Detected	9.0	Not Detected
cis-1,3-Dichloropropene	0.27	Not Detected	1.2	Not Detected
4-Methyl-2-pentanone	1.3	4.9	5.5	20
Toluene	0.27	25	1.0	96
trans-1,3-Dichloropropene	0.27	Not Detected	1.2	Not Detected
1,1,2-Trichloroethane	0.27	Not Detected	1.5	Not Detected
Tetrachloroethene	0.27	Not Detected	1.8	Not Detected
2-Hexanone	1.3	Not Detected	5.5	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 14885

Lab ID#: 0605085B-11A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051117	Date of Collection:	5/2/06
Dil. Factor:	2.68	Date of Analysis:	5/12/06 12:15 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.3	Not Detected	11	Not Detected
1,2-Dibromoethane (EDB)	0.27	Not Detected	2.0	Not Detected
Chlorobenzene	0.27	Not Detected	1.2	Not Detected
Ethyl Benzene	0.27	0.62	1.2	2.7
m,p-Xylene	0.27	1.9	1.2	8.2
o-Xylene	0.27	0.60	1.2	2.6
Styrene	0.27	Not Detected	1.1	Not Detected
Bromoform	1.3	Not Detected	14	Not Detected
Cumene	1.3	Not Detected	6.6	Not Detected
1,1,2,2-Tetrachloroethane	0.27	Not Detected	1.8	Not Detected
Propylbenzene	1.3	Not Detected	6.6	Not Detected
4-Ethyltoluene	1.3	Not Detected	6.6	Not Detected
1,3,5-Trimethylbenzene	0.27	Not Detected	1.3	Not Detected
1,2,4-Trimethylbenzene	0.27	0.43	1.3	2.1
1,3-Dichlorobenzene	0.27	Not Detected	1.6	Not Detected
1,4-Dichlorobenzene	0.27	Not Detected	1.6	Not Detected
alpha-Chlorotoluene	0.27	Not Detected	1.4	Not Detected
1,2-Dichlorobenzene	0.27	Not Detected	1.6	Not Detected
1,2,4-Trichlorobenzene	1.3	Not Detected	9.9	Not Detected
Hexachlorobutadiene	1.3	Not Detected	14	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 2387

Lab ID#: 0605085B-13A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051217**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**1.64**	**Date of Analysis:**	**5/12/06 10:02 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.16	0.67	0.81	3.3
Freon 114	0.16	Not Detected	1.1	Not Detected
Chloromethane	0.16	0.76	0.34	1.6
Vinyl Chloride	0.16	Not Detected	0.42	Not Detected
1,3-Butadiene	0.82	Not Detected	1.8	Not Detected
Bromomethane	0.16	Not Detected	0.64	Not Detected
Chloroethane	0.16	Not Detected	0.43	Not Detected
Freon 11	0.16	0.32	0.92	1.8
Ethanol	0.82	4.2	1.5	8.0
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Acetone	0.82	5.4	1.9	13
2-Propanol	0.82	Not Detected	2.0	Not Detected
Carbon Disulfide	0.82	Not Detected	2.6	Not Detected
Methylene Chloride	0.33	Not Detected	1.1	Not Detected
Methyl tert-butyl ether	0.82	Not Detected	3.0	Not Detected
trans-1,2-Dichloroethene	0.82	Not Detected	3.2	Not Detected
Hexane	0.82	Not Detected	2.9	Not Detected
1,1-Dichloroethane	0.16	Not Detected	0.66	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.82	Not Detected	2.4	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Tetrahydrofuran	0.82	Not Detected	2.4	Not Detected
Chloroform	0.16	Not Detected	0.80	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Cyclohexane	0.82	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.16	Not Detected	1.0	Not Detected
Benzene	0.16	0.27	0.52	0.88
1,2-Dichloroethane	0.16	Not Detected	0.66	Not Detected
Heptane	0.82	Not Detected	3.4	Not Detected
Trichloroethene	0.16	Not Detected	0.88	Not Detected
1,2-Dichloropropane	0.16	Not Detected	0.76	Not Detected
1,4-Dioxane	0.82	Not Detected	3.0	Not Detected
Bromodichloromethane	0.82	Not Detected	5.5	Not Detected
cis-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
4-Methyl-2-pentanone	0.82	Not Detected	3.4	Not Detected
Toluene	0.16	0.57	0.62	2.1
trans-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
1,1,2-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Tetrachloroethene	0.16	0.69	1.1	4.7
2-Hexanone	0.82	Not Detected	3.4	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 23886

Lab ID#: 0605085B-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051509**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**41.0**	**Date of Analysis:**	**5/15/06 06:48 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	4.1	Not Detected	20	Not Detected
Freon 114	4.1	Not Detected	29	Not Detected
Chloromethane	4.1	Not Detected	8.5	Not Detected
Vinyl Chloride	4.1	Not Detected	10	Not Detected
1,3-Butadiene	20	Not Detected	45	Not Detected
Bromomethane	4.1	Not Detected	16	Not Detected
Chloroethane	4.1	Not Detected	11	Not Detected
Freon 11	4.1	Not Detected	23	Not Detected
Ethanol	20	Not Detected	39	Not Detected
Freon 113	4.1	Not Detected	31	Not Detected
1,1-Dichloroethene	4.1	Not Detected	16	Not Detected
Acetone	20	Not Detected	49	Not Detected
2-Propanol	20	Not Detected	50	Not Detected
Carbon Disulfide	20	Not Detected	64	Not Detected
Methylene Chloride	8.2	Not Detected	28	Not Detected
Methyl tert-butyl ether	20	Not Detected	74	Not Detected
trans-1,2-Dichloroethene	20	Not Detected	81	Not Detected
Hexane	20	Not Detected	72	Not Detected
1,1-Dichloroethane	4.1	Not Detected	16	Not Detected
2-Butanone (Methyl Ethyl Ketone)	20	Not Detected	60	Not Detected
cis-1,2-Dichloroethene	4.1	Not Detected	16	Not Detected
Tetrahydrofuran	20	Not Detected	60	Not Detected
Chloroform	4.1	Not Detected	20	Not Detected
1,1,1-Trichloroethane	4.1	Not Detected	22	Not Detected
Cyclohexane	20	Not Detected	70	Not Detected
Carbon Tetrachloride	4.1	Not Detected	26	Not Detected
Benzene	4.1	Not Detected	13	Not Detected
1,2-Dichloroethane	4.1	Not Detected	16	Not Detected
Heptane	20	Not Detected	84	Not Detected
Trichloroethene	4.1	32	22	170
1,2-Dichloropropane	4.1	Not Detected	19	Not Detected
1,4-Dioxane	20	Not Detected	74	Not Detected
Bromodichloromethane	20	Not Detected	140	Not Detected
cis-1,3-Dichloropropene	4.1	Not Detected	19	Not Detected
4-Methyl-2-pentanone	20	Not Detected	84	Not Detected
Toluene	4.1	11	15	42
trans-1,3-Dichloropropene	4.1	Not Detected	19	Not Detected
1,1,2-Trichloroethane	4.1	Not Detected	22	Not Detected
Tetrachloroethene	4.1	1000	28	6800
2-Hexanone	20	Not Detected	84	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 23886

Lab ID#: 0605085B-14A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051509**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**41.0**	**Date of Analysis:**	**5/15/06 06:48 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	20	Not Detected	170	Not Detected
1,2-Dibromoethane (EDB)	4.1	Not Detected	32	Not Detected
Chlorobenzene	4.1	Not Detected	19	Not Detected
Ethyl Benzene	4.1	Not Detected	18	Not Detected
m,p-Xylene	4.1	9.4	18	41
o-Xylene	4.1	4.0 J	18	17 J
Styrene	4.1	Not Detected	17	Not Detected
Bromoform	20	Not Detected	210	Not Detected
Cumene	20	Not Detected	100	Not Detected
1,1,2,2-Tetrachloroethane	4.1	Not Detected	28	Not Detected
Propylbenzene	20	Not Detected	100	Not Detected
4-Ethyltoluene	20	Not Detected	100	Not Detected
1,3,5-Trimethylbenzene	4.1	Not Detected	20	Not Detected
1,2,4-Trimethylbenzene	4.1	Not Detected	20	Not Detected
1,3-Dichlorobenzene	4.1	Not Detected	25	Not Detected
1,4-Dichlorobenzene	4.1	Not Detected	25	Not Detected
alpha-Chlorotoluene	4.1	Not Detected	21	Not Detected
1,2-Dichlorobenzene	4.1	Not Detected	25	Not Detected
1,2,4-Trichlorobenzene	20	Not Detected	150	Not Detected
Hexachlorobutadiene	20	Not Detected	220	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	106	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 23997

Lab ID#: 0605085B-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051123**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**210**	**Date of Analysis:**	**5/12/06 05:42 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	21	Not Detected	100	Not Detected
Freon 114	21	Not Detected	150	Not Detected
Chloromethane	21	Not Detected	43	Not Detected
Vinyl Chloride	21	Not Detected	54	Not Detected
1,3-Butadiene	100	Not Detected	230	Not Detected
Bromomethane	21	Not Detected	82	Not Detected
Chloroethane	21	Not Detected	55	Not Detected
Freon 11	21	Not Detected	120	Not Detected
Ethanol	100	Not Detected	200	Not Detected
Freon 113	21	Not Detected	160	Not Detected
1,1-Dichloroethene	21	Not Detected	83	Not Detected
Acetone	100	Not Detected	250	Not Detected
2-Propanol	100	Not Detected	260	Not Detected
Carbon Disulfide	100	Not Detected	330	Not Detected
Methylene Chloride	42	Not Detected	140	Not Detected
Methyl tert-butyl ether	100	Not Detected	380	Not Detected
trans-1,2-Dichloroethene	100	Not Detected	420	Not Detected
Hexane	100	Not Detected	370	Not Detected
1,1-Dichloroethane	21	Not Detected	85	Not Detected
2-Butanone (Methyl Ethyl Ketone)	100	Not Detected	310	Not Detected
cis-1,2-Dichloroethene	21	20 J	83	79 J
Tetrahydrofuran	100	Not Detected	310	Not Detected
Chloroform	21	Not Detected	100	Not Detected
1,1,1-Trichloroethane	21	Not Detected	110	Not Detected
Cyclohexane	100	Not Detected	360	Not Detected
Carbon Tetrachloride	21	Not Detected	130	Not Detected
Benzene	21	Not Detected	67	Not Detected
1,2-Dichloroethane	21	Not Detected	85	Not Detected
Heptane	100	Not Detected	430	Not Detected
Trichloroethene	21	140	110	730
1,2-Dichloropropane	21	Not Detected	97	Not Detected
1,4-Dioxane	100	Not Detected	380	Not Detected
Bromodichloromethane	100	Not Detected	700	Not Detected
cis-1,3-Dichloropropene	21	Not Detected	95	Not Detected
4-Methyl-2-pentanone	100	Not Detected	430	Not Detected
Toluene	21	Not Detected	79	Not Detected
trans-1,3-Dichloropropene	21	Not Detected	95	Not Detected
1,1,2-Trichloroethane	21	Not Detected	110	Not Detected
Tetrachloroethene	21	6200	140	42000
2-Hexanone	100	Not Detected	430	Not Detected

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 23997

Lab ID#: 0605085B-16A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051123**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**210**	**Date of Analysis:**	**5/12/06 05:42 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	100	Not Detected	890	Not Detected
1,2-Dibromoethane (EDB)	21	Not Detected	160	Not Detected
Chlorobenzene	21	Not Detected	97	Not Detected
Ethyl Benzene	21	Not Detected	91	Not Detected
m,p-Xylene	21	Not Detected	91	Not Detected
o-Xylene	21	Not Detected	91	Not Detected
Styrene	21	Not Detected	89	Not Detected
Bromoform	100	Not Detected	1100	Not Detected
Cumene	100	Not Detected	520	Not Detected
1,1,2,2-Tetrachloroethane	21	Not Detected	140	Not Detected
Propylbenzene	100	Not Detected	520	Not Detected
4-Ethyltoluene	100	Not Detected	520	Not Detected
1,3,5-Trimethylbenzene	21	Not Detected	100	Not Detected
1,2,4-Trimethylbenzene	21	Not Detected	100	Not Detected
1,3-Dichlorobenzene	21	Not Detected	130	Not Detected
1,4-Dichlorobenzene	21	Not Detected	130	Not Detected
alpha-Chlorotoluene	21	Not Detected	110	Not Detected
1,2-Dichlorobenzene	21	Not Detected	130	Not Detected
1,2,4-Trichlorobenzene	100	Not Detected	780	Not Detected
Hexachlorobutadiene	100	Not Detected	1100	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	110	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 24484

Lab ID#: 0605085B-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051126	Date of Collection:	5/3/06
Dil. Factor:	1.71	Date of Analysis:	5/12/06 08:20 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.17	0.59	0.84	2.9
Freon 114	0.17	Not Detected	1.2	Not Detected
Chloromethane	0.17	0.86	0.35	1.8
Vinyl Chloride	0.17	Not Detected	0.44	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Bromomethane	0.17	Not Detected	0.66	Not Detected
Chloroethane	0.17	Not Detected	0.45	Not Detected
Freon 11	0.17	0.32	0.96	1.8
Ethanol	0.86	200 E	1.6	380 E
Freon 113	0.17	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.17	Not Detected	0.68	Not Detected
Acetone	0.86	9.6	2.0	23
2-Propanol	0.86	6.4	2.1	16
Carbon Disulfide	0.86	Not Detected	2.7	Not Detected
Methylene Chloride	0.34	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.86	Not Detected	3.1	Not Detected
trans-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Hexane	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.17	Not Detected	0.69	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.86	0.92	2.5	2.7
cis-1,2-Dichloroethene	0.17	Not Detected	0.68	Not Detected
Tetrahydrofuran	0.86	Not Detected	2.5	Not Detected
Chloroform	0.17	0.37	0.83	1.8
1,1,1-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Cyclohexane	0.86	Not Detected	2.9	Not Detected
Carbon Tetrachloride	0.17	Not Detected	1.1	Not Detected
Benzene	0.17	0.43	0.55	1.4
1,2-Dichloroethane	0.17	Not Detected	0.69	Not Detected
Heptane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.17	Not Detected	0.92	Not Detected
1,2-Dichloropropane	0.17	Not Detected	0.79	Not Detected
1,4-Dioxane	0.86	Not Detected	3.1	Not Detected
Bromodichloromethane	0.86	Not Detected	5.7	Not Detected
cis-1,3-Dichloropropene	0.17	Not Detected	0.78	Not Detected
4-Methyl-2-pentanone	0.86	Not Detected	3.5	Not Detected
Toluene	0.17	1.2	0.64	4.6
trans-1,3-Dichloropropene	0.17	Not Detected	0.78	Not Detected
1,1,2-Trichloroethane	0.17	Not Detected	0.93	Not Detected
Tetrachloroethene	0.17	1.5	1.2	10
2-Hexanone	0.86	Not Detected	3.5	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 24484

Lab ID#: 0605085B-17A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051126**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**1.71**	**Date of Analysis:**	**5/12/06 08:20 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.86	Not Detected	7.3	Not Detected
1,2-Dibromoethane (EDB)	0.17	Not Detected	1.3	Not Detected
Chlorobenzene	0.17	Not Detected	0.79	Not Detected
Ethyl Benzene	0.17	0.21	0.74	0.92
m,p-Xylene	0.17	0.50	0.74	2.2
o-Xylene	0.17	0.18	0.74	0.80
Styrene	0.17	Not Detected	0.73	Not Detected
Bromoform	0.86	Not Detected	8.8	Not Detected
Cumene	0.86	Not Detected	4.2	Not Detected
1,1,2,2-Tetrachloroethane	0.17	Not Detected	1.2	Not Detected
Propylbenzene	0.86	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.86	Not Detected	4.2	Not Detected
1,3,5-Trimethylbenzene	0.17	Not Detected	0.84	Not Detected
1,2,4-Trimethylbenzene	0.17	Not Detected	0.84	Not Detected
1,3-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.17	Not Detected	0.88	Not Detected
1,2-Dichlorobenzene	0.17	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.86	Not Detected	6.3	Not Detected
Hexachlorobutadiene	0.86	Not Detected	9.1	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 32109

Lab ID#: 0605085B-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051214	Date of Collection:	5/2/06
Dil. Factor:	2.06	Date of Analysis:	5/12/06 08:05 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.21	0.63	1.0	3.1
Freon 114	0.21	Not Detected	1.4	Not Detected
Chloromethane	0.21	1.0	0.42	2.1
Vinyl Chloride	0.21	Not Detected	0.53	Not Detected
1,3-Butadiene	1.0	Not Detected	2.3	Not Detected
Bromomethane	0.21	Not Detected	0.80	Not Detected
Chloroethane	0.21	Not Detected	0.54	Not Detected
Freon 11	0.21	0.30	1.2	1.6
Ethanol	1.0	4.1	1.9	7.7
Freon 113	0.21	Not Detected	1.6	Not Detected
1,1-Dichloroethene	0.21	Not Detected	0.82	Not Detected
Acetone	1.0	11	2.4	26
2-Propanol	1.0	Not Detected	2.5	Not Detected
Carbon Disulfide	1.0	Not Detected	3.2	Not Detected
Methylene Chloride	0.41	Not Detected	1.4	Not Detected
Methyl tert-butyl ether	1.0	1.6	3.7	5.7
trans-1,2-Dichloroethene	1.0	Not Detected	4.1	Not Detected
Hexane	1.0	Not Detected	3.6	Not Detected
1,1-Dichloroethane	0.21	Not Detected	0.83	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.0	1.1	3.0	3.4
cis-1,2-Dichloroethene	0.21	Not Detected	0.82	Not Detected
Tetrahydrofuran	1.0	Not Detected	3.0	Not Detected
Chloroform	0.21	Not Detected	1.0	Not Detected
1,1,1-Trichloroethane	0.21	Not Detected	1.1	Not Detected
Cyclohexane	1.0	Not Detected	3.5	Not Detected
Carbon Tetrachloride	0.21	Not Detected	1.3	Not Detected
Benzene	0.21	0.48	0.66	1.5
1,2-Dichloroethane	0.21	Not Detected	0.83	Not Detected
Heptane	1.0	Not Detected	4.2	Not Detected
Trichloroethene	0.21	Not Detected	1.1	Not Detected
1,2-Dichloropropane	0.21	Not Detected	0.95	Not Detected
1,4-Dioxane	1.0	Not Detected	3.7	Not Detected
Bromodichloromethane	1.0	Not Detected	6.9	Not Detected
cis-1,3-Dichloropropene	0.21	Not Detected	0.93	Not Detected
4-Methyl-2-pentanone	1.0	Not Detected	4.2	Not Detected
Toluene	0.21	2.0	0.78	7.7
trans-1,3-Dichloropropene	0.21	Not Detected	0.93	Not Detected
1,1,2-Trichloroethane	0.21	Not Detected	1.1	Not Detected
Tetrachloroethene	0.21	0.38	1.4	2.6
2-Hexanone	1.0	Not Detected	4.2	Not Detected

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 32109

Lab ID#: 0605085B-18A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051214**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**2.06**	**Date of Analysis:**	**5/12/06 08:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.0	Not Detected	8.8	Not Detected
1,2-Dibromoethane (EDB)	0.21	Not Detected	1.6	Not Detected
Chlorobenzene	0.21	Not Detected	0.95	Not Detected
Ethyl Benzene	0.21	0.27	0.89	1.2
m,p-Xylene	0.21	0.82	0.89	3.6
o-Xylene	0.21	0.26	0.89	1.2
Styrene	0.21	Not Detected	0.88	Not Detected
Bromoform	1.0	Not Detected	11	Not Detected
Cumene	1.0	Not Detected	5.1	Not Detected
1,1,2,2-Tetrachloroethane	0.21	Not Detected	1.4	Not Detected
Propylbenzene	1.0	Not Detected	5.1	Not Detected
4-Ethyltoluene	1.0	Not Detected	5.1	Not Detected
1,3,5-Trimethylbenzene	0.21	Not Detected	1.0	Not Detected
1,2,4-Trimethylbenzene	0.21	0.28	1.0	1.4
1,3-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
1,4-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
alpha-Chlorotoluene	0.21	Not Detected	1.1	Not Detected
1,2-Dichlorobenzene	0.21	Not Detected	1.2	Not Detected
1,2,4-Trichlorobenzene	1.0	Not Detected	7.6	Not Detected
Hexachlorobutadiene	1.0	Not Detected	11	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33568

Lab ID#: 0605085B-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051124	Date of Collection:	5/2/06
Dil. Factor:	1.00	Date of Analysis:	5/12/06 06:37 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.10	Not Detected	0.49	Not Detected
Freon 114	0.10	Not Detected	0.70	Not Detected
Chloromethane	0.10	Not Detected	0.21	Not Detected
Vinyl Chloride	0.10	Not Detected	0.26	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.10	Not Detected	0.39	Not Detected
Chloroethane	0.10	Not Detected	0.26	Not Detected
Freon 11	0.10	Not Detected	0.56	Not Detected
Ethanol	0.50	Not Detected	0.94	Not Detected
Freon 113	0.10	Not Detected	0.77	Not Detected
1,1-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Acetone	0.50	Not Detected	1.2	Not Detected
2-Propanol	0.50	Not Detected	1.2	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
Methylene Chloride	0.20	Not Detected	0.69	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.10	Not Detected	0.40	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.10	Not Detected	0.49	Not Detected
1,1,1-Trichloroethane	0.10	Not Detected	0.54	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.10	Not Detected	0.63	Not Detected
Benzene	0.10	Not Detected	0.32	Not Detected
1,2-Dichloroethane	0.10	Not Detected	0.40	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.10	Not Detected	0.54	Not Detected
1,2-Dichloropropane	0.10	Not Detected	0.46	Not Detected
1,4-Dioxane	0.50	Not Detected	1.8	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.10	Not Detected	0.45	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.10	Not Detected	0.38	Not Detected
trans-1,3-Dichloropropene	0.10	Not Detected	0.45	Not Detected
1,1,2-Trichloroethane	0.10	Not Detected	0.54	Not Detected
Tetrachloroethene	0.10	Not Detected	0.68	Not Detected
2-Hexanone	0.50	Not Detected	2.0	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33568

Lab ID#: 0605085B-19A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051124**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**1.00**	**Date of Analysis:**	**5/12/06 06:37 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.10	Not Detected	0.77	Not Detected
Chlorobenzene	0.10	Not Detected	0.46	Not Detected
Ethyl Benzene	0.10	Not Detected	0.43	Not Detected
m,p-Xylene	0.10	Not Detected	0.43	Not Detected
o-Xylene	0.10	Not Detected	0.43	Not Detected
Styrene	0.10	Not Detected	0.42	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.10	Not Detected	0.69	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.10	Not Detected	0.49	Not Detected
1,2,4-Trimethylbenzene	0.10	Not Detected	0.49	Not Detected
1,3-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
1,4-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
alpha-Chlorotoluene	0.10	Not Detected	0.52	Not Detected
1,2-Dichlorobenzene	0.10	Not Detected	0.60	Not Detected
1,2,4-Trichlorobenzene	0.50	Not Detected	3.7	Not Detected
Hexachlorobutadiene	0.50	Not Detected	5.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33571

Lab ID#: 0605085B-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051125	Date of Collection:	5/2/06
Dil. Factor:	1.64	Date of Analysis:	5/12/06 07:20 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.16	0.91	0.81	4.5
Freon 114	0.16	Not Detected	1.1	Not Detected
Chloromethane	0.16	Not Detected	0.34	Not Detected
Vinyl Chloride	0.16	Not Detected	0.42	Not Detected
1,3-Butadiene	0.82	Not Detected	1.8	Not Detected
Bromomethane	0.16	Not Detected	0.64	Not Detected
Chloroethane	0.16	Not Detected	0.43	Not Detected
Freon 11	0.16	0.46	0.92	2.6
Ethanol	0.82	Not Detected	1.5	Not Detected
Freon 113	0.16	Not Detected	1.2	Not Detected
1,1-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Acetone	0.82	5.2	1.9	12
2-Propanol	0.82	Not Detected	2.0	Not Detected
Carbon Disulfide	0.82	Not Detected	2.6	Not Detected
Methylene Chloride	0.33	Not Detected	1.1	Not Detected
Methyl tert-butyl ether	0.82	Not Detected	3.0	Not Detected
trans-1,2-Dichloroethene	0.82	Not Detected	3.2	Not Detected
Hexane	0.82	Not Detected	2.9	Not Detected
1,1-Dichloroethane	0.16	Not Detected	0.66	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.82	Not Detected	2.4	Not Detected
cis-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Tetrahydrofuran	0.82	Not Detected	2.4	Not Detected
Chloroform	0.16	Not Detected	0.80	Not Detected
1,1,1-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Cyclohexane	0.82	Not Detected	2.8	Not Detected
Carbon Tetrachloride	0.16	Not Detected	1.0	Not Detected
Benzene	0.16	Not Detected	0.52	Not Detected
1,2-Dichloroethane	0.16	Not Detected	0.66	Not Detected
Heptane	0.82	Not Detected	3.4	Not Detected
Trichloroethene	0.16	Not Detected	0.88	Not Detected
1,2-Dichloropropane	0.16	Not Detected	0.76	Not Detected
1,4-Dioxane	0.82	Not Detected	3.0	Not Detected
Bromodichloromethane	0.82	Not Detected	5.5	Not Detected
cis-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
4-Methyl-2-pentanone	0.82	Not Detected	3.4	Not Detected
Toluene	0.16	Not Detected	0.62	Not Detected
trans-1,3-Dichloropropene	0.16	Not Detected	0.74	Not Detected
1,1,2-Trichloroethane	0.16	Not Detected	0.89	Not Detected
Tetrachloroethene	0.16	1.9	1.1	13
2-Hexanone	0.82	Not Detected	3.4	Not Detected

