Report. Hw. 152139. 1999-07-28. Bulova Soil Gas Survey

152139

**IT Corporation**
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*A Member of The IT Group*

the IT group SM

July 28, 1999

Mr. Carl Hoffman
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Re: Soil Gas Survey Report
Former Watch Case Factory Site
Sag Harbor, New York
Site #152139

Dear Mr. Hoffman:

IT Corporation conducted a soil gas survey as described in the revised work plan dated May 10, 1999 and approved by the NYSDEC. The purpose of the soil gas survey was to document that volatile organic compound (VOC) concentrations in soil gas are within acceptable concentrations for residential housing. The scope of work included:

- On June 15, 1999, six soil gas survey points within the interior courtyard and two points within the building between the interior and western courtyard were installed utilizing an ATV-mounted Geoprobe. The soil gas probes were installed to a depth of three to four feet below grade. See the attached site plan with the sample locations.

- Prior to collection of the air samples, the soil gas point was purged by connecting it to a vacuum pump. The soil gas samples were then collected with 6-liter SUMMA canisters. In addition, one ambient air sample was collected from the south parking lot. Samples were shipped by overnight courier to Air Toxics Limited of Folsom, California. The samples were analyzed for VOCs according to EPA Method TO-14.

- A fate and transport model was used to estimate indoor air concentrations from volatile compounds in the soil gas that could potentially migrate into the indoor air of the site building. The vapor migration model which was utilized has been validated by USEPA and was developed by Jury et al (1983) and is based on the principles of simple diffusion. The model initially estimated the effective diffusivity in the soil pore gas using air-filled porosity and total porosity parameters. The diffusivity was then adjusted by an empirical factor to account for the attenuation due to the concrete foundation. Using this adjusted value the emission rate of chemicals from the soil gas into the building was calculated. Finally, the estimated indoor air concentrations were derived from the emission rate and the estimated building ventilation rate. Please note that the highest concentration for each compound detected in the soil gas samples was conservatively used in the calculations. These estimated indoor air concentrations were then compared

to published literature background values for indoor air and used to estimate potential exposure and risk from inhalation of indoor air. The estimated indoor air concentrations from soil gas were then input into the same exposure and risk equations used in the risk assessment that was conducted as part of the 1995 remedial investigation. In this evaluation all chemicals detected in the soil gas were evaluated, whether or not they were previously detected indoors. The estimated risk estimates for inhalation of indoor air from the soil gas analytical results were then compared to USEPA's target risk levels.

The results of the soil gas survey are as follows:

- The analytical results indicated concentrations of 1,1-dichloroethane in SGP-3, SGP-6, SGP-7 and SGP-8; cis-1,2 dichloroethene in all points except SGP-4; chloroform in SGP-5 and SGP-6; 1,1,1-trichloroethane and trichloroethene in all soil gas points; tetrachloroethene in all points except for SGP-2; carbon tetrachloride in SGP-5, SGP-6, and SGP-7 and concentrations of Freon 113 in SGP-1, SGP-2, and SGP-3. The highest concentrations were found in SGP-1, which is located adjacent to MW-11, the monitoring well containing the highest VOC concentrations. The ambient air results contained 1 ppbv (2.1 ug/$m^3$) of chloromethane and 0.95 ppbv (5.4 ug/$m^3$) of Freon 11. A summary table and a site plan with sample locations and soil gas analytical results are attached along with the laboratory report.

- The estimated indoor air concentrations from the fate and transport model were input into the exposure and risk equations. These results indicate that there is no significant risk at this site as a result of the compounds found in the soil gas. See the attached "Modeling Approach For Volatilization From Soil Gas Into Indoor Air." The risk assessment that was conducted as part of the remedial investigation and included in the Record of Decision previously concluded that no significant risk exists at the site. The remedial system operated for another two years after the remedial investigation was completed. This soil gas survey, fate and transport model, and updated exposure and risk estimates confirm the results of the original risk assessment that there is no significant risk at this site.

Please contact Nick Hastings at (860) 688-1151 or myself at (516) 472-4000 to discuss procedures for delisting this site.

Sincerely,
**IT CORPORATION**

Albert M. Tonn
Project Manager

enc.

cc: Nicholas Hastings (IT Corporation)
Robert Weber (Bulova)
Mitchell H. Bernstein. Esq. (Van Ness, Feldman)
Geoffrey Laccetti (NYSDOH)