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33571

Lab ID#: 0605085B-20A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051125**	**Date of Collection:**	**5/2/06**
Dil. Factor:	**1.64**	**Date of Analysis:**	**5/12/06 07:20 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.82	Not Detected	7.0	Not Detected
1,2-Dibromoethane (EDB)	0.16	Not Detected	1.3	Not Detected
Chlorobenzene	0.16	Not Detected	0.76	Not Detected
Ethyl Benzene	0.16	Not Detected	0.71	Not Detected
m,p-Xylene	0.16	Not Detected	0.71	Not Detected
o-Xylene	0.16	Not Detected	0.71	Not Detected
Styrene	0.16	Not Detected	0.70	Not Detected
Bromoform	0.82	Not Detected	8.5	Not Detected
Cumene	0.82	Not Detected	4.0	Not Detected
1,1,2,2-Tetrachloroethane	0.16	Not Detected	1.1	Not Detected
Propylbenzene	0.82	Not Detected	4.0	Not Detected
4-Ethyltoluene	0.82	Not Detected	4.0	Not Detected
1,3,5-Trimethylbenzene	0.16	Not Detected	0.81	Not Detected
1,2,4-Trimethylbenzene	0.16	Not Detected	0.81	Not Detected
1,3-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,4-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
alpha-Chlorotoluene	0.16	Not Detected	0.85	Not Detected
1,2-Dichlorobenzene	0.16	Not Detected	0.99	Not Detected
1,2,4-Trichlorobenzene	0.82	Not Detected	6.1	Not Detected
Hexachlorobutadiene	0.82	Not Detected	8.7	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33881

Lab ID#: 0605085B-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051218	Date of Collection:	5/3/06
Dil. Factor:	43.4	Date of Analysis:	5/13/06 08:30 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	4.3	Not Detected	21	Not Detected
Freon 114	4.3	Not Detected	30	Not Detected
Chloromethane	4.3	Not Detected	9.0	Not Detected
Vinyl Chloride	4.3	Not Detected	11	Not Detected
1,3-Butadiene	22	Not Detected	48	Not Detected
Bromomethane	4.3	Not Detected	17	Not Detected
Chloroethane	4.3	Not Detected	11	Not Detected
Freon 11	4.3	Not Detected	24	Not Detected
Ethanol	22	450	41	860
Freon 113	4.3	Not Detected	33	Not Detected
1,1-Dichloroethene	4.3	Not Detected	17	Not Detected
Acetone	22	140	52	330
2-Propanol	22	1600	53	3800
Carbon Disulfide	22	Not Detected	68	Not Detected
Methylene Chloride	8.7	Not Detected	30	Not Detected
Methyl tert-butyl ether	22	Not Detected	78	Not Detected
trans-1,2-Dichloroethene	22	Not Detected	86	Not Detected
Hexane	22	Not Detected	76	Not Detected
1,1-Dichloroethane	4.3	Not Detected	18	Not Detected
2-Butanone (Methyl Ethyl Ketone)	22	Not Detected	64	Not Detected
cis-1,2-Dichloroethene	4.3	Not Detected	17	Not Detected
Tetrahydrofuran	22	Not Detected	64	Not Detected
Chloroform	4.3	Not Detected	21	Not Detected
1,1,1-Trichloroethane	4.3	Not Detected	24	Not Detected
Cyclohexane	22	Not Detected	75	Not Detected
Carbon Tetrachloride	4.3	Not Detected	27	Not Detected
Benzene	4.3	Not Detected	14	Not Detected
1,2-Dichloroethane	4.3	Not Detected	18	Not Detected
Heptane	22	Not Detected	89	Not Detected
Trichloroethene	4.3	Not Detected	23	Not Detected
1,2-Dichloropropane	4.3	Not Detected	20	Not Detected
1,4-Dioxane	22	Not Detected	78	Not Detected
Bromodichloromethane	22	Not Detected	140	Not Detected
cis-1,3-Dichloropropene	4.3	Not Detected	20	Not Detected
4-Methyl-2-pentanone	22	Not Detected	89	Not Detected
Toluene	4.3	Not Detected	16	Not Detected
trans-1,3-Dichloropropene	4.3	Not Detected	20	Not Detected
1,1,2-Trichloroethane	4.3	Not Detected	24	Not Detected
Tetrachloroethene	4.3	6.2	29	42
2-Hexanone	22	Not Detected	89	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33881

Lab ID#: 0605085B-21A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051218**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**43.4**	**Date of Analysis:**	**5/13/06 08:30 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	22	Not Detected	180	Not Detected
1,2-Dibromoethane (EDB)	4.3	Not Detected	33	Not Detected
Chlorobenzene	4.3	Not Detected	20	Not Detected
Ethyl Benzene	4.3	Not Detected	19	Not Detected
m,p-Xylene	4.3	Not Detected	19	Not Detected
o-Xylene	4.3	Not Detected	19	Not Detected
Styrene	4.3	Not Detected	18	Not Detected
Bromoform	22	Not Detected	220	Not Detected
Cumene	22	Not Detected	110	Not Detected
1,1,2,2-Tetrachloroethane	4.3	Not Detected	30	Not Detected
Propylbenzene	22	Not Detected	110	Not Detected
4-Ethyltoluene	22	Not Detected	110	Not Detected
1,3,5-Trimethylbenzene	4.3	Not Detected	21	Not Detected
1,2,4-Trimethylbenzene	4.3	Not Detected	21	Not Detected
1,3-Dichlorobenzene	4.3	Not Detected	26	Not Detected
1,4-Dichlorobenzene	4.3	Not Detected	26	Not Detected
alpha-Chlorotoluene	4.3	Not Detected	22	Not Detected
1,2-Dichlorobenzene	4.3	Not Detected	26	Not Detected
1,2,4-Trichlorobenzene	22	Not Detected	160	Not Detected
Hexachlorobutadiene	22	Not Detected	230	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34028

Lab ID#: 0605085B-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051210	Date of Collection:	5/3/06
Dil. Factor:	3.48	Date of Analysis:	5/12/06 04:42 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.35	130	1.7	630
Freon 114	0.35	Not Detected	2.4	Not Detected
Chloromethane	0.35	0.36	0.72	0.73
Vinyl Chloride	0.35	Not Detected	0.89	Not Detected
1,3-Butadiene	1.7	Not Detected	3.8	Not Detected
Bromomethane	0.35	Not Detected	1.4	Not Detected
Chloroethane	0.35	Not Detected	0.92	Not Detected
Freon 11	0.35	0.33 J	2.0	1.9 J
Ethanol	1.7	63	3.3	120
Freon 113	0.35	Not Detected	2.7	Not Detected
1,1-Dichloroethene	0.35	Not Detected	1.4	Not Detected
Acetone	1.7	210 E	4.1	500 E
2-Propanol	1.7	Not Detected	4.3	Not Detected
Carbon Disulfide	1.7	Not Detected	5.4	Not Detected
Methylene Chloride	0.70	5.6	2.4	19
Methyl tert-butyl ether	1.7	39	6.3	140
trans-1,2-Dichloroethene	1.7	Not Detected	6.9	Not Detected
Hexane	1.7	29	6.1	100
1,1-Dichloroethane	0.35	Not Detected	1.4	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.7	Not Detected	5.1	Not Detected
cis-1,2-Dichloroethene	0.35	Not Detected	1.4	Not Detected
Tetrahydrofuran	1.7	Not Detected	5.1	Not Detected
Chloroform	0.35	Not Detected	1.7	Not Detected
1,1,1-Trichloroethane	0.35	Not Detected	1.9	Not Detected
Cyclohexane	1.7	9.4	6.0	32
Carbon Tetrachloride	0.35	Not Detected	2.2	Not Detected
Benzene	0.35	9.5	1.1	30
1,2-Dichloroethane	0.35	Not Detected	1.4	Not Detected
Heptane	1.7	30	7.1	120
Trichloroethene	0.35	4.2	1.9	23
1,2-Dichloropropane	0.35	Not Detected	1.6	Not Detected
1,4-Dioxane	1.7	Not Detected	6.3	Not Detected
Bromodichloromethane	1.7	Not Detected	12	Not Detected
cis-1,3-Dichloropropene	0.35	Not Detected	1.6	Not Detected
4-Methyl-2-pentanone	1.7	2.8	7.1	11
Toluene	0.35	46	1.3	170
trans-1,3-Dichloropropene	0.35	Not Detected	1.6	Not Detected
1,1,2-Trichloroethane	0.35	Not Detected	1.9	Not Detected
Tetrachloroethene	0.35	36	2.4	250
2-Hexanone	1.7	Not Detected	7.1	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34028

Lab ID#: 0605085B-23A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051210**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**3.48**	**Date of Analysis:**	**5/12/06 04:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	1.7	Not Detected	15	Not Detected
1,2-Dibromoethane (EDB)	0.35	Not Detected	2.7	Not Detected
Chlorobenzene	0.35	Not Detected	1.6	Not Detected
Ethyl Benzene	0.35	10	1.5	44
m,p-Xylene	0.35	37	1.5	160
o-Xylene	0.35	14	1.5	59
Styrene	0.35	Not Detected	1.5	Not Detected
Bromoform	1.7	Not Detected	18	Not Detected
Cumene	1.7	Not Detected	8.6	Not Detected
1,1,2,2-Tetrachloroethane	0.35	Not Detected	2.4	Not Detected
Propylbenzene	1.7	Not Detected	8.6	Not Detected
4-Ethyltoluene	1.7	3.5	8.6	17
1,3,5-Trimethylbenzene	0.35	1.2	1.7	6.0
1,2,4-Trimethylbenzene	0.35	3.4	1.7	16
1,3-Dichlorobenzene	0.35	Not Detected	2.1	Not Detected
1,4-Dichlorobenzene	0.35	Not Detected	2.1	Not Detected
alpha-Chlorotoluene	0.35	Not Detected	1.8	Not Detected
1,2-Dichlorobenzene	0.35	Not Detected	2.1	Not Detected
1,2,4-Trichlorobenzene	1.7	Not Detected	13	Not Detected
Hexachlorobutadiene	1.7	Not Detected	18	Not Detected

J = Estimated value.
E = Exceeds instrument calibration range.
Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	104	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34125

Lab ID#: 0605085B-24A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051213	Date of Collection:	5/3/06
Dil. Factor:	79.0	Date of Analysis:	5/12/06 07:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	7.9	Not Detected	39	Not Detected
Freon 114	7.9	Not Detected	55	Not Detected
Chloromethane	7.9	Not Detected	16	Not Detected
Vinyl Chloride	7.9	Not Detected	20	Not Detected
1,3-Butadiene	40	Not Detected	87	Not Detected
Bromomethane	7.9	Not Detected	31	Not Detected
Chloroethane	7.9	Not Detected	21	Not Detected
Freon 11	7.9	Not Detected	44	Not Detected
Ethanol	40	Not Detected	74	Not Detected
Freon 113	7.9	Not Detected	60	Not Detected
1,1-Dichloroethene	7.9	Not Detected	31	Not Detected
Acetone	40	Not Detected	94	Not Detected
2-Propanol	40	Not Detected	97	Not Detected
Carbon Disulfide	40	Not Detected	120	Not Detected
Methylene Chloride	16	Not Detected	55	Not Detected
Methyl tert-butyl ether	40	Not Detected	140	Not Detected
trans-1,2-Dichloroethene	40	Not Detected	160	Not Detected
Hexane	40	Not Detected	140	Not Detected
1,1-Dichloroethane	7.9	Not Detected	32	Not Detected
2-Butanone (Methyl Ethyl Ketone)	40	Not Detected	120	Not Detected
cis-1,2-Dichloroethene	7.9	7.8 J	31	31
Tetrahydrofuran	40	Not Detected	120	Not Detected
Chloroform	7.9	Not Detected	38	Not Detected
1,1,1-Trichloroethane	7.9	Not Detected	43	Not Detected
Cyclohexane	40	Not Detected	140	Not Detected
Carbon Tetrachloride	7.9	Not Detected	50	Not Detected
Benzene	7.9	Not Detected	25	Not Detected
1,2-Dichloroethane	7.9	Not Detected	32	Not Detected
Heptane	40	Not Detected	160	Not Detected
Trichloroethene	7.9	41	42	220
1,2-Dichloropropane	7.9	Not Detected	36	Not Detected
1,4-Dioxane	40	Not Detected	140	Not Detected
Bromodichloromethane	40	Not Detected	260	Not Detected
cis-1,3-Dichloropropene	7.9	Not Detected	36	Not Detected
4-Methyl-2-pentanone	40	Not Detected	160	Not Detected
Toluene	7.9	Not Detected	30	Not Detected
trans-1,3-Dichloropropene	7.9	Not Detected	36	Not Detected
1,1,2-Trichloroethane	7.9	Not Detected	43	Not Detected
Tetrachloroethene	7.9	2000	54	13000
2-Hexanone	40	Not Detected	160	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34125

Lab ID#: 0605085B-24A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051213	Date of Collection:	5/3/06
Dil. Factor:	79.0	Date of Analysis:	5/12/06 07:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	40	Not Detected	340	Not Detected
1,2-Dibromoethane (EDB)	7.9	Not Detected	61	Not Detected
Chlorobenzene	7.9	Not Detected	36	Not Detected
Ethyl Benzene	7.9	Not Detected	34	Not Detected
m,p-Xylene	7.9	Not Detected	34	Not Detected
o-Xylene	7.9	Not Detected	34	Not Detected
Styrene	7.9	Not Detected	34	Not Detected
Bromoform	40	Not Detected	410	Not Detected
Cumene	40	Not Detected	190	Not Detected
1,1,2,2-Tetrachloroethane	7.9	Not Detected	54	Not Detected
Propylbenzene	40	Not Detected	190	Not Detected
4-Ethyltoluene	40	Not Detected	190	Not Detected
1,3,5-Trimethylbenzene	7.9	Not Detected	39	Not Detected
1,2,4-Trimethylbenzene	7.9	Not Detected	39	Not Detected
1,3-Dichlorobenzene	7.9	Not Detected	48	Not Detected
1,4-Dichlorobenzene	7.9	Not Detected	48	Not Detected
alpha-Chlorotoluene	7.9	Not Detected	41	Not Detected
1,2-Dichlorobenzene	7.9	Not Detected	47	Not Detected
1,2,4-Trichlorobenzene	40	Not Detected	290	Not Detected
Hexachlorobutadiene	40	Not Detected	420	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	107	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34318

Lab ID#: 0605085B-25A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051510	Date of Collection:	5/3/06
Dil. Factor:	54.7	Date of Analysis:	5/15/06 08:13 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	5.5	Not Detected	27	Not Detected
Freon 114	5.5	Not Detected	38	Not Detected
Chloromethane	5.5	Not Detected	11	Not Detected
Vinyl Chloride	5.5	Not Detected	14	Not Detected
1,3-Butadiene	27	Not Detected	60	Not Detected
Bromomethane	5.5	Not Detected	21	Not Detected
Chloroethane	5.5	Not Detected	14	Not Detected
Freon 11	5.5	Not Detected	31	Not Detected
Ethanol	27	Not Detected	52	Not Detected
Freon 113	5.5	Not Detected	42	Not Detected
1,1-Dichloroethene	5.5	Not Detected	22	Not Detected
Acetone	27	Not Detected	65	Not Detected
2-Propanol	27	Not Detected	67	Not Detected
Carbon Disulfide	27	Not Detected	85	Not Detected
Methylene Chloride	11	Not Detected	38	Not Detected
Methyl tert-butyl ether	27	Not Detected	99	Not Detected
trans-1,2-Dichloroethene	27	Not Detected	110	Not Detected
Hexane	27	Not Detected	96	Not Detected
1,1-Dichloroethane	5.5	Not Detected	22	Not Detected
2-Butanone (Methyl Ethyl Ketone)	27	Not Detected	81	Not Detected
cis-1,2-Dichloroethene	5.5	Not Detected	22	Not Detected
Tetrahydrofuran	27	Not Detected	81	Not Detected
Chloroform	5.5	Not Detected	27	Not Detected
1,1,1-Trichloroethane	5.5	Not Detected	30	Not Detected
Cyclohexane	27	Not Detected	94	Not Detected
Carbon Tetrachloride	5.5	Not Detected	34	Not Detected
Benzene	5.5	Not Detected	17	Not Detected
1,2-Dichloroethane	5.5	Not Detected	22	Not Detected
Heptane	27	Not Detected	110	Not Detected
Trichloroethene	5.5	11	29	57
1,2-Dichloropropane	5.5	Not Detected	25	Not Detected
1,4-Dioxane	27	Not Detected	98	Not Detected
Bromodichloromethane	27	Not Detected	180	Not Detected
cis-1,3-Dichloropropene	5.5	Not Detected	25	Not Detected
4-Methyl-2-pentanone	27	Not Detected	110	Not Detected
Toluene	5.5	Not Detected	21	Not Detected
trans-1,3-Dichloropropene	5.5	Not Detected	25	Not Detected
1,1,2-Trichloroethane	5.5	Not Detected	30	Not Detected
Tetrachloroethene	5.5	1200	37	8300
2-Hexanone	27	Not Detected	110	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34318

Lab ID#: 0605085B-25A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051510**	**Date of Collection:**	**5/3/06**
Dil. Factor:	**54.7**	**Date of Analysis:**	**5/15/06 08:13 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	27	Not Detected	230	Not Detected
1,2-Dibromoethane (EDB)	5.5	Not Detected	42	Not Detected
Chlorobenzene	5.5	Not Detected	25	Not Detected
Ethyl Benzene	5.5	Not Detected	24	Not Detected
m,p-Xylene	5.5	Not Detected	24	Not Detected
o-Xylene	5.5	Not Detected	24	Not Detected
Styrene	5.5	Not Detected	23	Not Detected
Bromoform	27	Not Detected	280	Not Detected
Cumene	27	Not Detected	130	Not Detected
1,1,2,2-Tetrachloroethane	5.5	Not Detected	38	Not Detected
Propylbenzene	27	Not Detected	130	Not Detected
4-Ethyltoluene	27	Not Detected	130	Not Detected
1,3,5-Trimethylbenzene	5.5	Not Detected	27	Not Detected
1,2,4-Trimethylbenzene	5.5	Not Detected	27	Not Detected
1,3-Dichlorobenzene	5.5	Not Detected	33	Not Detected
1,4-Dichlorobenzene	5.5	Not Detected	33	Not Detected
alpha-Chlorotoluene	5.5	Not Detected	28	Not Detected
1,2-Dichlorobenzene	5.5	Not Detected	33	Not Detected
1,2,4-Trichlorobenzene	27	Not Detected	200	Not Detected
Hexachlorobutadiene	27	Not Detected	290	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	101	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34328

Lab ID#: 0605085B-26A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7051215	Date of Collection:	5/2/06
Dil. Factor:	1.75	Date of Analysis:	5/12/06 08:43 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.18	0.66	0.86	3.2
Freon 114	0.18	Not Detected	1.2	Not Detected
Chloromethane	0.18	1.0	0.36	2.1
Vinyl Chloride	0.18	Not Detected	0.45	Not Detected
1,3-Butadiene	0.88	Not Detected	1.9	Not Detected
Bromomethane	0.18	Not Detected	0.68	Not Detected
Chloroethane	0.18	Not Detected	0.46	Not Detected
Freon 11	0.18	0.30	0.98	1.7
Ethanol	0.88	4.3	1.6	8.2
Freon 113	0.18	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.18	Not Detected	0.69	Not Detected
Acetone	0.88	14	2.1	32
2-Propanol	0.88	0.94	2.2	2.3
Carbon Disulfide	0.88	Not Detected	2.7	Not Detected
Methylene Chloride	0.35	Not Detected	1.2	Not Detected
Methyl tert-butyl ether	0.88	1.7	3.2	6.2
trans-1,2-Dichloroethene	0.88	Not Detected	3.5	Not Detected
Hexane	0.88	Not Detected	3.1	Not Detected
1,1-Dichloroethane	0.18	Not Detected	0.71	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.88	1.2	2.6	3.5
cis-1,2-Dichloroethene	0.18	Not Detected	0.69	Not Detected
Tetrahydrofuran	0.88	Not Detected	2.6	Not Detected
Chloroform	0.18	Not Detected	0.85	Not Detected
1,1,1-Trichloroethane	0.18	Not Detected	0.95	Not Detected
Cyclohexane	0.88	Not Detected	3.0	Not Detected
Carbon Tetrachloride	0.18	Not Detected	1.1	Not Detected
Benzene	0.18	0.49	0.56	1.6
1,2-Dichloroethane	0.18	Not Detected	0.71	Not Detected
Heptane	0.88	Not Detected	3.6	Not Detected
Trichloroethene	0.18	Not Detected	0.94	Not Detected
1,2-Dichloropropane	0.18	Not Detected	0.81	Not Detected
1,4-Dioxane	0.88	Not Detected	3.2	Not Detected
Bromodichloromethane	0.88	Not Detected	5.9	Not Detected
cis-1,3-Dichloropropene	0.18	Not Detected	0.79	Not Detected
4-Methyl-2-pentanone	0.88	Not Detected	3.6	Not Detected
Toluene	0.18	2.4	0.66	8.9
trans-1,3-Dichloropropene	0.18	Not Detected	0.79	Not Detected
1,1,2-Trichloroethane	0.18	Not Detected	0.95	Not Detected
Tetrachloroethene	0.18	0.38	1.2	2.6
2-Hexanone	0.88	Not Detected	3.6	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34328

Lab ID#: 0605085B-26A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7051215**	**Date of Collection: 5/2/06**	
Dil. Factor:	**1.75**	**Date of Analysis: 5/12/06 08:43 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Dibromochloromethane	0.88	Not Detected	7.4	Not Detected
1,2-Dibromoethane (EDB)	0.18	Not Detected	1.3	Not Detected
Chlorobenzene	0.18	Not Detected	0.80	Not Detected
Ethyl Benzene	0.18	0.29	0.76	1.3
m,p-Xylene	0.18	0.89	0.76	3.9
o-Xylene	0.18	0.40	0.76	1.8
Styrene	0.18	Not Detected	0.74	Not Detected
Bromoform	0.88	Not Detected	9.0	Not Detected
Cumene	0.88	Not Detected	4.3	Not Detected
1,1,2,2-Tetrachloroethane	0.18	Not Detected	1.2	Not Detected
Propylbenzene	0.88	Not Detected	4.3	Not Detected
4-Ethyltoluene	0.88	Not Detected	4.3	Not Detected
1,3,5-Trimethylbenzene	0.18	0.19	0.86	0.93
1,2,4-Trimethylbenzene	0.18	0.44	0.86	2.2
1,3-Dichlorobenzene	0.18	Not Detected	1.0	Not Detected
1,4-Dichlorobenzene	0.18	Not Detected	1.0	Not Detected
alpha-Chlorotoluene	0.18	Not Detected	0.90	Not Detected
1,2-Dichlorobenzene	0.18	Not Detected	1.0	Not Detected
1,2,4-Trichlorobenzene	0.88	Not Detected	6.5	Not Detected
Hexachlorobutadiene	0.88	Not Detected	9.3	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	105	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 02330

Lab ID#: 0605085A-01A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6050913	Date of Collection:	5/3/06
Dil. Factor:	1.91	Date of Analysis:	5/9/06 08:15 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.019	Not Detected	0.049	Not Detected
1,1-Dichloroethene	0.019	Not Detected	0.076	Not Detected
1,1-Dichloroethane	0.038	Not Detected	0.15	Not Detected
cis-1,2-Dichloroethene	0.038	0.14	0.15	0.56
1,1,1-Trichloroethane	0.038	Not Detected	0.21	Not Detected
Benzene	0.096	0.23	0.30	0.75
1,2-Dichloroethane	0.038	Not Detected	0.15	Not Detected
Trichloroethene	0.038	0.12	0.20	0.66
Toluene	0.038	2.8	0.14	10
1,1,2-Trichloroethane	0.038	Not Detected	0.21	Not Detected
Tetrachloroethene	0.038	5.3	0.26	36
Ethyl Benzene	0.038	0.51	0.16	2.2
m,p-Xylene	0.076	0.89	0.33	3.9
o-Xylene	0.038	0.50	0.16	2.2
1,1,2,2-Tetrachloroethane	0.038	Not Detected	0.26	Not Detected
trans-1,2-Dichloroethene	0.19	Not Detected	0.76	Not Detected
Methyl tert-butyl ether	0.19	Not Detected	0.69	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	92	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	107	70-130

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organic Analysis

CASE No.: N/A
LABORATORY: AIR TOXICS
SAMPLES: 05 Air
SAMPLER: US EPA

SDG No.: 0608350
SITE: VIP CLEANERS
SAMPLES: 05 MODIFIED TO-15 SIM

DATA ASSESSMENT

The current SOP HW-31 (Revision 1) June 2004, USEPA Region II Data Validation SOP for Statement of Work TO-15 for evaluating organic Ambient Air in Canisters have been applied.

All data are valid and acceptable except those analytes rejected "R"(unusable). Due to the detection of QC problems, some analytes may have the "J" (estimated), "N"(presumptive evidence for the presence of the material), "U" (non-detect) or "JN" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Charlene M. Alaimo — Date: 09/28/2006

Peer Reviewer's Signature: C. Stanco — Date: 9/28/2006

Verified By: [illegible] — Date: 9/29/2006

CLP DATA ASSESSMENT

SDG# WS023

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

No problems found for this qualification.

2. Leak Test Evaluation:

All canisters are leak tested prior to each sampling use. The initial pressure is measured, the canister valve is closed, and the final pressure is checked after 24 hours. If acceptable, the pressure should not vary more than 13.8 kPa (2 psig) over the 24-hour period.

Leak Test evaluation documentation was not provided.

3. Canister Certification:

Canister certification involves two procedures: Blank Analysis and blank spike Analysis. The canister is "Certified" if target analytes are < 0.2 ppv. For the spiked canister, the acceptable % difference for any target compound at a nominal 10-ppv concentration in humidified zero air is <30%.

No problems found for this qualification.

4. Laboratory Control/Lab Control Duplicate Recovery:(LCS/LCSD)

The LCS/LCS Duplicate data is generated to determine the long-term precision and accuracy of the analytical method. The LCS/LCS Duplicate may be used in conjunction with other QC criteria for additional qualification of data. The LCS is analyzed once per 24-hour analytical sequence and concurrently with the samples in the SDG.

The following samples are associated with LCS/LCSD compounds whose recoveries fall outside the specified limits. LCS % recoveries greater than the specific limits had positive associated compounds qualified estimate "J".

1,2-Dichloroethane
0608350-01A, 0608350-01AA, 0608350-02A, 0608350-03A, 0608350-04A, 0608350-05A, 0608350-06A

CLP DATA ASSESSMENT

5. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination that may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples throughout field operations. If the concentration of the analyte is less than or equal five times (5X) the method blank concentration, the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

None.

B) Field or rinse blank contamination:

None.

C) Tics "R" rejected

None.

6. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene.

If the mass calibration is in error, all associated data will be classified as unusable "R".

No problems.

7. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing

CLP DATA ASSESSMENT

calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be 30% for all Target analytes. %D must be 30% for all Target analytes. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

The following samples have volatile compounds with a Percent Relative Standard Deviation (%RSD) calculated from the initial calibration which exceed the ± 30% criteria, therefore the associated positive results were qualified as estimated (J).

Benzene
0608350-01A, 0608350-01AA, 0608350-02A, 0608350-03A, 0608350-04A, 0608350-05A, 0608350-06A, 0608350-08A, 0608350-09A

The following samples have volatile compounds with a % Difference (%D) between the initial calibration and the daily RRFs which exceed the ± 30% criteria, therefore the associated results (both positive and non-detects) were qualified as estimated (J).

1,2-Dichloroethane
0608350-01A, 0608350-01AA, 0608350-02A, 0608350-03A, 0608350-04A, 0608350-05A, 0608350-06A, 0608350-08A, 0608350-09A

7. INTERNAL STANDARDS PERFORMANCE GC/MS:

Internal standards (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than 40% from the most recent valid calibration standard area. The retention time of the internal standard must not vary more than ± 20 seconds from the latest daily (24-hour) calibration standard. If the area count is greater the 40% range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects are not flagged. If the area count is less than the 40% range of the associated standard, all of the positive results for compounds quantitated with that IS are qualified as estimated "J", and all non-detects are qualified as unusable "UJ". If the area count is < 25%, flag all non-detects as unusable "R".

If an internal standard retention time varies by more than 20 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

No problems found for this qualification.

8. COMPOUND IDENTIFICATION:

CLP DATA ASSESSMENT

A) Air Volatile Samples:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

No problems.

9. CONTRACT PROBLEMS NON-COMPLIANCE:

No problems.

10. FIELD DOCUMENTATION:

No problems.

11. OTHER PROBLEMS

Samples 0608350-01A and 0608350-01AA are lab duplicate pairs. The RPD for 1,2-Dichloroethane exceeded 25%. No action was taken since all results had been previously qualified.

12. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified not to be used.

No problems.

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

TDF # 06-0128

DATE: 09/13/06
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section (HWSS)/RSCC
TO: HWSS ESAT-TOPO

Attached is the following Non-RASData Package to be reviewed for Quality Assurance

SITE: VIP Cleaners **CASE #: N/A**

SDG#: 0608350

SAMPLER: US EPA

		#SAMPLES	MATRIX
PROJ. CODE: RS	**SITE SPILL #: 02XN**		
LAB: Air Toxics	**OPERABLE UNIT: 01**	5	AIR
TURN-AROUND-TIME: 7 day			

CERCLIS ID # : **FRACTION:** VOCs

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	**Date/Time**	**Signature**	**Date/Time**
[illegible]	9/21/06 8:49	C Stanne	9/21/06 8:49 am
C. Stanne	9/26/06	C M Al[illegible]	9/26/06
C M Al[illegible]	9/28/06	John Bu[illegible]	9/28/06
John Bu[illegible]	9/28/06 1:20 pm	[illegible]	9/28/06 1:20 pm
[illegible]	9/28/06 1:30 pm	Hanif Sheikh	9/28/06 1:30PM
Hanif Sheikh	9/29/06 10:47 AM	[illegible]	9/29/06 10:47 AM
[illegible]	9/29/06 12:30 pm	John Bu[illegible]	9/29/06 12:30 PM
John Bu[illegible]	9/29/06 2:45 PM	[illegible]	9/29/06 2:45 PM

SOP NO. HW-31

STANDARD OPERATING PROCEDURE

FOR

VALIDATING

VOLATILE ORGANIC ANALYSIS OF AMBIENT AIR IN CANISTER

BY METHOD TO-15

Revision 3, April 2006

By: George Karras Date: 4/5/06
George Karras, Chemist
Hazardous Waste Support Section

By: _____ Date: _____
Avraham Teitz, Environmental Scientist
Air and Water QA Team

By: Russell Arnone Date: 4/5/06
Russell Arnone, Chemist
Hazardous Waste Support Section

CONCURRED BY: Linda M. Mauel Date: 4/5/06
Linda Mauel
Hazardous Waste Support Section

APPROVED BY: Robert Runyon Date: 4/7/06
Robert Runyon, Chief
Hazardous Waste Support Branch

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: N/A SDG(s): 0608350

SITE: VIP LAB: Air Toxics

This Region II SOP document is based on Method TO-15: Determination of Volatile Organics Compounds (VOCs) in Air Collected in Specially-Prepared Canisters & Analyzed by Gas Chromatography/Mass Spectrometry, January 1999.

1.0 Data Completeness and Deliverables

	YES	NO	N/A
1.1 Have any missing deliverables been received and added to the data package?	[ ]	✓	

ACTION: Contact lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effect under "Contract Problems/ Non-Compliance" section of data assessment report.

2.0 Cover Letter, Narrative, and Data Reporting Forms

	YES	NO	N/A
2.1 Is the Lab. Narrative and Cover Page present?	[✓]		
2.2 Is Case Number contained in the Narrative?	[ ]		✓
2.3 Are the following Data Reporting Forms present?			
Analysis Data Sheet [Form I/Equivalent]	[✓]		
Tentatively Identified Compounds [Form I-TIC]	[ ]		✓
Blank Summary [Form IV/Equivalent]	[✓]		
Laboratory Control Sample Data Sheet [Form III/Equivalent]	[✓]		
GC/MS Instrument Performance Check and Mass Calibration [Form V/Equivalent]	[✓]		
Initial Calibration [Form VI/Equivalent]	[✓]		
Continuing Calibration [Form VII/Equivalent]	[✓]		
Internal Standard Area and RT Summary [Form VIII/Equivalent]	[✓]		

	YES	NO	N/A
Canister Certification [Form IX/Equivalent]	[✓]	___	___

3.0 **Canister Receipt/Log-in Sheet**

Receipt of each canister is recorded in a laboratory notebook dedicated to this use. The sample receipt/log-in sheet must demonstrate that the information on custody records, traffic reports, and sample tags agree for each sample.

3.1 Do all info items agree with each sample ?	[✓]	___	___

ACTION: If these documents are not consistent, contact Project officer or laboratory and attach a record of resolution.

4.0 **Traffic Reports and Laboratory Narrative**

4.1 Are the Traffic Report Forms present for all samples?	[✓]	___	___

ACTION: If no, contact lab for replacement of missing or illegible copies.

5.0 **Holding Times**

5.1 Have any VOA technical holding times of 30 days, determined from the date of sample collection to the date of analysis, been exceeded?	___	[✓]	___

NOTE: The contract requires that samples must be retained from verified time sample receipt (VTSR) until 45 days after delivery of a complete sample data package to the Agency.

VOA Table of Holding Time Violations

Sample ID	Sample Matrix	Date Lab Received	Date Analyzed

YES NO N/A

ACTION: If technical holding times have been exceeded, flag all results unusable ("R").

6.0 Leak Test Evaluation

6.1 All canisters are leak tested prior to each sampling use.
Form IX/Equivalent - summarizes the canister certification for each canister. The initial gauge pressure should be approximately 206 kPa (30 psi) with zero air.

Did the pressure test not vary by more than ± 13.8 kPa (± 2 psi) over the 24 hours period? ___ [ ] ___

could not verify Leak Test Evaluation not present

ACTION: If the canister does not meet the leak-tight criteria all results should be flagged "R".

7.0 Canister Certification Form IX/Equivalent

7.1 Blank Analysis

All canisters have to be checked after cleaning.

Were the target analytes < 0.2 ppbV? [✓] ___ ___

Note: Samples with large amount of non target analytes can be valid as long as the < 0.2 ppbV criterion is met for target analytes.

ACTION: If the lab failed to do so, it should be noted under contract non-compliance. The contamination Analytes should then be rejected "R".

7.2 Is the canister certification form provided, and the associated canister sample identification included? When contamination, included contamination detected (all raw data), analyte and reference mass spectra. [✓] ___ ___

ACTION: If no, have EPA project officer/TOPO contact laboratory for missing documents.

.0 Laboratory Control Samples

8.1 Is an LCS Data Sheet (Form III/Equivalent)

	YES	NO	N/A
present and complete for each LCS?	[✓]		
8.2 Was an LCS prepared (10ppbv) and analyzed at the required frequency (once per 24 hour analytical sequence, and concurrently with the samples in the SDG)?	[✓]		
ACTION: Call lab for explanation/resubmittals. If missing deliverables or information is unavailable, document the effect in the data assessment.			
8.3 Are there any transcription/calculation errors between the raw data and Form III/Equivalent? Check LCS target compound recoveries.		[✓]	
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document the effects in the data assessment.			
8.4 Is the % recovery within 70-130 % for each LCS <u>target compound</u> reported on Form III/Equivalent?	[ ]	✓	
ACTION: Professional judgement should be used to qualify the impact on sample data, if the recoveries are outside the given limits.			
8.5 Is the RT of <u>each reported LCS compound</u> within the windows established during the most recent valid calibration?	[✓]		
If the most recent calibration is the initial calibration use mid level standard (10 ppbv).			
ACTION: Professional judgement should be used to qualify sample data, if retention times differ by more than 20 seconds.			
8.6 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[✓]		
ACTION: If not, see Sections 18.1 and 18.2.			
ACTION: Circle outliers in red.			
ACTION: 1. If any LCS compounds are outside the specified limits, the associated sample results for the <u>outlying compounds</u> should be qualified as indicated in			

YES NO N/A

Table 1 below.

2. If the absolute RT for any LCS compound is outside the established windows, then qualify positive results and non-detects in the associated environmental sample data for that LCS compound(s) (See Table 2). All non-LCS compounds should be qualified using professional judgement.

Laboratory Control Samples

TABLE 1

The following table summarizes the LCS criteria and the data qualification guidelines for all associated field samples.

LCS	NOT QUALIFIED	J	R
% RECOVERY			
Detects	70 - 130%	< 70%, > 130%	
Non-detects	≥ 130%	50 - 69%	< 50%
ABSOLUTE RT OF LCS COMPOUNDS			
LCS Compounds in samples RT: (min)	± 0.33		> ± 0.33

9.0 GC/MS Instrument Performance Check

9.1 Are the GC/MS Instrument Performance Check Forms (Form V/Equivalent) present for Bromofluorobenzene (BFB)? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the 50 ng BFB provided for each twenty four hour shift? [✓] ___ ___

9.3 Has the instrument performance compound been analyzed for every twenty four hours of sample analysis per instrument? [✓] ___ ___

ACTION: List date, time, instrument ID, and sample

YES NO N/A

analysis for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

9.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

9.8 Are the spectra of the mass calibration compound acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, or qualified.

10.0 <u>Performance Evaluation Sample (Optional)</u>

	YES	NO	N/A
10.1 The PE sample will assist the Agency in monitoring Contractor performance. The lab will not be informed as to which compounds are contained in the PE samples or the concentrations. Was a PE sample submitted from the Agency with each SDG?	[ ]	___	✓
10.2 PE samples must be validated like environmental samples. There is no holding time for PE samples. If the data results do not comply with the Agencies' spike results use professional judgement together with other QC criteria in order to determine usability of the other data in the SDG. If the associated data was rejected because of PE results, the EPA technical project officer must be notified.			
10.3 Do the Internal Standards meet the requirements specified in Sections 18.1 and 18.2?	[ ]	___	✓

ACTION: If not, see Sections 18.1 and 18.2.

11.0 Laboratory Method Blanks

11.1 Is an Analysis Data Sheet (Form IV/Equivalent) present and complete for each method blank?	[✓]	___	___
11.2 Frequency of analysis:			
Has a method blank analysis been reported per instrument for each 24-hour analytical sequence?	[✓]	___	___
Change this — Has a method blank been analyzed after the initial calibration or a valid calibratio check standard, and before the LCS, prior to sample analysis?	[ ]	✓	___

ACTION: If any blank data are missing, call lab for explanation/resubmittals. If missing deliverables are unavailable, reject ("R") all positive data.

MB analyzed after the LCS but before samples
check list wrong

11.3 Chromatography: review the blank raw data - chromatograms, quant reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	[✓]	___	___

ACTION: Use professional judgement to determine the effect on the data.

11.4 Were the area response of each Internal Standards (IS) in the blank within ± 40% of the mean area response of the IS of the most recent valid calibration?	[✓]	___	___

	YES	NO	N/A
Were the RT of each IS within ± 0.33 min (20 sec.) between blanks & most recent valid calibration	[✓]		

ACTION: If not, see section 18.1 and 18.2.

12.0 Blank Contamination

12.1 Do any method blanks have positive target and non-target VOA results ?		[✓]	

ACTION: Use Table 2 below to qualify samples with target compound results also present in the associated blank. Use the largest value from all the associated method blanks if more than one method blank was run.

VOA Laboratory Blanks TABLE 2

SAMPLES	NOT QUALIFIED	U
Target compounds	> 5 x Blank Level	≤ 5 x Blank Level *

* If sample result is also less than CRQL, report as not detected (U) at [CRQL]. Note that the dilution factor has to be taken into account when calculating the Blank Level.

13.0 Target Compound Analytes

13.1 Are the Organic Analysis Data Sheets (Form I-, Equivalent), VOA chromatograms, and data system printouts present and complete with required header information for each of the following:			
a. Samples?	[✓]		
b. Method blanks?	[✓]		
c. Laboratory Control Sample (LCS)?	[✓]		
d. Performance Evaluation Sample (PES)?	[ ]		✓

ACTION: If any data are missing, take action specified in 1.1 above.

13.2 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]		
b. Resolution?	[✓]		
c. Peak shape?	[ ]		
d. Full-scale graph (attenuation)?	[✓]		

	YES	NO	N/A
e. Other:	[ ]		✓
13.3 Were any electropositive displacement (negative peaks) or unusual peaks seen?		✓	

ACTION: Use professional judgement to determine the acceptability of the data. Address comments under "System Performance" section of data assessment.

13.4 Is the sample component relative retention time (RRT) within ± 0.06 RRT units of the RRT of the standard component from the most recent continuing calibration?	✓		

NOTE: If the most recent calibration is a calibration curve, the mean RRT (RRT) should be used for comparison.

ACTION: If the above criteria is not met, professional judgement should be used to qualify sample data.

13.5 Was Nafion dryer used?		✓	

ACTION: In cases where Nafion tubing is used to dry the sample stream, polar target and non target compounds must not be reported.

ACTION: Reject all polar compounds if reported as non detects. Polar compounds reported as positive hits should be flagged "J".

4.0 Tentatively Identified Compounds (TIC)

14.1 Are all Tentatively Identified Compound Forms (Form I-TIC) present and are retention time, estimated concentration and "JN" qualifier listed corresponding to each TIC?	[ ]		✓
14.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following?			
a. Samples	[ ]		✓
b. Blanks	[ ]		✓

ACTION: If any TIC data are missing, take action specified in 1.1 above.

	YES	NO	N/A
ACTION: Add "JN" qualifier if missing.			
14.3 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	✓
14.4 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	___	___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

Also, when a compound is not found in any blanks, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (e.g., Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Aldol Condensation Products, Solvent Preservatives, and related by products.

15.0 Initial Calibration and System Performance (Form VI/Equivalent)

15.1 Were each GC/MS system calibrated at 5 concentrations that span the monitoring range of interest in an initial calibration sequence to determine the sensitivity and the linearity of the GC/MS response for the target compounds?	[✓]	___	___

ACTION: If any calibration standard forms or raw data are missing, take action specified in section 1.1 above.

15.2 Was the same volume introduced into the trap consistently for all field and QC-sample analyses?	[✓]	___	___
15.3 Were the area response (Y) at each calibration level within ± 40% of the mean area response (mean Y) over the initial calibration range for each Internal Standard?	[✓]	___	___

Did the laboratory tabulate the area response (Y) of the primary ions and the corresponding concen-

	YES	NO	N/A
tration for each compound and Internal Standard?	[✓]		

ACTION: If the range exceeds ± 40% for particular compounds, flag these compounds "J" for positive and non-detects in the associated samples. If the %RSDs exceeds ± 90%, associated sample non-detect compounds should be rejected (R) and associated hits as estimate (J).

15.4 Are the relative retention times (RRT) for each of the target compounds at each calibration level within ± 0.06 RRT units of the mean relative retention time for the compound?	[✓]		

ACTION: If no, reject the associated sample compounds.

15.5 Are all individual RRF and average RRFs ≥ 0.050?	[✓]		

NOTE: For the following compounds the individual RRF and average RRF must be ≥ 0.01.

2-Butanone
Carbon disufide
Chlorethane
Chlormethane
1,2-Dibromoethane
1,2-Dichloropropane
1,4-Dioxane
1,2-Dibromo-3-chloropropane
Methylene chloride

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 9 compounds in 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

15.6 Are response factors (RF) stable i.e. % Relative Standard Deviation (%RSD) ≤30.0% with at most two exceptions up to limit of ± 40%?	[ ]	[✓]	

ACTION: Circle all outliers in red.

ACTION: If %RSD > 30.0%, qualify associated positive results for that analytes "J" and non-detects

	YES	NO	N/A
are not qualified. When RSD > 90%, flag all non-detects for that analytes R (unusable) and associate positive values as estimate (J).			
NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.			
15.7 Are there any transcription/calculation errors in the reporting of average response factors (RRFs) or %RSDs? (Check at least 2 values, but if errors are found, check more.)		[✓]	
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effects in data assessment.			
15.8 Are the RT shift for each Internal Standard (IS) at each calibration level within 20s of the mean RT over the initial calibration range of each IS?	[✓]		

6.0 <u>Daily Calibration (Form VII/Equivalent)</u>

	YES	NO	N/A
16.1 Are the daily Calibration Forms (Form VII/Equivalent) present and complete for the volatile fraction?	[✓]		
16.2 Has a daily calibration standard (10 ppbv) been analyzed for every twenty four hours of sample analysis per instrument after the BFB tuning analysis?	[✓]		

ACTION: List below all sample analyses that were not within 24 hours of the daily calibration analysis.

_____

_____

_____

ACTION: If any forms are missing or no daily calibration standard has been analyzed within 24 hours of every sample analysis, call lab for explanation/resubmittal.
If daily calibration data are not available,

	YES	NO	N/A
flag all associated sample data as unuable ("R").			
16.3 Do any volatile compounds have a % Difference (% D) between the initial and daily RRFs which exceed the ± 30% criteria?	✓	[ ]	___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When % D is above 90%, reject non-detects as R) unusable and associated positive values (J).

16.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %difference (%D) between initial and daily RRFs? (Check at least two values but if errors are found, check more.)	___	[✓]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance".

17.0 Compound Quantitation and Reported Detection Limits

17.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct average RRF of the initial calibration was used to calculate Form I results.	[✓]	___	___
17.2 Are the reported detection limits adjusted to reflect sample dilutions?	[✓]	___	___

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Contract Non-Compliance" of the data assessment.

NOTE: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC accedence dictates the use of the higher CRQL data from the diluted sample analysis). Cross out "E" from the original analysis. Replace the concentrations in the original analysis with the ones from the diluted sample. Specify which Form I is to be used. Draw a red "X" across the entire

	YES	NO	N/A
page of all Form I's that should not be used, including any in the summary package.			
17.3 Have any target compound concentrations exceeded the calibration range of the GC?		[✓]	
ACTION: If yes, flag as estimated ("J").			
17.4 Was more than one method of quantitation used to calculate sample results within a batch or 24 hr. analytical sequence?		[✓]	
17.5 Did the lab report the target compounds below CRQLs with the suffix "J"?	[✓]		
ACTION: When appropriate, include suffix "J".			

18.0 Internal Standard (Form VIII/Equivalent)

18.1 Are the 3 internal standard areas (Form VIII) of every sample, LCS, PE, and blank within the upper and lower limits (+40% to -40%) for each continuing calibration or 10 ppbv level of initial calibration?	[✓]		

ACTION: List all the outliers below.

ample #	Internal Std	Area	Lower Limit	Upper Limit

ACTION:

1. If the internal standard area count is outside the limit, flag all positive results quantitated with this internal standard with a "J."
2. Non-detects associated with IS area counts > 40% are not qualified.
3. If IS area is below the lower limit (< 40%), qualify all associated non-detects (U values) "J". If extremely low area counts are reported, (< 25%), or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

	YES	NO	N/A
18.2 Are the internal standard retention times in each sample, LCS, PE, and blank within 20 seconds of the corresponding retention times in the associated calibration standard?	[✓]	___	___

ACTION: Professional judgement should be used to qualify sample data if the internal standard retention times differ by more than 20 seconds.

19.0 Mass Spectral Interpretation/Identification

	YES	NO	N/A
19.1 Are the Organic Analysis Data Sheets present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples?	[✓]	___	___
c. Blanks?	[✓]	___	___
19.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Laboratory Control Samples	[✓]	___	___
c. Blanks?	[✓]	___	___

ACTION: If any data are missing, take action specified in 1.1 above.

	YES	NO	N/A
19.3 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph (attenuation)?	[✓]	___	___
e. Other: _____?	[ ]	___	[✓]

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
19.4 Are the lab-generated standard mass spectra of the identified compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 1.1 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment.

19.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
19.6 Are all ions present in the reference standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
19.7 Do sample and reference standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 19.5, 19.6, and 19.7

0.0 Field Duplicates

20.1 Were any field duplicates submitted for VOA analysis?	[✓]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Note the RPD value in the data assessment.

YES NO N/A

DATA ASSESSMENT

This Data Assessment is based on USEPA Region II SOP HW- : Volatile Organics Analysis of Ambient Air in Canisters by Method TO-15, May 2004.

Case No. _____ SDG No. _____ LABORATORY: _____

SITE : _____

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "N" (presumptive). All action is detailed on the following sheets.

The following facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error. In addition the "N" flag shows that the analysis indicates the presence of an analyte for which there is presumption evidence to make a "tentative identifiction."

All actions are detailed below and on the attached sheets:

Overall Assessment:

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

RECEIVED
SEP 05 2006
HAZ. WASTE SUPPORT SEC.

WORK ORDER #: 0608350

Work Order Summary

CLIENT:	Ms. Jennifer Feranda US EPA Region II 2890 Woodbridge Avenue MS 100 Edison, NJ 08837	**BILL TO:**	Ms. Mary Ann Keith US EPA Financial Management Center (D143-02) Durham, NC 27711
PHONE:	732-321-6687	**P.O. #**	EP06W000231
FAX:		**PROJECT #**	
DATE RECEIVED:	08/11/2006	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	08/24/2006		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	24229	Modified TO-15 SIM	4.5 "Hg
01AA	24229 Duplicate	Modified TO-15 SIM	4.5 "Hg
02A	33329	Modified TO-15 SIM	3.0 "Hg
03A	33863	Modified TO-15 SIM	7.5 "Hg
04A	33914	Modified TO-15 SIM	3.0 "Hg
05A	34414	Modified TO-15 SIM	29.0 "Hg
06A	Lab Blank	Modified TO-15 SIM	NA
07A	CCV	Modified TO-15 SIM	NA
08A	LCS	Modified TO-15 SIM	NA
09A	LCSD	Modified TO-15 SIM	NA

CERTIFIED BY: Linda S. Freeman

Laboratory Director

DATE: 08/24/06

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/06, Expiration date: 06/30/07
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified TO-15 SIM
US EPA Region II
Workorder# 0608350

Five 6 Liter Summa Canister (SIM Certified) samples were received on August 11, 2006. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode. The method involves concentrating up to 0.5 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no recieving discrepancies.

Analytical Notes

All Quality Control Limit failures and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: 24229

Lab ID#: 0608350-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,1-Trichloroethane	0.032	0.62	0.17	3.4
Benzene	0.079	0.73 J	0.25	2.3 J
1,2-Dichloroethane	0.032	0.044 JJ	0.13	0.18 JJ
Trichloroethene	0.032	0.13	0.17	0.71
Toluene	0.032	7.6	0.12	29
Tetrachloroethene	0.032	1.3	0.21	8.8
Ethyl Benzene	0.032	1.4	0.14	6.1
m,p-Xylene	0.063	4.0	0.27	17
o-Xylene	0.032	1.2	0.14	5.3
Methyl tert-butyl ether	0.16	0.91	0.57	3.3

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 24229

Lab ID#: 0608350-01A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6081510	Date of Collection:	8/10/06
Dil. Factor:	1.58	Date of Analysis:	8/15/06 05:30 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.032	0.62	0.17	3.4
Benzene	0.079	0.73 J	0.25	2.3 J
1,2-Dichloroethane	0.032	0.044 J	0.13	0.18 J
Trichloroethene	0.032	0.13	0.17	0.71
Toluene	0.032	7.6	0.12	29
1,1,2-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Tetrachloroethene	0.032	1.3	0.21	8.8
Ethyl Benzene	0.032	1.4	0.14	6.1
m,p-Xylene	0.063	4.0	0.27	17
o-Xylene	0.032	1.2	0.14	5.3
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Methyl tert-butyl ether	0.16	0.91	0.57	3.3

J = Estimated value due to bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	115	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	118	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: 33329

Lab ID#: 0608350-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Benzene	0.074	1.9 J	0.24	6.0 J
1,2-Dichloroethane	0.030	0.052 J	0.12	0.21 J
Trichloroethene	0.030	3.7	0.16	20
Toluene	0.030	20	0.11	75
Tetrachloroethene	0.030	0.67	0.20	4.5
Ethyl Benzene	0.030	6.7	0.13	29
m,p-Xylene	0.060	22	0.26	96
o-Xylene	0.030	6.7	0.13	29
Methyl tert-butyl ether	0.15	2.9	0.54	10

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33329

Lab ID#: 0608350-02A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6081512	Date of Collection:	8/10/06
Dil. Factor:	1.49	Date of Analysis:	8/15/06 06:55 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.015	Not Detected	0.038	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.059	Not Detected
1,1-Dichloroethane	0.030	Not Detected	0.12	Not Detected
cis-1,2-Dichloroethene	0.030	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Benzene	0.074	1.9	0.24	6.0
1,2-Dichloroethane	0.030	0.052 J	0.12	0.21 J
Trichloroethene	0.030	3.7	0.16	20
Toluene	0.030	20	0.11	75
1,1,2-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Tetrachloroethene	0.030	0.67	0.20	4.5
Ethyl Benzene	0.030	6.7	0.13	29
m,p-Xylene	0.060	22	0.26	96
o-Xylene	0.030	6.7	0.13	29
1,1,2,2-Tetrachloroethane	0.030	Not Detected	0.20	Not Detected
trans-1,2-Dichloroethene	0.15	Not Detected	0.59	Not Detected
Methyl tert-butyl ether	0.15	2.9	0.54	10

J = Estimated value due to bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	116	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	111	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: 33863

Lab ID#: 0608350-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,1-Trichloroethane	0.036	0.47	0.20	2.6
Benzene	0.090	0.50 J	0.28	1.6 J
Trichloroethene	0.036	0.10	0.19	0.54
Toluene	0.036	5.5	0.13	21
Tetrachloroethene	0.036	0.91	0.24	6.2
Ethyl Benzene	0.036	1.0	0.16	4.3
m,p-Xylene	0.072	2.8	0.31	12
o-Xylene	0.036	0.85	0.16	3.7
Methyl tert-butyl ether	0.18	0.63	0.64	2.3

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33863

Lab ID#: 0608350-03A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6081513	Date of Collection:	8/10/06
Dil. Factor:	1.79	Date of Analysis:	8/15/06 07:34 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.018	Not Detected	0.046	Not Detected
1,1-Dichloroethene	0.018	Not Detected	0.071	Not Detected
1,1-Dichloroethane	0.036	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.036	Not Detected	0.14	Not Detected
1,1,1-Trichloroethane	0.036	0.47	0.20	2.6
Benzene	0.090	0.50	0.28	1.6
1,2-Dichloroethane	0.036	Not Detected	0.14	Not Detected
Trichloroethene	0.036	0.10	0.19	0.54
Toluene	0.036	5.5	0.13	21
1,1,2-Trichloroethane	0.036	Not Detected	0.20	Not Detected
Tetrachloroethene	0.036	0.91	0.24	6.2
Ethyl Benzene	0.036	1.0	0.16	4.3
m,p-Xylene	0.072	2.8	0.31	12
o-Xylene	0.036	0.85	0.16	3.7
1,1,2,2-Tetrachloroethane	0.036	Not Detected	0.24	Not Detected
trans-1,2-Dichloroethene	0.18	Not Detected	0.71	Not Detected
Methyl tert-butyl ether	0.18	0.63	0.64	2.3

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	114	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: 33914

Lab ID#: 0608350-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Benzene	0.074	0.15 J	0.24	0.49 J
Toluene	0.030	0.70	0.11	2.6
Tetrachloroethene	0.030	0.11	0.20	0.73
Ethyl Benzene	0.030	0.11	0.13	0.46
m,p-Xylene	0.060	0.31	0.26	1.4
o-Xylene	0.030	0.098	0.13	0.43

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 33914

Lab ID#: 0608350-04A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6081514	Date of Collection:	8/10/06
Dil. Factor:	1.49	Date of Analysis:	8/15/06 08:12 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.015	Not Detected	0.038	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.059	Not Detected
1,1-Dichloroethane	0.030	Not Detected	0.12	Not Detected
cis-1,2-Dichloroethene	0.030	Not Detected	0.12	Not Detected
1,1,1-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Benzene	0.074	0.15	0.24	0.49
1,2-Dichloroethane	0.030	Not Detected	0.12	Not Detected
Trichloroethene	0.030	Not Detected	0.16	Not Detected
Toluene	0.030	0.70	0.11	2.6
1,1,2-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Tetrachloroethene	0.030	0.11	0.20	0.73
Ethyl Benzene	0.030	0.11	0.13	0.46
m,p-Xylene	0.060	0.31	0.26	1.4
o-Xylene	0.030	0.098	0.13	0.43
1,1,2,2-Tetrachloroethane	0.030	Not Detected	0.20	Not Detected
trans-1,2-Dichloroethene	0.15	Not Detected	0.59	Not Detected
Methyl tert-butyl ether	0.15	Not Detected	0.54	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	109	70-130

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TB

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: 34414

Lab ID#: 0608350-05A

No Detections Were Found.

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: 34414

Lab ID#: 0608350-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	6081515	Date of Collection:	8/10/06
Dil. Factor:	1.00	Date of Analysis:	8/15/06 08:50 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	114	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	104	70-130

APPENDIX D

VIP CLEANERS SITE

TRIP REPORT

MAY 2006

SAMPLING TRIP REPORT

Site Name: VIP Cleaners Site
Sampling Dates: April 24 – May 03, 2006

1. Site Location:

   Morristown, Morris County, New Jersey

2. Sample Descriptions:

   Refer to Table 1 for all sample information.

3. Laboratories Receiving Samples:

Matrix	Sample Type	Laboratory Code	Name and Address of Laboratory
Air Samples in 6 lt. SUMMA™ canisters	VOCs	AIRTOX	Air Toxics, Ltd. 180 Blue Ravine Road, Suite B Folsom, CA 95630

4. **Sample Dispatch Data:**

This sampling event consisted of installing at least one sub-slab sample port in the lowest floor of ten structures, collecting an air sample into a SUMMA™ canisters from the port and placing one additional canister in the main floor of the on-site building. Each air sample was collected over a twenty four (24) hour sampling period. The canister contains a vacuum that once opened, drew the surrounding air into the body of the canister. During the week of April 24, 2006, the sub-slab ports were installed in the lowest level of each structure. One sub-slab port was installed in five structures. Two sub-slab ports were installed at three locations due to a larger size or more complex floor. At one location, four sub-slab ports were installed due to the future intentions of the owner. In addition, sub-slab ports were installed in the main building which is made up of nine storefronts. Five of the storefronts received on port, three storefronts have 2 ports and one has 3 ports.

During the week of May 01, 2006, the sub-slab ports were sampled and an indoor air sample was collected from each of the on-site building storefronts, except the dry cleaner. During May 01 – 02, 2006, the sub-slab of seven (7) residences/businesses were sampled. During May 02 - 03, 2006, the main building was sampled for sub-slab and indoor air and the sub-slab air from two residences/businesses was collected. In addition, two trip blank samples accompanied each canister sample set and two ambient air samples were collected during the two sample days. A total of thirty one (31) sub-slab samples, including two field duplicate samples; nine (9) indoor air samples, including one field duplicate; two trip blank sample for

quality assurance/ quality control and two ambient air sample were collected during the course of this sampling event.

All forty four (44) air samples and forty four (44) valves were shipped in fifteen boxes via United Parcel Service to Air Toxics under the following tracking numbers: 1Z0615472110002655, 1Z0615472110002664, 1Z0615472110002646, 1Z0615472110002495, 1Z0615472110002486, 1Z0615472110002477, 1Z0615472110002468, 1Z0615472110002459, 1Z0615472110002440, 1Z0615472110002422, 1Z0615472110002431, 1Z0615472110002397, 1Z0615472110002404, 1Z0615472110002413, and 1Z0615472110002388, at 1730 on May 03, 2006. In addition, one box was sent via UPS Ground with three unused canisters under tracking number K0199660389 at 1730 on May 03, 2006. Table 1 displays the sampling information such as the address, initial and final canister pressure, sampling times, dates and the canister number. The chain of custody form can be found as Appendix A.

5. **Sampling Personnel:**

Name	Organization	Site Duties
Diane Salkie	USEPA Region II DESA/HWSB Superfund Contract Support Team	Project Manager/Sample Management
Christina Leung	USEPA Region II DESA/HWSB Superfund Contract Support Team	Field Personnel
Robert Finke	USEPA Region II DESA/HWSB Superfund Contract Support Team	Field Personnel
Mark Denno	USEPA Region II DESA/HWSB Superfund Contract Support Team	Field Personnel
Pat Sheridan	USEPA Region II DESA/HWSB Superfund Contract Support Team	Quality Assurance Officer

6. **Additional Comments:**

The number of samples includes:

- 29 sub-slab air samples;
- 8 indoor air samples;
- 3 field duplicates (laboratory quality control sample)
- 2 trip blanks (field quality control sample); and
- 2 ambient (outdoor) samples.

7. **Report Prepared By:** Diane Salkie Date: May 08, 2006 5/8/06

TABLE 1
SAMPLE DESCRIPTIONS
VIP CLEANERS SITE

Address	Sample Location	Sample Type	Sample #	Canister #	Valve #	Pressure		Begin Date	Begin Time	End Date	End Time
						Initial	Final				
N/A	N/A	Trip Blank	TB-01	33965	102-07	-30	-30	5/01/06	N/A	5/02/06	N/A
24 Pine St.	NW side of basement	Sub-slab	24Pine	4568	54-10	-30	-14	5/01/06	0910	5/02/06	0910
48/50 Pine St.	Center	Sub-slab	48Pine	11882	103-80	-30	-7	5/01/06	1037	5/02/06	1002
	NW side	Sub-slab	50Pine	33571	103-29	-30	-8	5/01/06	1039	5/02/06	1002
95 Morris St. Auto Concepts	Basement with heater	Sub-slab	95MorrisA	14885	54-07	-30	-17	5/01/06	1005	5/02/06	1005
	SW corner of back room	Sub-slab	95MorrisB	34730	03-71	-30	-6	5/01/06	1009	5/02/06	1009
105 Morris St. Morristown Tire Company	SE basement	Sub-slab	105MorrisA	34440	102-02	-30	-5	5/01/06	1023	5/02/06	1002
	South/center of back room	Sub-slab	105MorrisB	34028	03-20	-30	0	5/01/06	1026	5/03/06	1340
73 Morris St. Morristown Diner	East/center of basement	Sub-slab	73Morris	23886	62-02	-30	-6	5/01/06	1054	5/02/06	1054
44 Pine St.	SE side of basement	Sub-slab	44Pine	4324	103-77	-30	-7	5/01/06	1146	5/02/06	1148

TABLE 1 - Continued
SAMPLE DESCRIPTIONS
VIP CLEANERS SITE

Address	Sample Location	Sample Type	Sample #	Canister #	Valve #	Pressure		Begin Date	Begin Time	End Date	End Time
						Initial	Final				
40 Pine St. Future Day Care Cent	NW corner of back room	Sub-slab	40Pine1	32109	100-034T	-30	-15	5/01/06	1340	5/02/06	1350
	Duplicate of 40Pine1	Sub-slab	40Pine1B	5712	03-19T	-30	-15	5/01/06	1340	5/02/06	1350
	Center of back room	Sub-slab	40Pine2	34328	100-12	-30	-7	5/01/06	1342	5/02/06	1352
	South/center at entrance to back room	Sub-slab	40Pine3	13853	95-81	-30	-5	5/01/06	1345	5/02/06	1355
	SE corner in front room	Sub-slab	40Pine4	33568	103-24	-30	-7	5/01/06	1348	5/02/06	1400
	Backyard	Ambient	40PineA	2387	03-10	-30	-6	5/01/06	1352	5/02/06	1403
N/A	N/A	Trip Blank	TB-02	23887	103-21	-30	-30	5/02/06	N/A	5/03/06	N/A
4A Wilmot Former Kid Fit; Main Building	West port	Sub-slab	4AWil1	34125	100-81	-30	-7	5/02/06	0950	5/03/06	0950
	East port	Sub-slab	4AWil2	35172	103-84	-30	-6	5/02/06	0950	5/03/06	0950
	Duplicate of 4AWil2	Sub-slab	4AWil2B	34475	03-34	-30	-9	5/02/06	0950	5/03/06	0950
	Center/east near cracks	Indoor Air	4AWillA	34453	03-38	-30	-7	5/02/06	0950	5/03/06	0950
	Duplicate of 4AWillA	Indoor Air	4AWillA2	4084	03-25	-30	-14	5/02/06	0950	5/03/06	0950
4B Wilmot Elite Photography Main Building	Center, port in office	Sub-slab	4BWil	35154	95-01	-30	-5	5/02/06	1026	5/03/06	1026
	Center/north on table	Indoor Air	4BWillA	13999	101-03	-30	-11	5/02/06	1027	5/03/06	1026

TABLE 1 - Continued
SAMPLE DESCRIPTIONS
VIP CLEANERS SITE

Address	Sample Location	Sample Type	Sample #	Canister #	Valve #	Pressure		Begin Date	Begin Time	End Date	End Time
						Initial	Final				
4C Wilmot Cardio-Care Main Building	NE corner port	Sub-slab	4CWil	33881	103-52	-30	-12	5/02/06	1040	5/03/06	1040
	SE corner on table	Indoor Air	4CWilIA	2330	102-01	-30	-11	5/02/06	1040	5/03/06	1040
4D Wilmot Amici Hair Design Main Building	East side, port in back room	Sub-slab	4DWil	4191	95-01	-30	-5	5/02/06	1026	5/03/06	1026
	East side, near port on box	Indoor Air	4DWilIA	9940	101-03	-30	-11	5/02/06	1027	5/03/06	1026
4E Wilmot Curves Main Building	SW corner port below carpet	Sub-slab	4EWil	34399	102-19	-30	-9	5/02/06	1100	5/03/06	1100
	NE in changing area	Indoor Air	4EWilIA	39426	103-28	-30	-6	5/02/06	1100	5/03/06	1100
8 Wilmot Former Florist Main Building	SW corner port	Sub-slab	8Wil1	05359	03-64	-30	-7	5/02/06	1140	5/03/06	1140
	NE corner port	Sub-slab	8Wil2	34318	103-62	-30	-6	5/02/06	1142	5/03/06	1140
	SE corner, on floor	Indoor Air	8WilIA	21077	55-41	-30	-16	5/02/06	1141	5/03/06	1140
63 Morris St. Asahi Sushi	SE corner, port near back door	Sub-slab	63Morris	13843	54-08	-30	-6	5/02/06	1334	5/03/06	1334

TABLE 1 - Continued
SAMPLE DESCRIPTIONS
VIP CLEANERS SITE

Address	Sample Location	Sample Type	Sample #	Canister #	Valve #	Pressure		Begin Date	Begin Time	End Date	End Time
						Initial	Final				
89 Morris St. New Image Cleaners & Tailoring Main Building	Lower floor port on W side	Sub-slab	89Morris1	23997	04-01	-30	-8	5/02/06	1347	5/03/06	1345
	NE side port in small room	Sub-slab	89Morris2	915	03-05	-30	-7	5/02/06	1350	5/03/06	1347
	N port behind counter	Sub-slab	89Morris3	912	58-71	-30	-3	5/02/06	1358	5/03/06	1349
Empty Storefront NW side of Main Building	N/center port	Sub-slab	EO1	902	53-45	-30	-7	5/02/06	1400	5/03/06	1400
	SE port	Sub-slab	EO2	34746	05-18	-30	-7	5/02/06	1400	5/03/06	1400
	Center, between rooms	Indoor Air	EOIA	9403	103-57	-30	-8	5/02/06	1400	5/03/06	1400
Ambient	South of former florist	Ambient	MorrisA	34373	100-02	-30	-6	5/02/06	1425	5/03/06	1423
6 Wilmot State Farm Insurance Main Building	SE, port in closet	Sub-slab	6Wil	13655	03-73	-30	-11	5/02/06	1430	5/03/06	1430
	East side on table	Indoor Air	6WillA	14038	96-03	-30	-6	5/02/06	1430	5/03/06	1430
26 Pine St.	Port in center of basement	Sub-slab	26Pine	24484	58-89	-30	-7	5/02/06	1442	5/03/06	1442

APPENDIX A

CHAIN OF CUSTODY RECORDS

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case:
Client No:

R

Region:	2	Date Shipped:	5/3/2006	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	UPS	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1Z0615472110002388	1 5/3/06 1730	UPS 1Z0615472110002388 5/3/06 1730
CERCLIS ID:		Shipped to:	Air Toxics Ltd. 180 Blue Ravine Rd., Suite B Folsom CA 95630 (916) 985-1000	2	
Spill ID:	00			3	
Site Name/State:	VIP Cleaners/NJ			4	
Project Leader:	Diane Salkie				
Action:					
Sampling Co:	U.S. EPA				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
02330	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	102-01 (Not preserved) (1)	4CWillA	S: 5/3/2006	10:40	–
04586	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	54-10 (Not preserved) (1)	24Pine	S: 5/2/2006	9:10	–
05359	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-64 (Not preserved) (1)	8Will	S: 5/3/2006	11:40	–
05712	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-19T (Not preserved) (1)	40Pine1B	S: 5/2/2006	13:56	–
11882	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-80 (Not preserved) (1)	48Pine	S: 5/2/2006	10:02	–
13655	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-73 (Not preserved) (1)	6Wil	S: 5/3/2006	14:30	–
13843	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	54-08 (Not preserved) (1)	63Morris	S: 5/3/2006	13:34	–
13853	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	95-81 (Not preserved) (1)	40Pine3	S: 5/2/2006	13:55	–
13999	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	101-03 (Not preserved) (1)	4BWillA	S: 5/3/2006	10:27	–
14038	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	96-03 (Not preserved) (1)	6WillA	S: 5/3/2006	14:30	–
14885	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	54-07 (Not preserved) (1)	95MorrisA	S: 5/2/2006	10:06	–

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

TO-15 = TO-15, TO-15SIM = TO-15SIM

TR Number: 2-043013577-050306-0003

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Send Copy [redacted]ple Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center [redacted]ntilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-460[redacted]

F2V[redacted]

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case:
Client No:

Region:	2	Date Shipped:	5/3/2006	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	UPS	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1Z0615472110002388	1 5/3/06 1730	UPS 1Z0615472110002388 5/3/06 1730
CERCLIS ID:		Shipped to:	Air Toxics Ltd. 180 Blue Ravine Rd., Suite B Folsom CA 95630 (916) 985-1000	2	
Spill ID:	00			3	
Site Name/State:	VIP Cleaners/NJ			4	
Project Leader:	Diane Salkie				
Action:					
Sampling Co:	U.S. EPA				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
2177	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	55-41 (Not preserved) (1)	8WillA	S: 5/3/2006	11:41	--
2387	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-10 (Not preserved) (1)	40PineA	S: 5/2/2006	14:03	--
23886	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	62-02 (Not preserved) (1)	73Morris	S: 5/2/2006	10:54	--
23887	Field QC/ Diane Salkie	L/G	TO-15SIM (21)	103-21 (Not preserved) (1)	TB-02	S: 5/3/2006		Trip Blank
23997	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	04-01 (Not preserved) (1)	89Morris1	S: 5/3/2006	13:47	--
24484	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	5889 (Not preserved) (1)	26Pine	S: 5/3/2006	14:42	--
32109	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	100-034T (Not preserved) (1)	40Pine1	S: 5/2/2006	13:56	--
33568	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-24 (Not preserved) (1)	40Pine4	S: 5/2/2006	14:00	--
33571	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-29 (Not preserved) (1)	50Pine	S: 5/2/2006	10:02	--
33881	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-52 (Not preserved) (1)	4CWil	S: 5/3/2006	10:40	--
33965	Field QC/ Diane Salkie	L/G	TO-15SIM (21)	102-07 (Not preserved) (1)	TB-01	S: 5/2/2006		Trip Blank

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____
TO-15 = TO-15, TO-15SIM = TO-15SIM			

TR Number: 2-043013577-050306-0003

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Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case:
Client No:

R

Region:	2	Date Shipped:	5/3/2006	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	UPS	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1Z0615472110002388	1 5/3/06 1730	UPS 1Z0615472110002388 5/3/06 1730
CERCLIS ID:		Shipped to:	Air Toxics Ltd. 180 Blue Ravine Rd., Suite B Folsom CA 95630 (916) 985-1000	2	
Spill ID:	00			3	
Site Name/State:	VIP Cleaners/NJ			4	
Project Leader:	Diane Salkie				
Action:	-				
Sampling Co:	U.S. EPA				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
34028	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-20 (Not preserved) (1)	105MorrisB	S: 5/3/2006	13:40	--
34125	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	100-81 (Not preserved) (1)	4AWil1	S: 5/3/2006	9:50	--
34318	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-62 (Not preserved) (1)	8Wil2	S: 5/3/2006	11:42	--
34328	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	100-12 (Not preserved) (1)	40Pine2	S: 5/2/2006	13:52	--
34373	Ambient Air/ Diane Salkie	L/G	TO-15SIM (21)	100-02 (Not preserved) (1)	MorrisA	S: 5/3/2006	14:25	--
34399	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	102-19 (Not preserved) (1)	4EWil	S: 5/3/2006	11:00	--
34440	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	102-02 (Not preserved) (1)	105MorrisA	S: 5/2/2006	10:30	--
34453	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	03-38 (Not preserved) (1)	4AWillA	S: 5/3/2006	9:50	--
34475	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-34 (Not preserved) (1)	4AWil2B	S: 5/3/2006	9:50	--
34730	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-71 (Not preserved) (1)	95MorrisB	S: 5/2/2006	10:09	--
34746	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	05-18 (Not preserved) (1)	EO2	S: 5/3/2006	14:00	--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

TO-15 = TO-15, TO-15SIM = TO-15SIM

TR Number: 2-043013577-050306-0003

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F2V5[illegible] Page 3 of

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case:
Client No:

Region:	2	Date Shipped:	5/3/2006	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	UPS	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1Z0615472110002388	1 5/3/06 1730	UPS 1Z0615472110002388 5/3/06 1730
CERCLIS ID:		Shipped to:	Air Toxics Ltd. 180 Blue Ravine Rd., Suite B Folsom CA 95630 (916) 985-1000	2	
Spill ID:	00			3	
Site Name/State:	VIP Cleaners/NJ			4	
Project Leader:	Diane Salkie				
Action:					
Sampling Co:	U.S. EPA				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
35154	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	95-01 (Not preserved) (1)	4BWil	S: 5/3/2006	10:26	--
35172	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-84 (Not preserved) (1)	4AWil2	S: 5/3/2006	9:50	--
39426	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	103-28 (Not preserved) (1)	4EWillA	S: 5/3/2006	11:00	--
4084	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	03-25 (Not preserved) (1)	4AWillA2	S: 5/3/2006	9:50	--
4191	Su-slab/ Diane Salkie	L/G	TO-15 (21)	54-18 (Not preserved) (1)	4DWil	S: 5/3/2006	10:48	--
4324	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	103-77 (Not preserved) (1)	44Pine	S: 5/2/2006	11:48	--
902	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	53-45 (Not preserved) (1)	EO1	S: 5/3/2006	14:00	--
912	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	58-71 (Not preserved) (1)	89Morris3	S: 5/3/2006	13:55	--
915	Sub-slab/ Diane Salkie	L/G	TO-15 (21)	03-05 (Not preserved) (1)	89Morris2	S: 5/3/2006	13:50	--
9403	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	103-57 (Not preserved) (1)	EOIA	S: 5/3/2006	14:00	--
9940	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	54-8 (Not preserved) (1)	4DWillA	S: 5/3/2006	10:48	--

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: TO-15 = TO-15, TO-15SIM = TO-15SIM	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

TR Number: 2-043013577-050306-0003

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APPENDIX E

VIP CLEANERS SITE

TRIP REPORT

AUGUST 2006

SAMPLING TRIP REPORT

Site Name: VIP Cleaners
Sampling Dates: August 9, 2006
CERCLIS ID: NJD982744740

1. Site Location:

   Morristown, New Jersey

2. Sample Descriptions:

   Refer to Table 1 for all sample information.

3. Laboratories Receiving Samples:

Matrix	Sample Type	Laboratory Code	Name and Address of Laboratory
Air Samples in 6 lt. SUMMA™ canisters	VOCs	AIRTOX	Air Toxics Ltd. 180 Blue Ravine Road Suite B Folsom, CA 95630

4. **Sample Dispatch Data:**

   On August 9, 2006, three (3) SUMMA™ canisters, including one field duplicate, were placed in two businesses in the vicinity of the VIP Cleaners site for twenty four (24) hours. The canister contained a vacuum that once opened, drew the surrounding air into the body of the canister. In addition, one ambient air sample was taken from outside, and an unopened trip blank accompanied all of the samples.

   On August 10, 2006, all three (3) air samples and three (3) valves, in addition to the unopened trip blank, one (1) ambient air sample, and one unused canister were shipped in two boxes to Air Toxics Ltd. via United Parcel Service under air bill numbers 1Z0615472110000246 and 1Z0615472110000004 at 1145. Table 1 displays the sampling information such as the location of canister placement, initial and final canister pressure, sampling times, dates and the canister number. The chain of custody form can be found as Appendix A.

5. **Sampling Personnel:**

Name	Organization	Site Duties
Diane Salkie	USEPA Region II DESA/HWSB Superfund Contract Support Team	Project Manager/Sample Management
Kelli Lucarino	USEPA Region II DESA/HWSB Superfund Contract Support Team	Field Personnel
Pat Sheridan	USEPA Region II DESA/HWSB Superfund Contract Support Team	Quality Assurance Officer

6. **Additional Comments:**

The number of samples includes:

- 2 indoor air samples from 2 business locations;
- 1 field duplicate
- 1 ambient (outdoor) samples
- 1 unopened trip blank

7. **Report Prepared By:** Diane Salkie Date: August 10, 2006

TABLE 1
SAMPLE DESCRIPTIONS
VIP CLEANERS SITE

Location	Sample Type	Sample #	Canister #	Valve #	Pressure		Begin Date	Begin Time	End Date	End Time
					Initial	Final				
N/A	Trip Blank	TB-01	34414	---	---	---	8/9/2006	------	8/10/2006	----
AA-01	Ambient	AA-01	33914	103-34	-30+	-4	8/9/2006	0941	8/10/2006	0941
105 Morris Street	Indoor Air	105MorrisIA	33329	03-30	-30+	-8	8/9/2006	0944	8/10/2006	0944
95 Morris Street	Indoor Air	95MorrisIA	24229	53-44	-30+	-5	8/9/2006	0954	8/10/2006	0954
95 Morris Street Duplicate	Indoor Air	95Morris2IA	33863	54-47	-30	-8	8/9/2006	0954	8/10/2006	0954

APPENDIX A

CHAIN OF CUSTODY RECORDS

USEPA Contract Laboratory Program
Generic Chain of Custody

Reference Case: R
Client No:

Region:	2	Date Shipped:	8/10/2006	**Chain of Custody Record**	Sampler Signature:
Project Code:		Carrier Name:	UPS	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:		Airbill:	1z0615472110000004	1 8/10/06 1130	UPS 1Z0615472110000004 8/10/06 1130
CERCLIS ID:		Shipped to:	Air Toxics Ltd. 180 Blue Ravine Rd., Suite B Folsom CA 95630 (916) 985-1000	2	
Spill ID:	00			3	
Site Name/State:	VIP Cleaners/NJ			4	
Project Leader:	Diane Salkie				
Action:					
Sampling Co:	U.S. EPA				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME		QC Type
24229	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	(Not preserved) (1)	95MorrisIA	S: 8/10/2006	9:54	–
33329	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	(Not preserved) (1)	105MorrisIA	S: 8/10/2006	9:44	–
33863	Indoor Air/ Diane Salkie	L/G	TO-15SIM (21)	(Not preserved) (1)	95Morris2IA	S: 8/10/2006	9:54	Field Duplicate
33914	Ambient Air	/G	TO-15SIM (21)	(Not preserved) (1)	AA-01	S: 8/10/2006	9:41	–
34414	Field QC/ Diane Salkie	L/G	TO-15SIM (21)	(Not preserved) (1)	TB-01	S: 8/10/2006		Trip Blank

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: TO-15SIM = TO-15SIM	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

TR Number: 2-043013577-081006-0001

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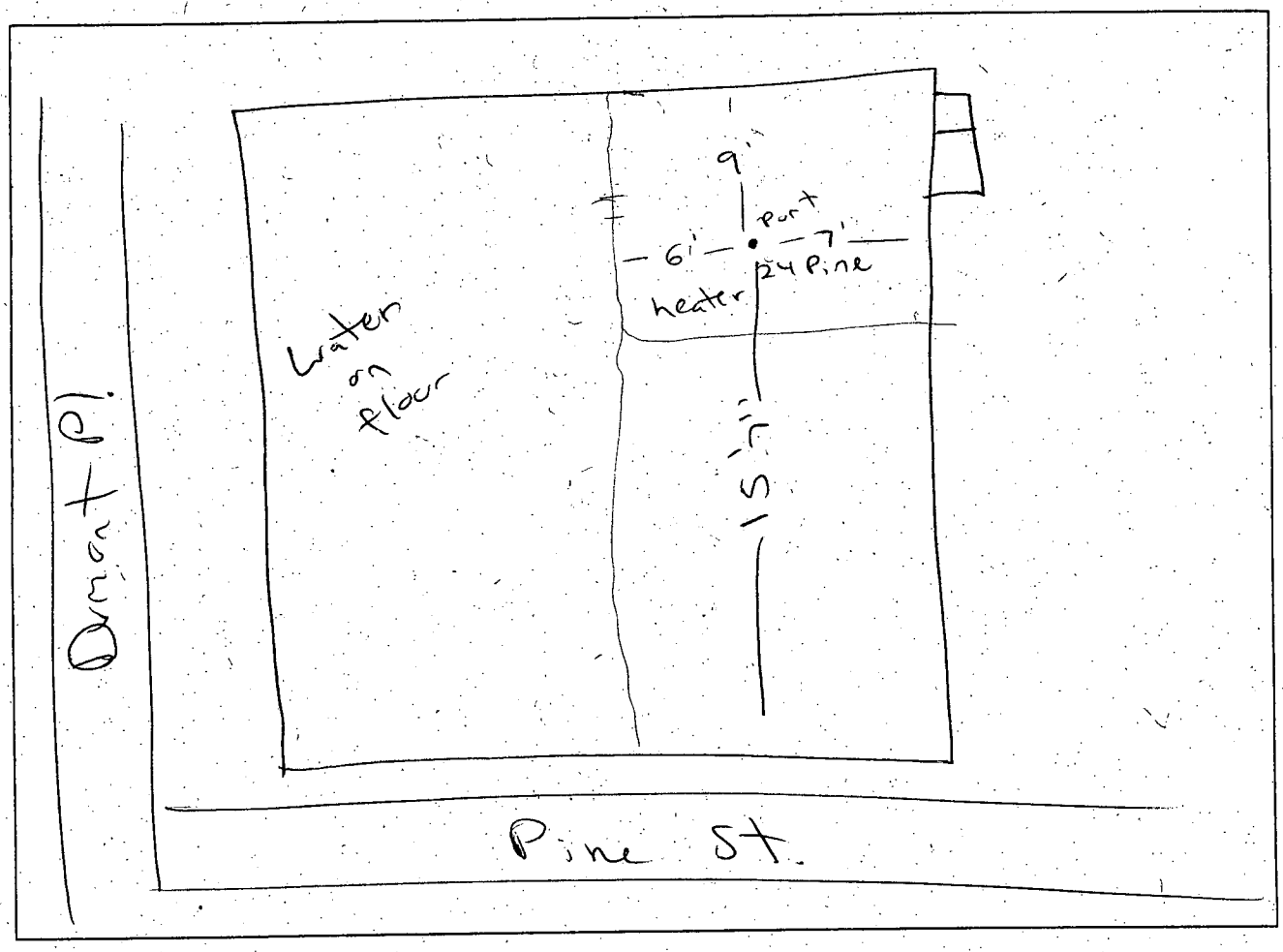
APPENDIX F

SAMPLE LOCATION DRAWINGS

Provide Drawing of Sample Location(s) in Building

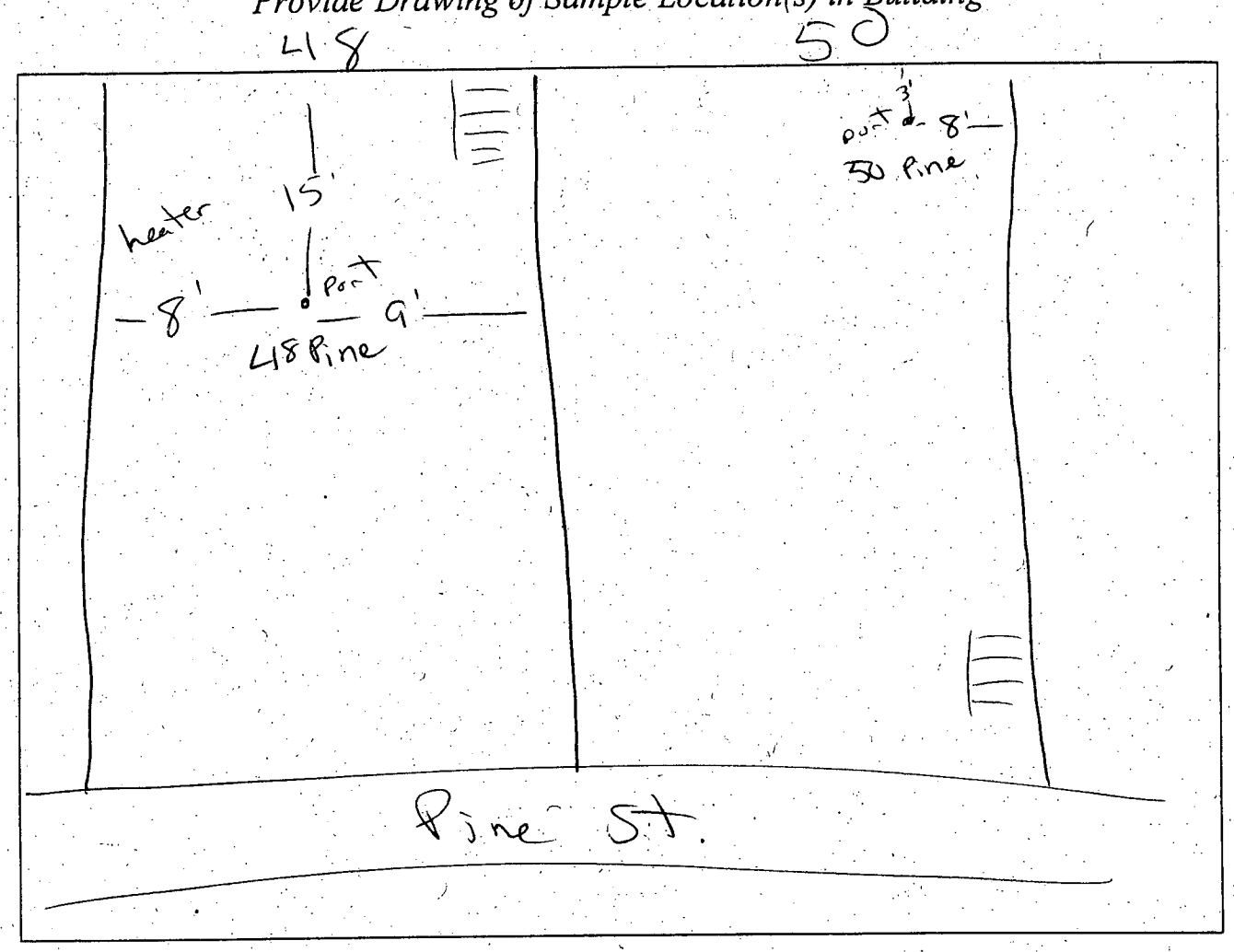


24 Pine St.

N →

Not to Scale

Provide Drawing of Sample Location(s) in Building

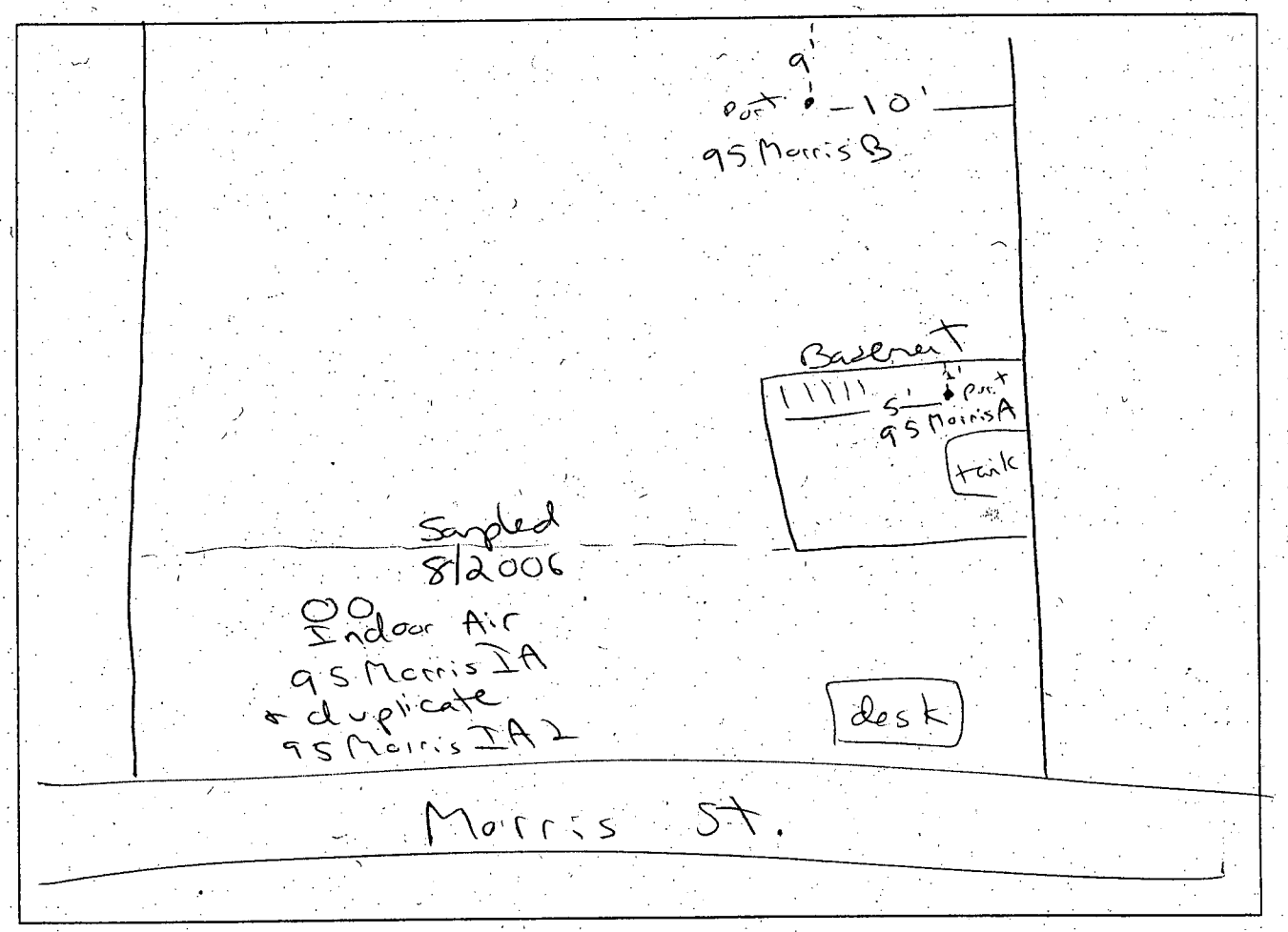


48/50 Pine St.

N

Not to Scale

Provide Drawing of Sample Location(s) in Building



N

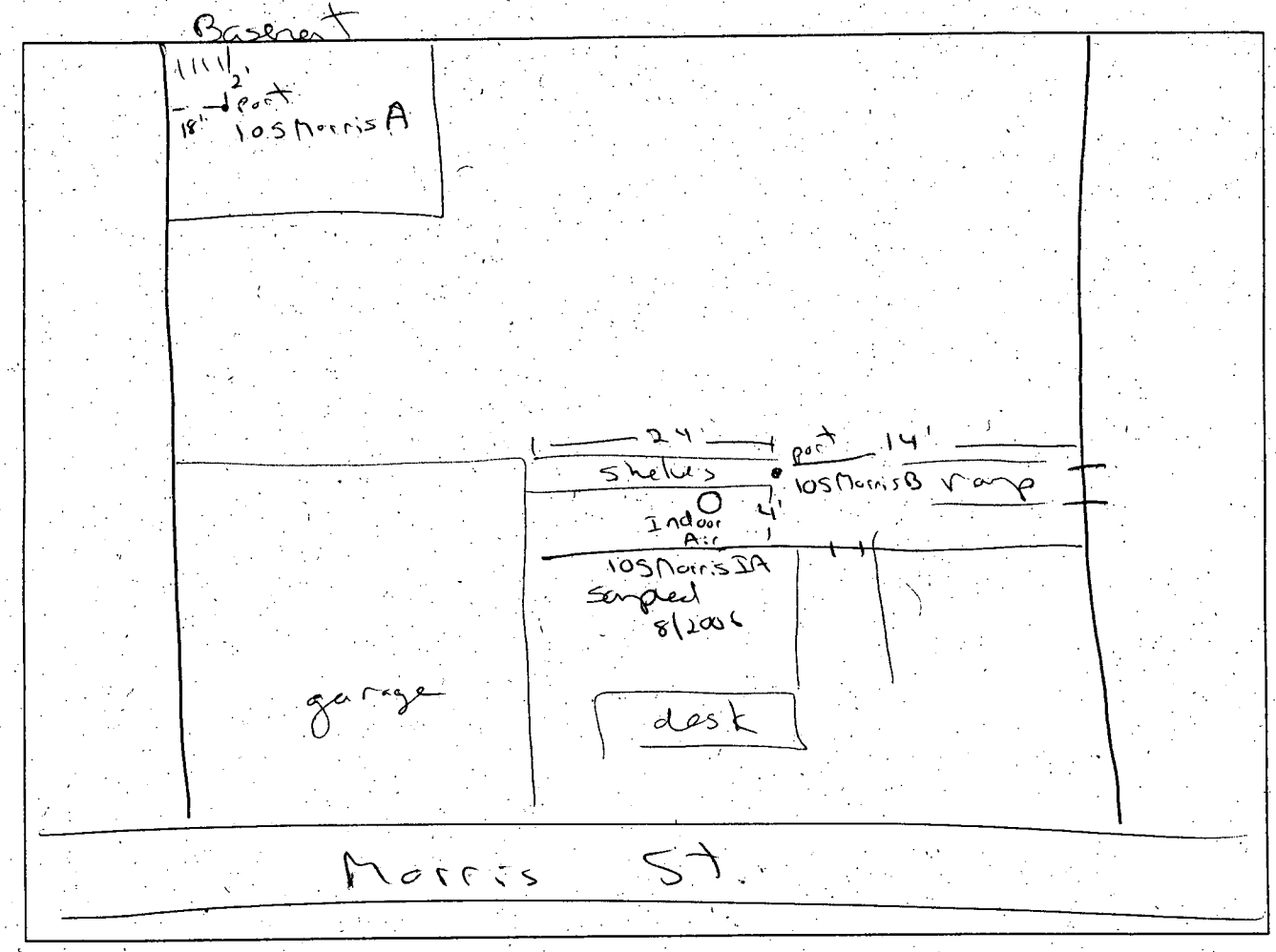
95 Morris St.
(Auto Concepts)

Not to Scale

Sampled 8/2006

O ambient air

Provide Drawing of Sample Location(s) in Building

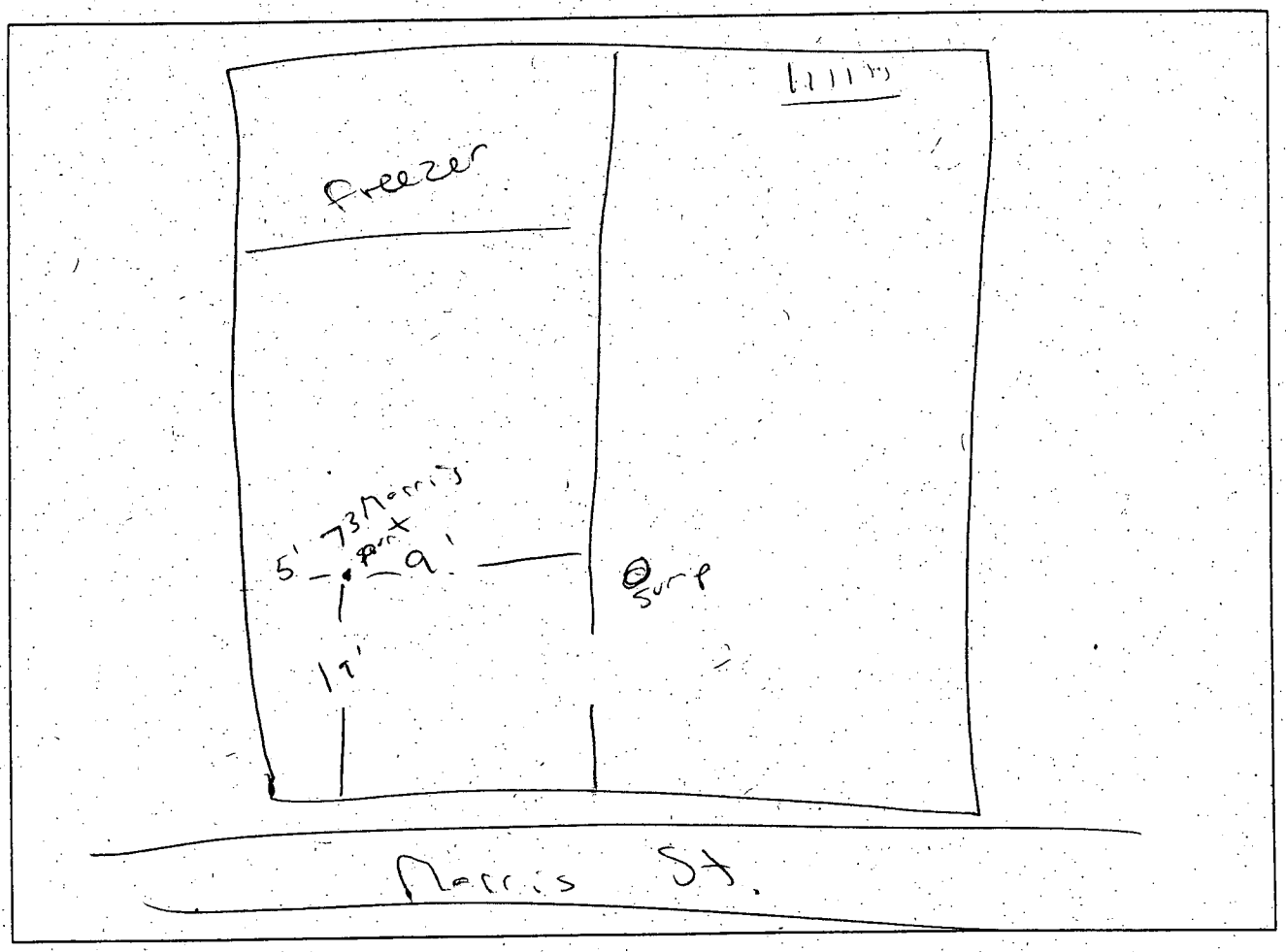


105 Morris St
(Morristown Tire)

N

Not to Scale

Provide Drawing of Sample Location(s) in Building

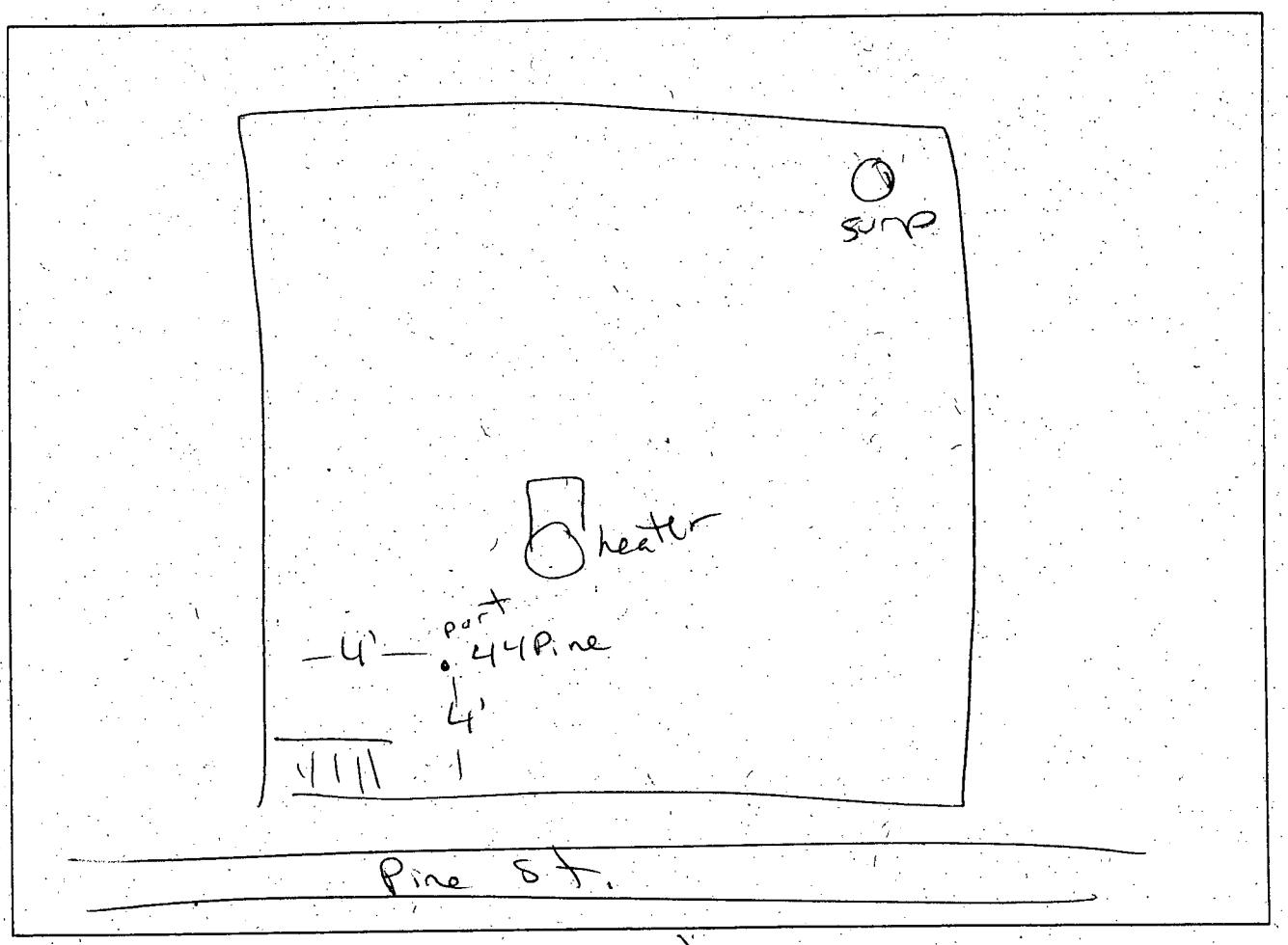


73 Morris St.
(Morristown Diner)

N ↓

Not to scale

Provide Drawing of Sample Location(s) in Building

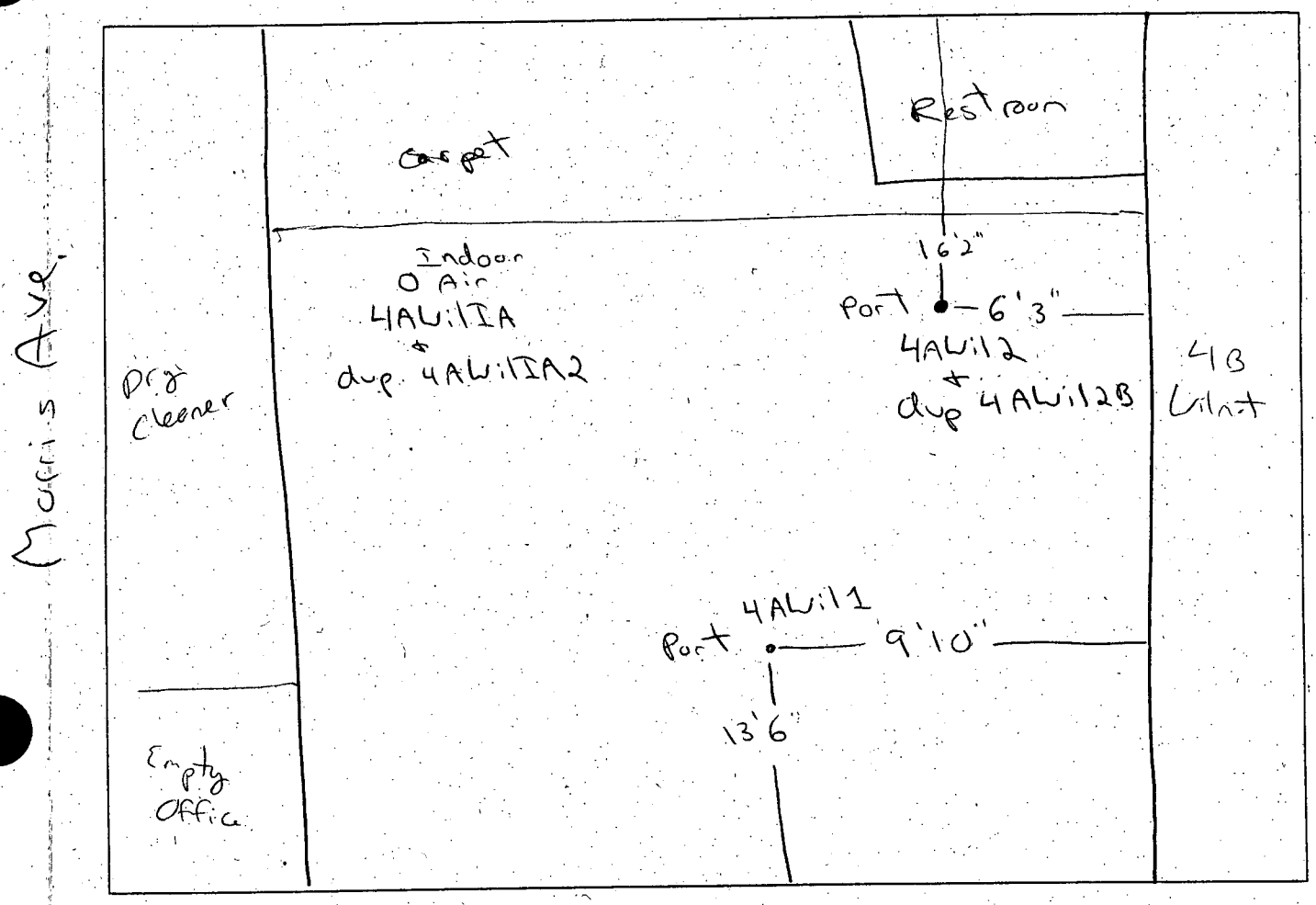


44 Pine St.

N →

Not to scale

Provide Drawing of Sample Location(s) in Building

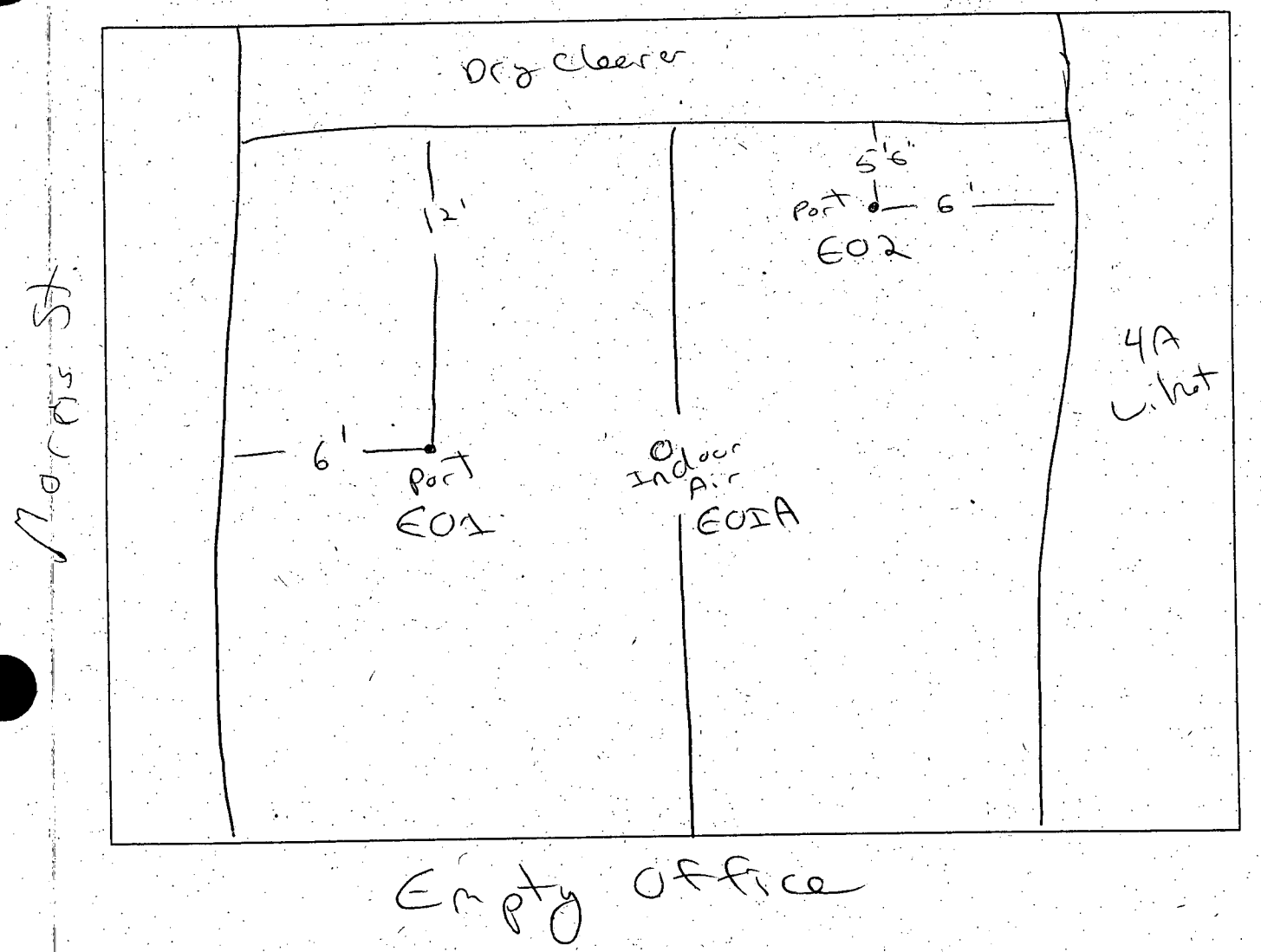


4A Wilmot St.
(former Kid Fit)

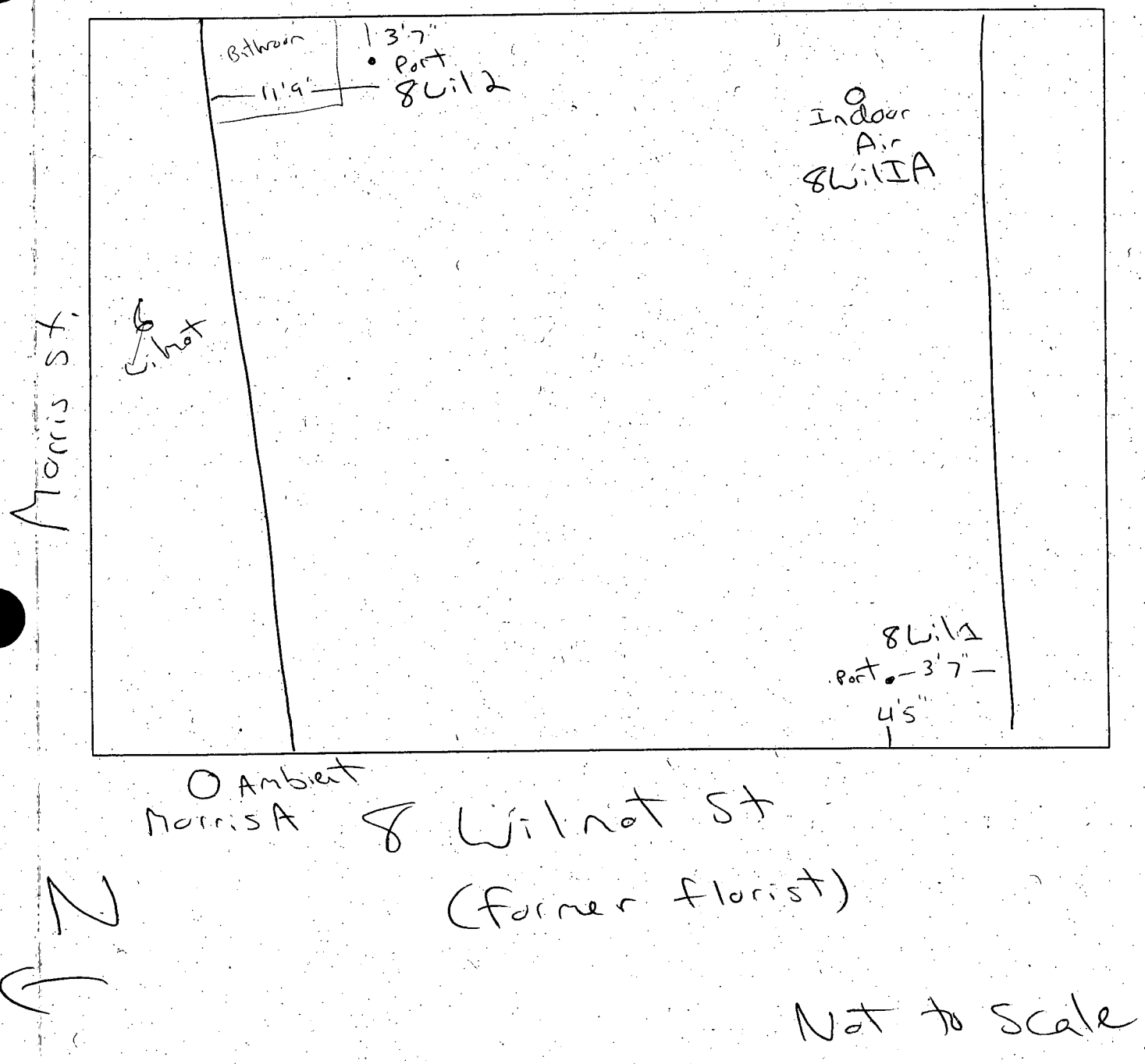
N

Not to Scale

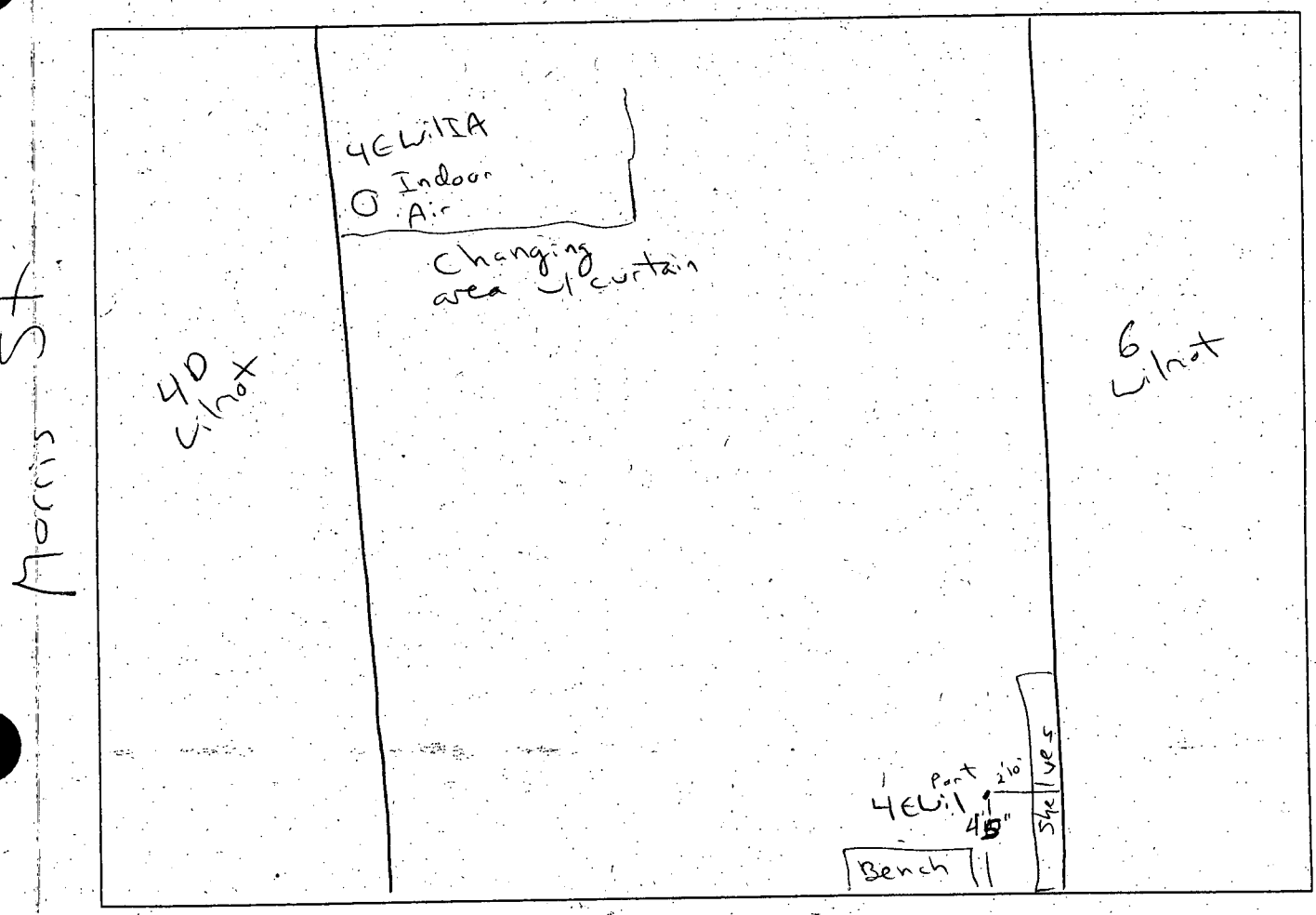
Provide Drawing of Sample Location(s) in Building



Provide Drawing of Sample Location(s) in Building



Provide Drawing of Sample Location(s) in Building

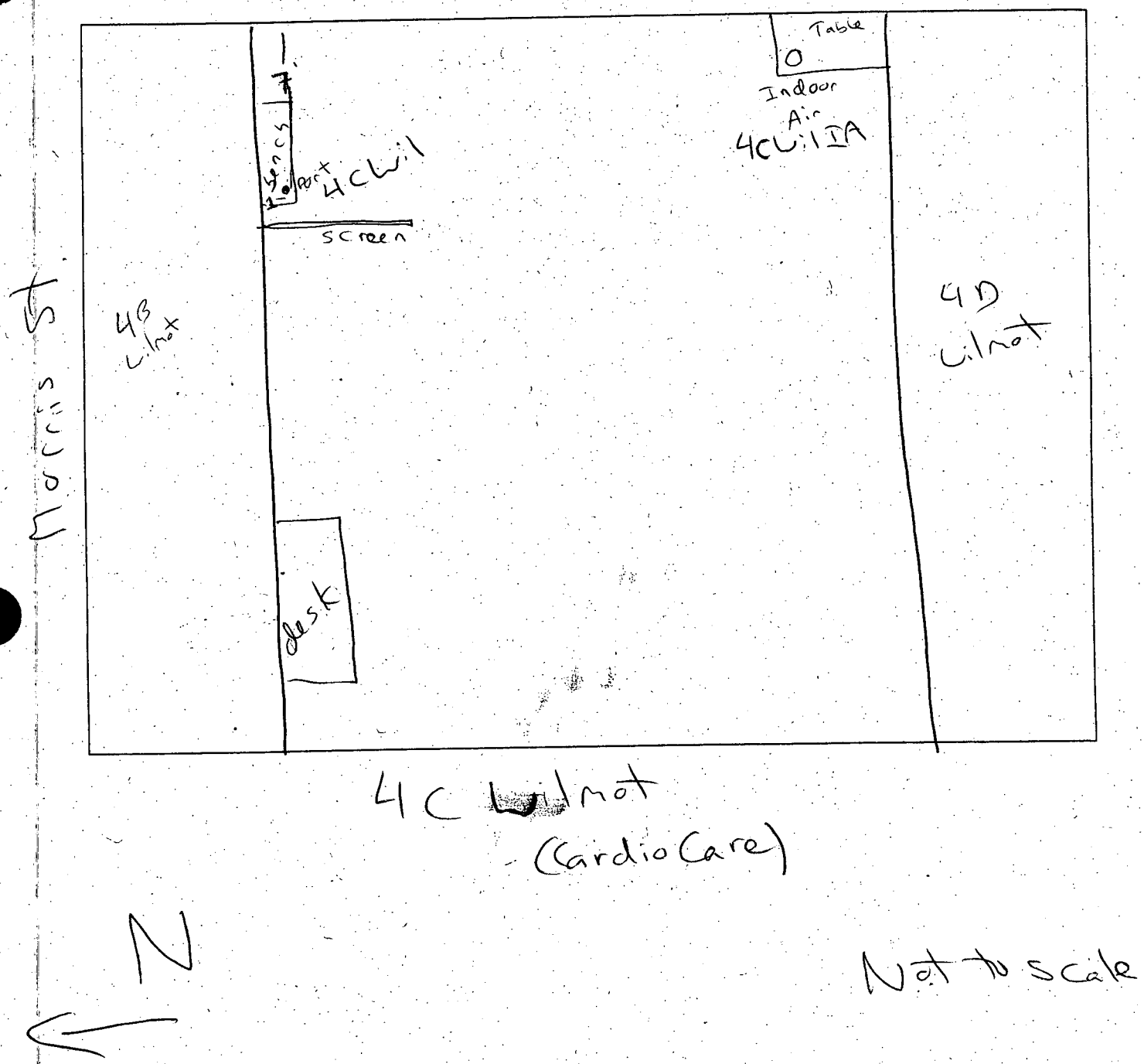


4E Walnut St.
(Curves)

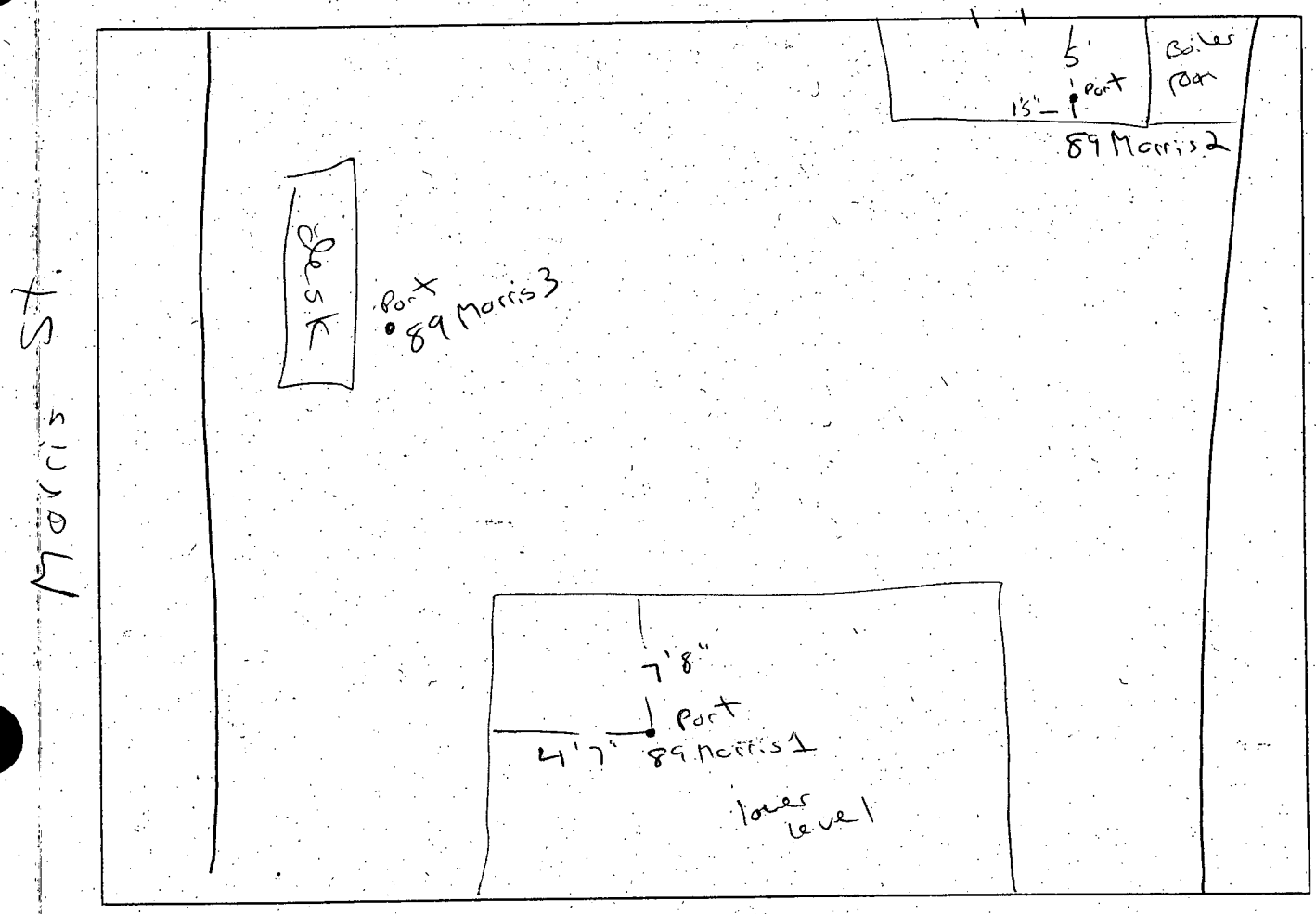
N

Not to Scale

Provide Drawing of Sample Location(s) in Building



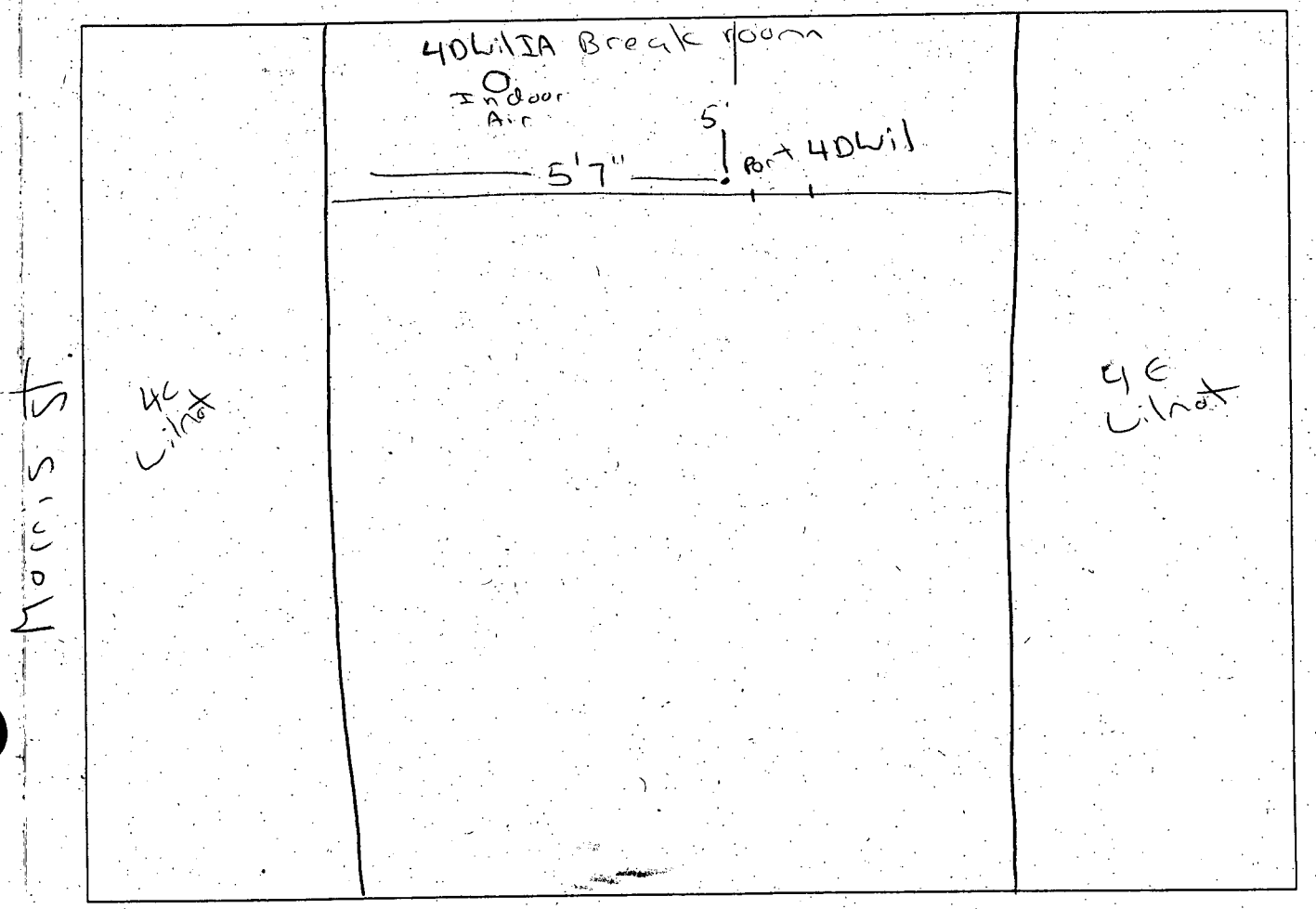
Provide Drawing of Sample Location(s) in Building



89 Morris ST.

(New Image Cleaners + Tailoring)

Provide Drawing of Sample Location(s) in Building

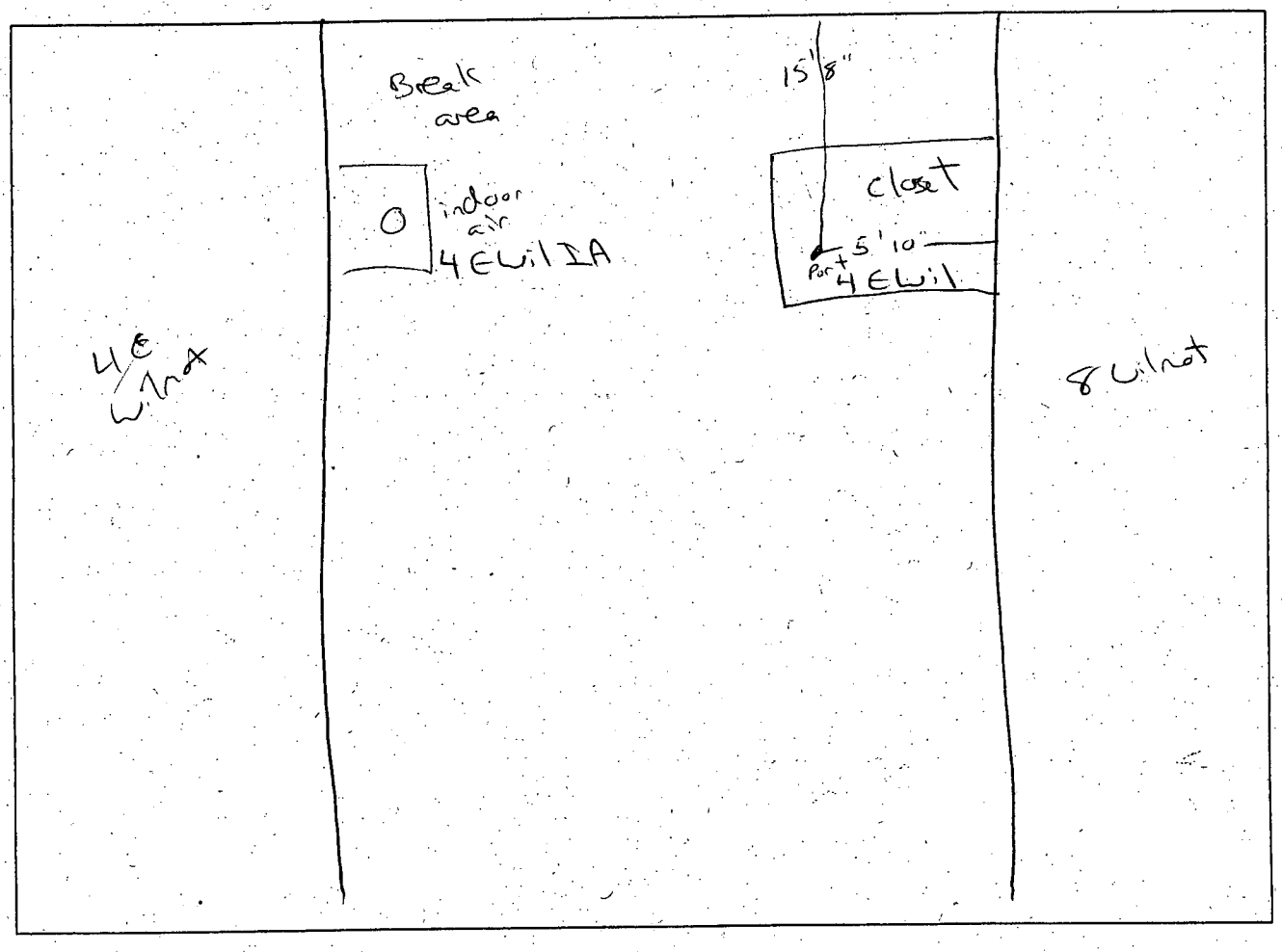


4 D Wilnot St.
(Amici Hair Design)

N

Not to scale

Provide Drawing of Sample Location(s) in Building

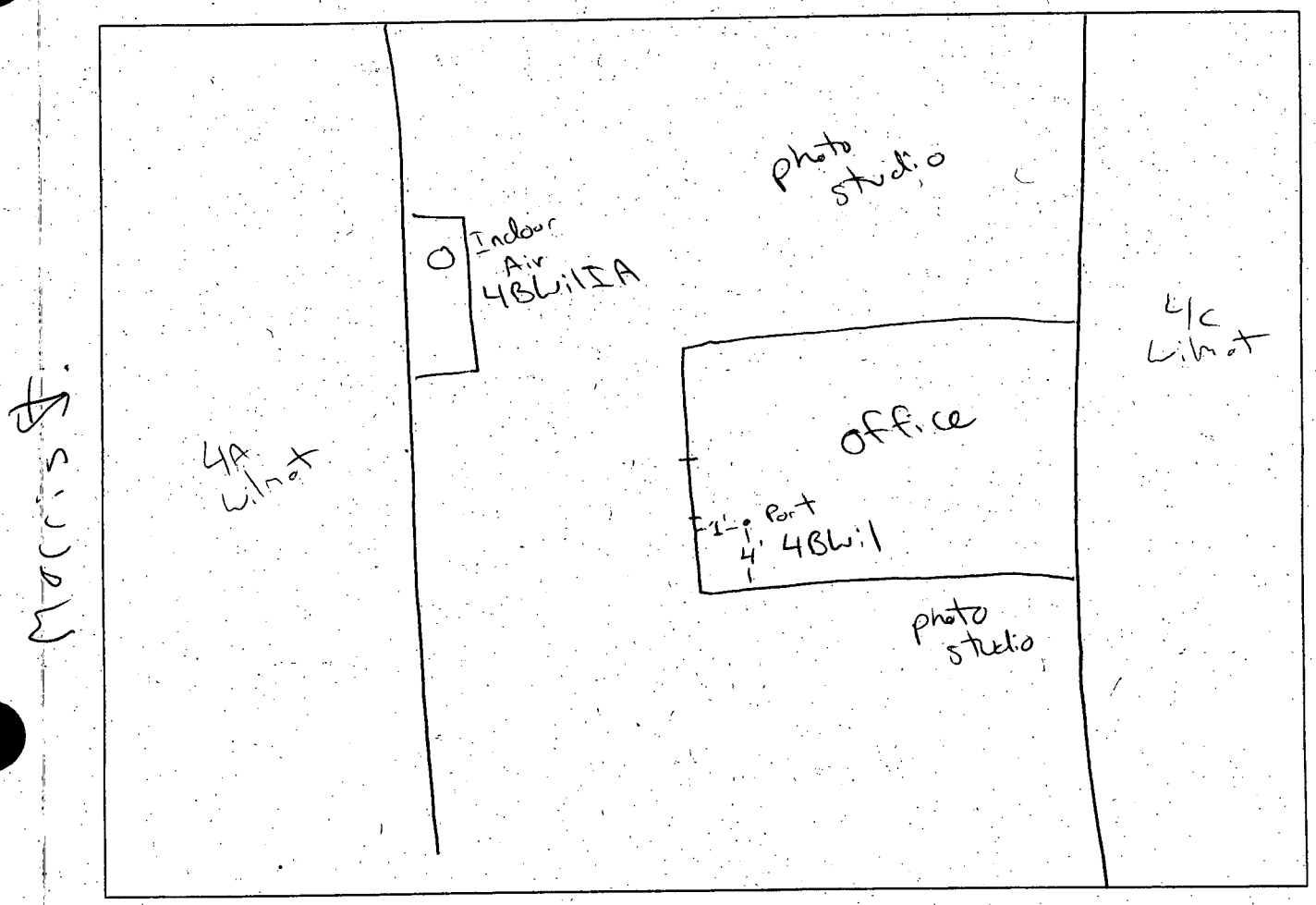


~~4~~ 6 Wilnot
(~~state~~ farm)

Morris St.

N

Provide Drawing of Sample Location(s) in Building

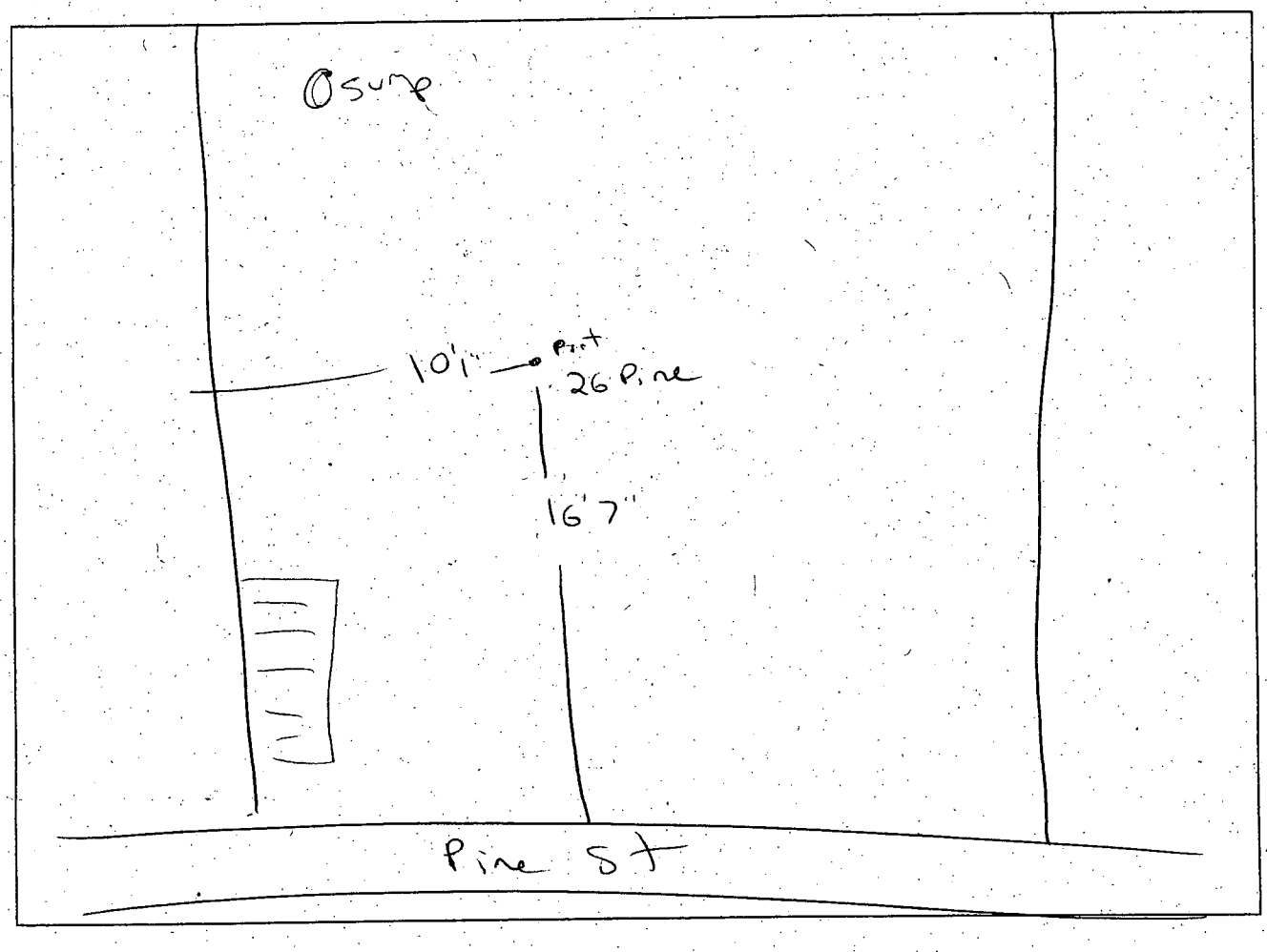


4B Wilmot St.
Elite Photography

N

Not to scale

Provide Drawing of Sample Location(s) in Building

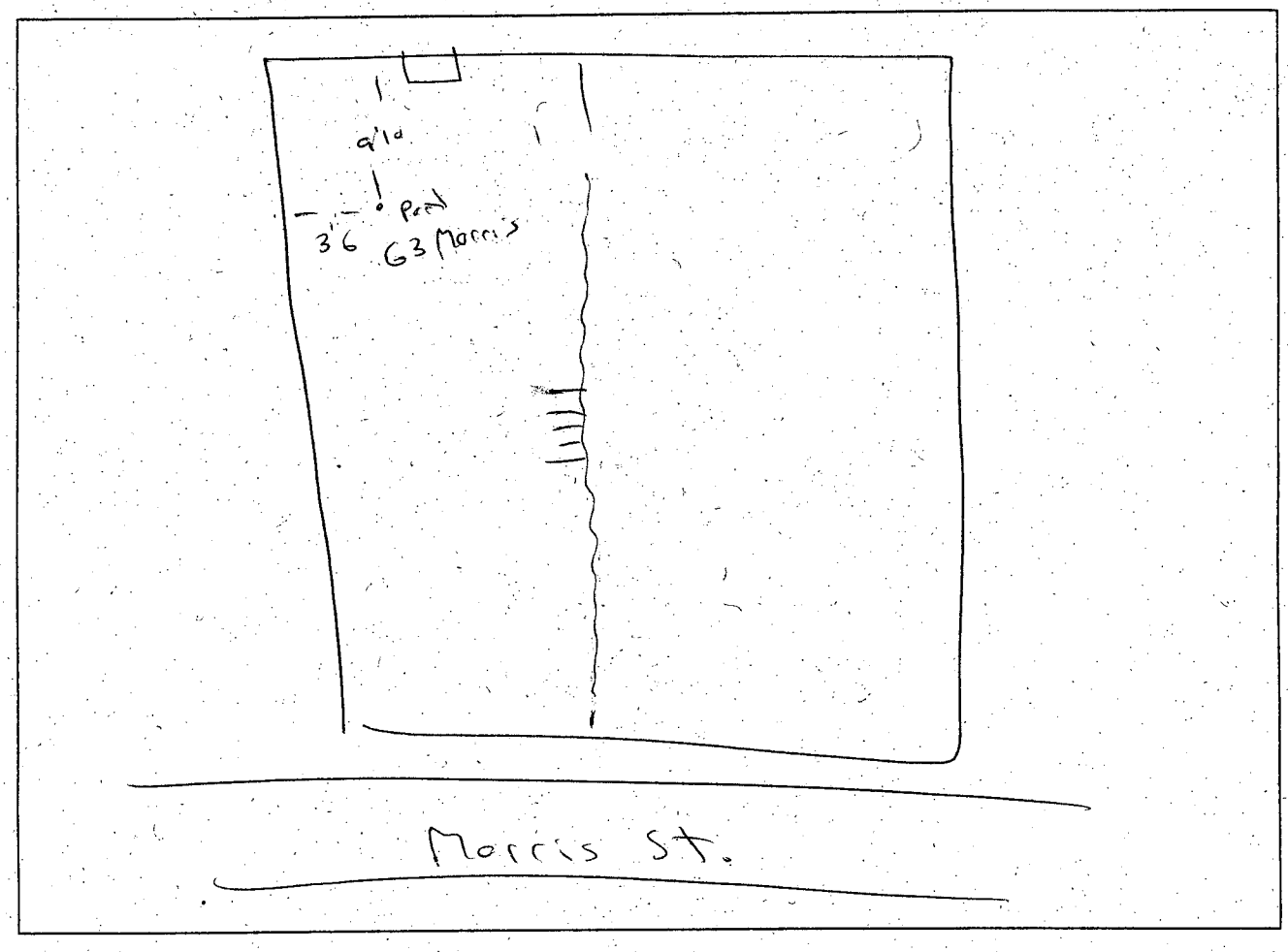


26 Pine St.

N →

Not to scale

Provide Drawing of Sample Location(s) in Building

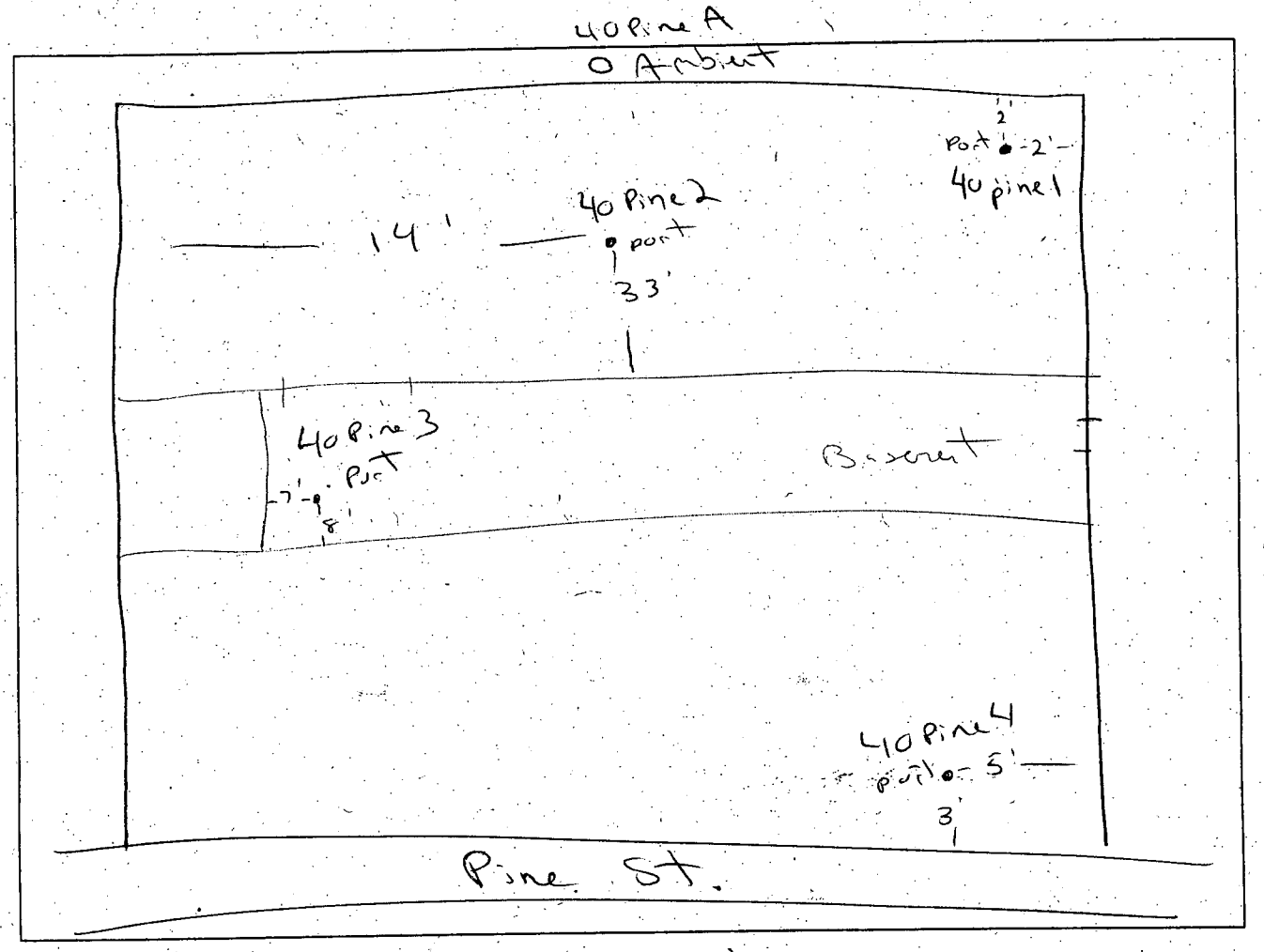


63 Morris St.
(Asahi Sushi)

N

Not to Scale

Provide Drawing of Sample Location(s) in Building



40 Pine St.
(Future Day Care)

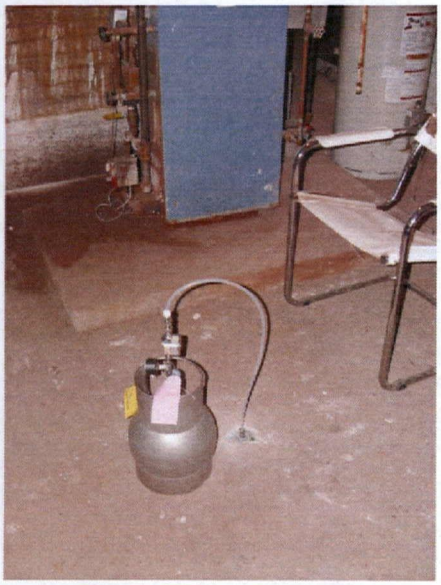
N →

Not to Scale

APPENDIX G

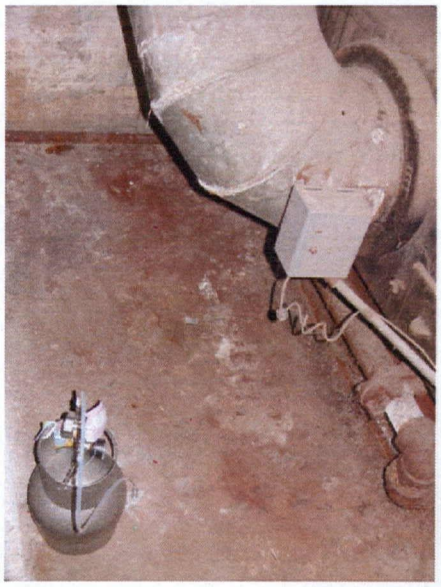
PHOTOGRAPH LOG

24 Pine St.



Sub-slab port sample

48 Pine St.

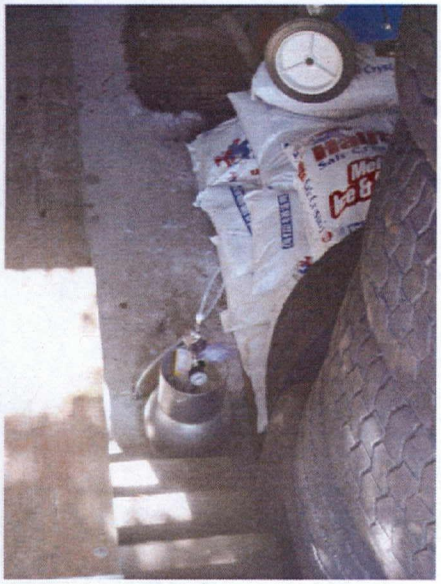


Sub-slab port sample

50 Pine St.

Sub-slab port sample

105 Morris St.

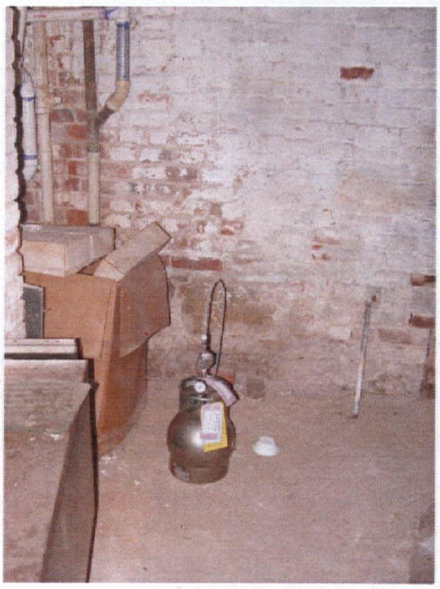


Southeast sub-slab port sample

Center sub-slab port sample

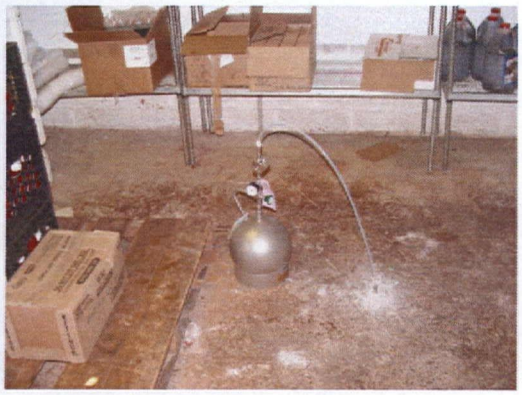
95 Morris St.

Southwest sub-slab port sample



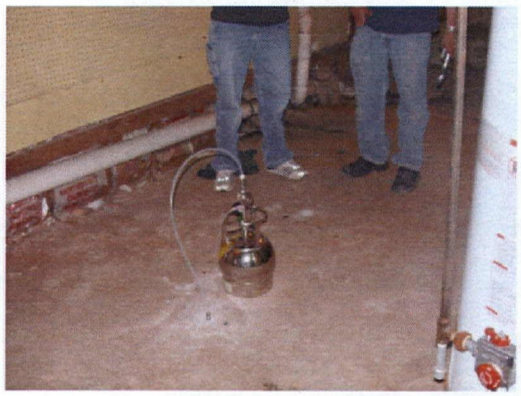
West sub-slab port sample

73 Morris St.



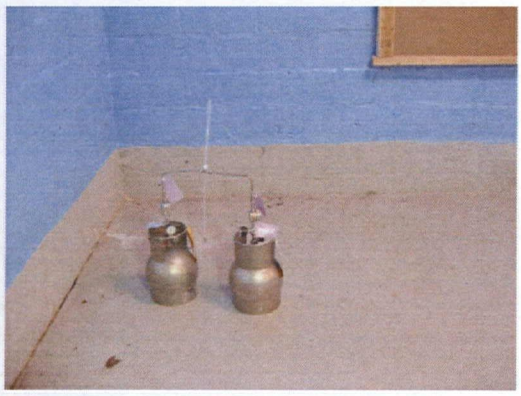
Sub-slab port sample

44 Pine St.

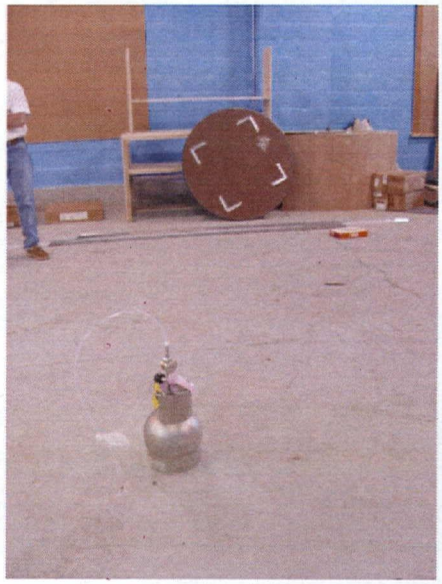


Sub-slab port sample

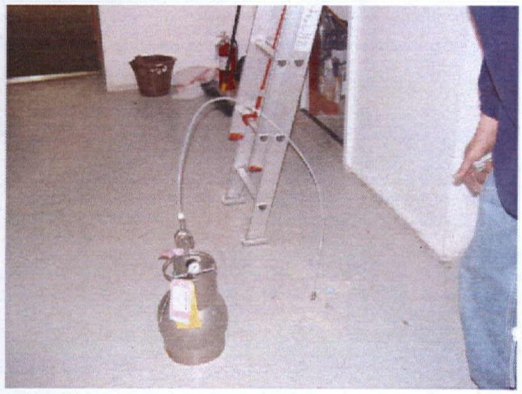
40 Pine St.



Northwest sub-slab port sample with duplicate



Center sub-slab port sample



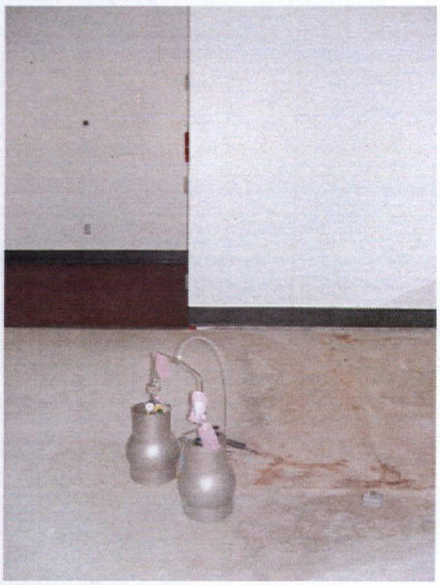
South/center sub-slab port sample

Northeast sub-slab port sample

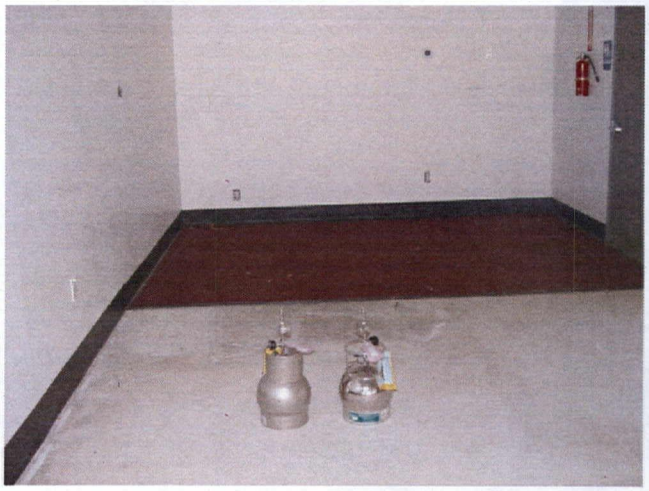
Ambient sample, west of 40 Pine St.

Main, On-site Building

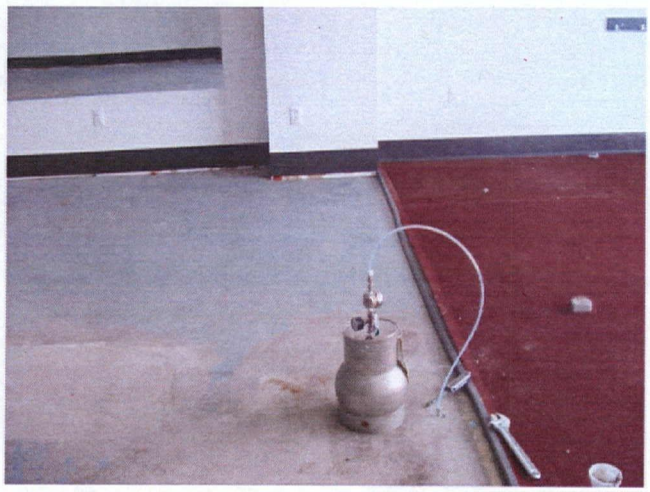
4A Wilmot St.



East sub-slab port sample with duplicate

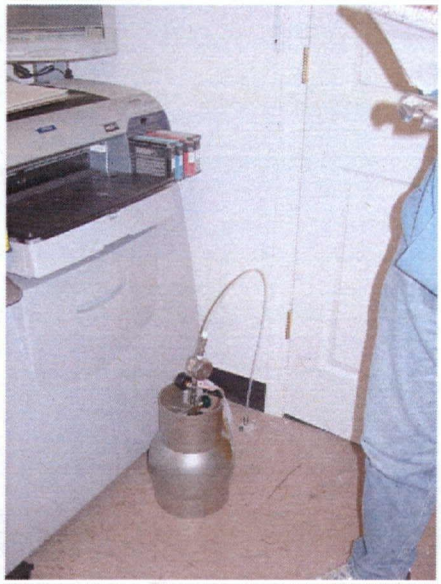


Indoor air sample with duplicate



West sub-slab port sample

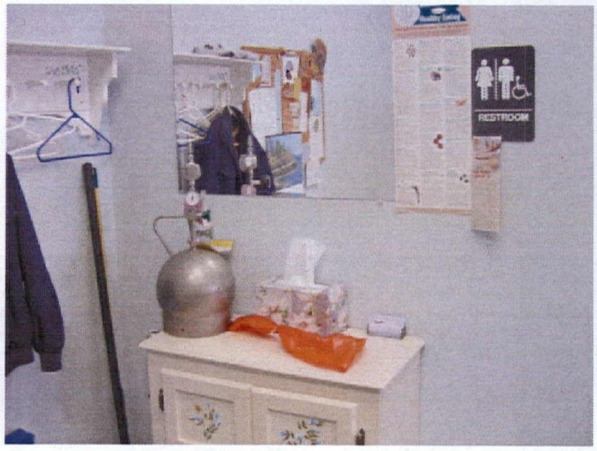
4B Wilmot St.



Sub-slab port sample

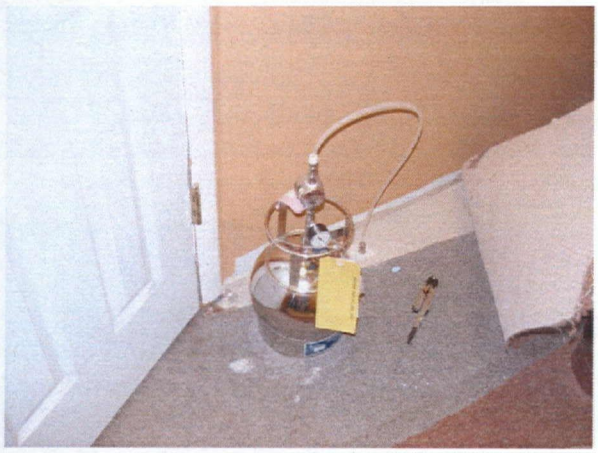
4C Wilmot St

Sub-slab port sample

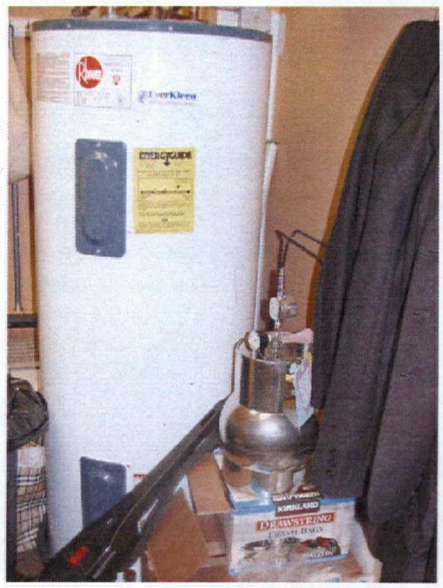


Indoor air sample

4D Wilmot St.

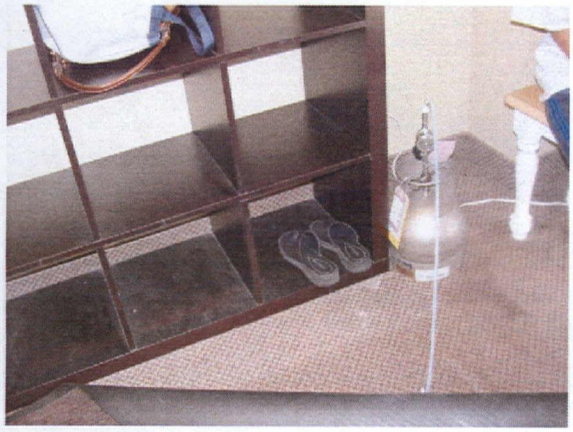


Sub-slab port sample

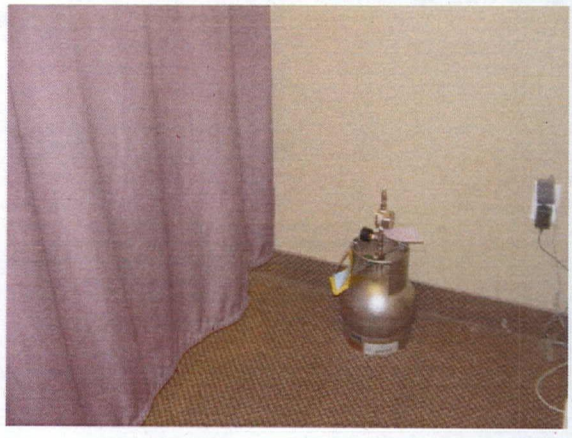


Indoor air sample

4E Wilmot St.



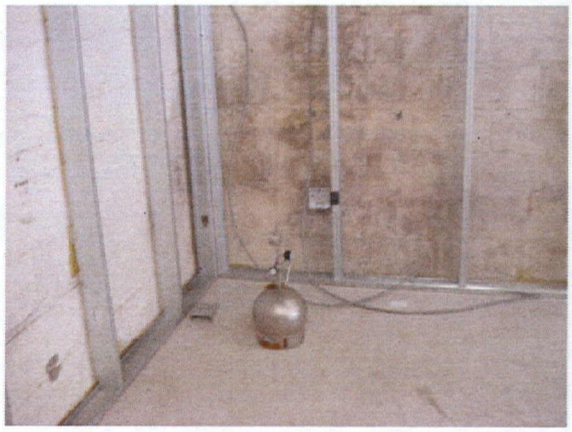
Sub-slab port sample



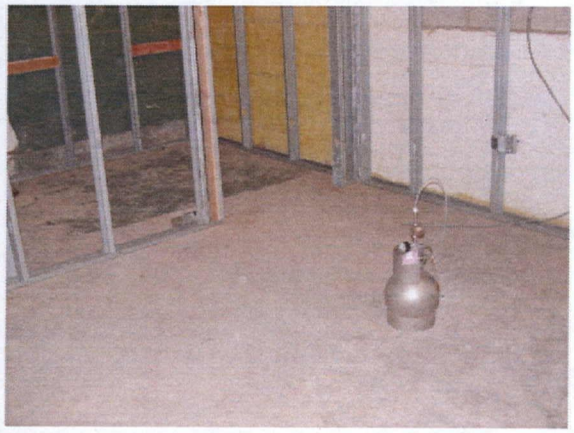
Indoor air sample

8 Wilmot St.

Southwest sub-slab port sample



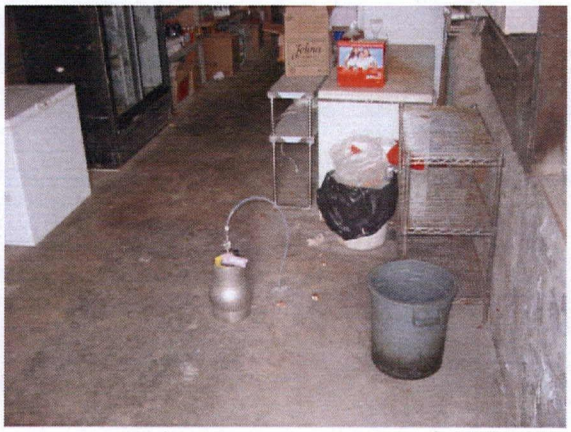
Indoor air sample



Northeast sub-slab port sample

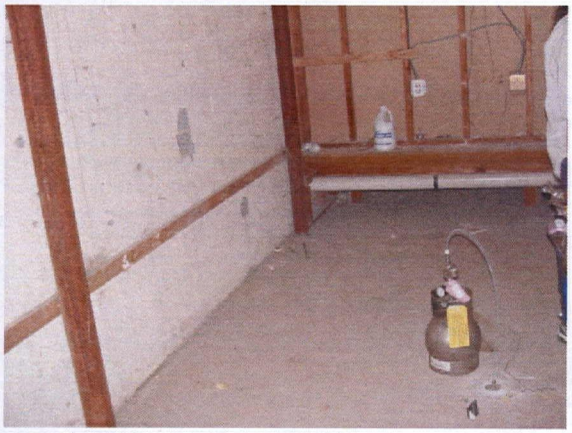
Ambient air sample, north of 8 Wilmot St.

63 Morris St.

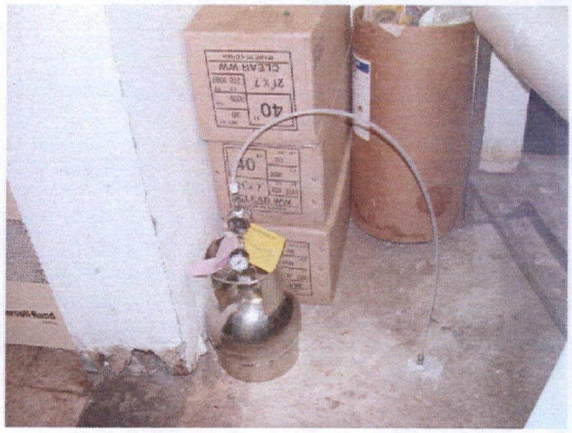


Sub-slab port sample

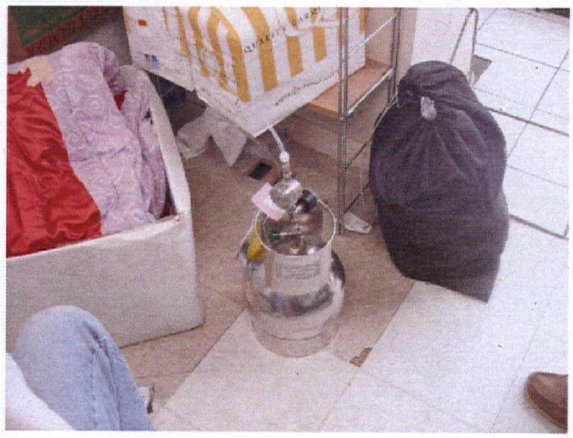
89 Morris St.



West sub-slab port sample

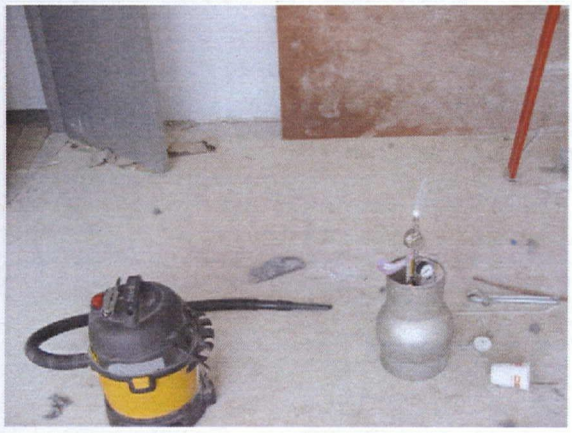


Northeast sub-slab port sample

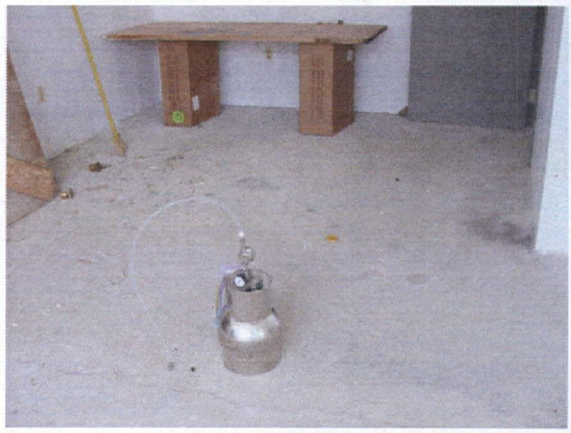


North sub-slab port sample

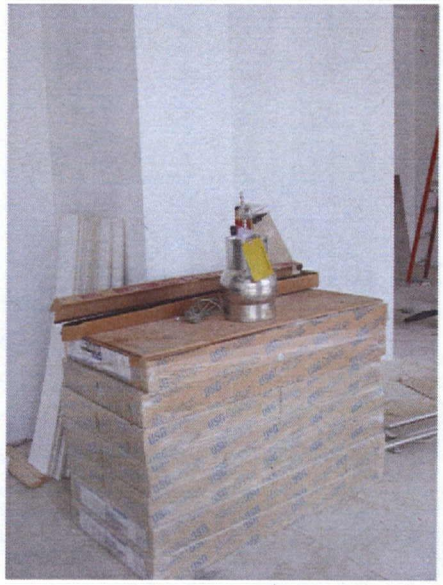
Empty Storefront



North/center sub-slab port sample



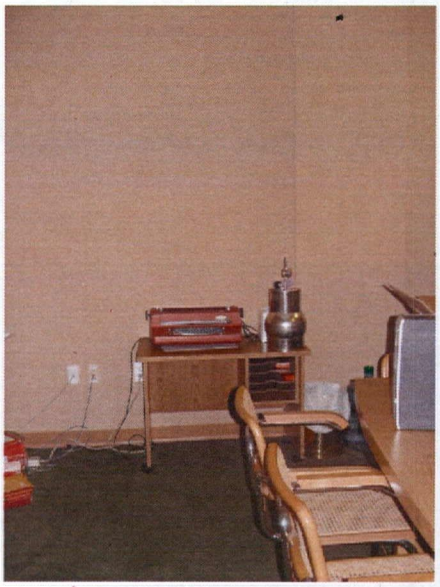
Southeast sub-slab port sample



Indoor air sample

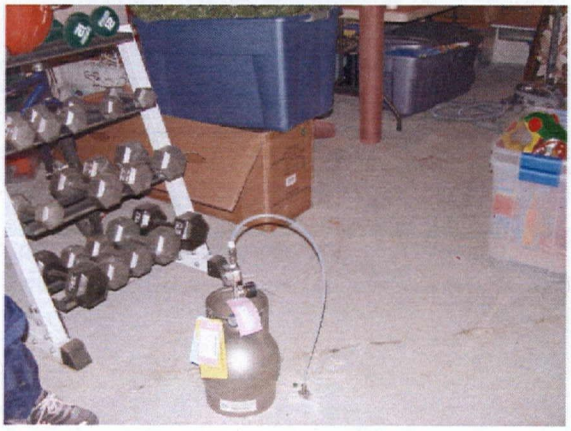
6 Wilmot St.

Sub-slab port sample



Indoor air sample

26 Pine St.



Sub-slab port sample

APPENDICES

APPENDIX A:	Site Maps
APPENDIX B:	Quality Assurance Project Plan
APPENDIX C:	Air Data Packages
APPENDIX D:	VIP Cleaners Trip Report, May 08, 2006
APPENDIX E:	VIP Cleaners Trip Report, August 10, 2006
APPENDIX F:	Sample location drawings
APPENDIX G:	Photograph log