BulovaDisk6/revsgs.wpd

[redacted]ARY [redacted] GAS [redacted]TICAL [redacted]LTS

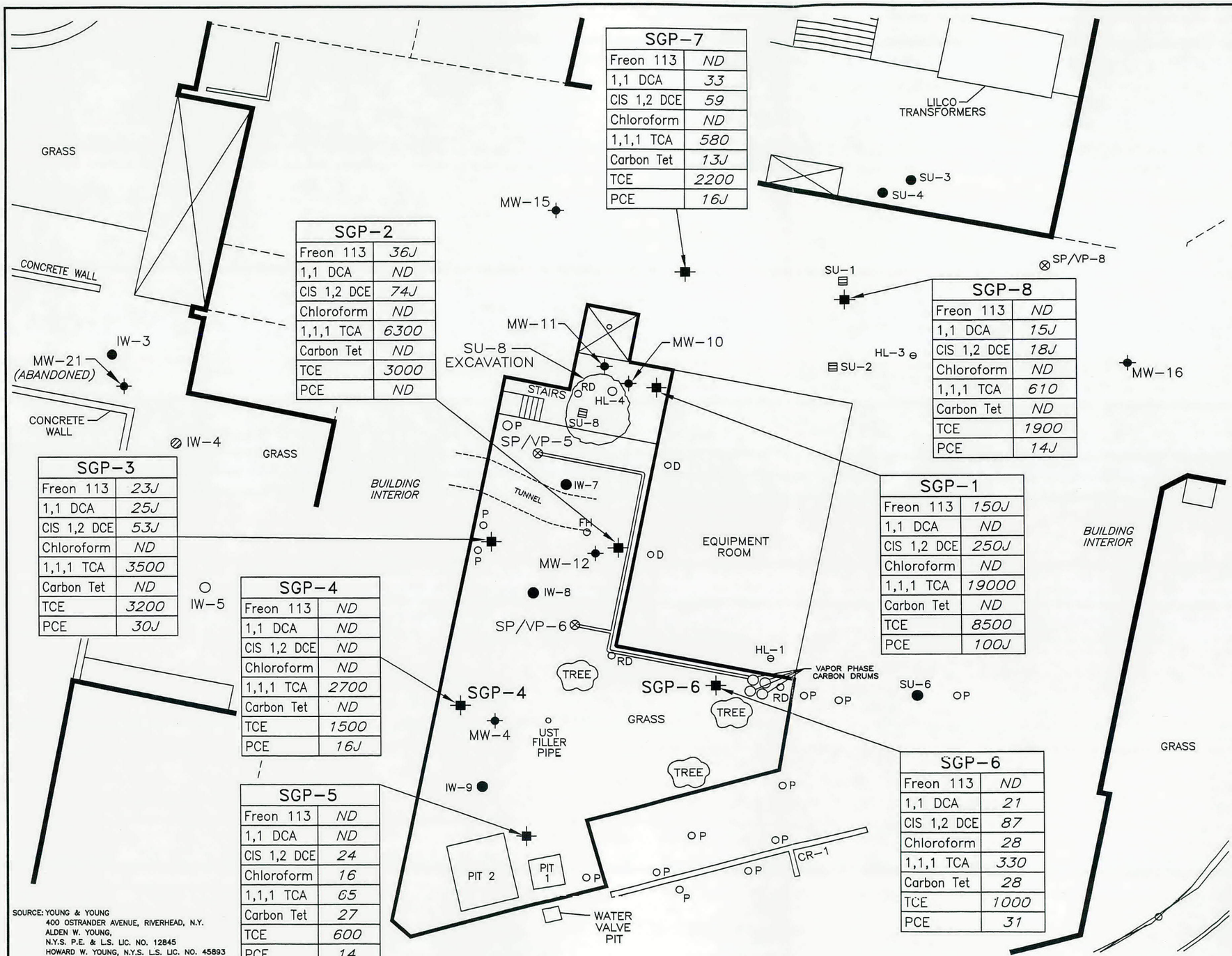
WATCH CASE FACTORY SITE

SAG HARBOR, NEW YORK

June 15, 1999

| | Ambient Air | | | SGP-1 | | | SGP-2 | | | SGP-3 | | | SGP-4 | | | SGP-5 | | | SGP-6 | | | SGP-7 | | | SGP-8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COMPOUND NAME | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Data Flags | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags | Detection Limit (ppbv) | Result (ppbv) | Data Flags |
| Freon 12 | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Freon 114 | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Chloromethane | 0.72 | 1.0 | J | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Vinyl Chloride | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Bromomethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Chloroethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Freon 11 | 0.72 | 0.95 | J | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,1-Dichloroethene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Freon 113 | 0.72 | | ND | 70 | 150 | J | 30 | 36 | J | 15 | 23 | J | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Methylene Chloride | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | 21 | | 7.3 | 33 | | 8.4 | 15 | J |
| 1,1-Dichloroethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | 25 | J | 15 | | ND | 2.9 | 24 | | 4.4 | 87 | | 7.3 | 59 | | 8.4 | 18 | J |
| cis-1,2-Dichloroethene | 0.72 | | ND | 70 | 250 | J | 30 | 74 | J | 15 | 53 | J | 15 | | ND | 2.9 | 16 | | 4.4 | 28 | | 7.3 | | ND | 8.4 | | ND |
| Chloroform | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | 65 | | 4.4 | 330 | | 7.3 | 580 | | 8.4 | 610 | |
| 1,1,1-Trichloroethane | 0.72 | | ND | 70 | 19000 | | 30 | 6300 | | 15 | 3500 | | 15 | 2700 | | 2.9 | 27 | | 4.4 | 28 | | 7.3 | 13 | J | 8.4 | | ND |
| Carbon Tetrachloride | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Benzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,2-Dichloroethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Trichloroethene | 0.72 | | ND | 70 | 8500 | | 30 | 3000 | | 15 | 3200 | | 15 | 1500 | | 2.9 | 600 | | 4.4 | 1000 | | 7.3 | 2200 | | 8.4 | 1900 | |
| 1,2-Dichloropropane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| cis-1,3-Dichloropropene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Toluene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| trans-1,3-Dichloropropene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,1,2-Trichloroethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Tetrachloroethene | 0.72 | | ND | 70 | 100 | J | 30 | | ND | 15 | 30 | J | 15 | 16 | J | 2.9 | 14 | | 4.4 | 31 | | 7.3 | 16 | J | 8.4 | 14 | J |
| Ethylene Dibromide | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Chlorobenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Ethyl Benzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| m,p-Xylene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| o-Xylene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Styrene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,1,2,2-Tetrachloroethane | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,3,5-Trimethylbenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,2,4-Trimethylbenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,3-Dichlorobenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,4-Dichlorobenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Chlorotoluene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,2-Dichlorobenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| 1,2,4-Trichlorobenzene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Hexachlorobutadiene | 0.72 | | ND | 70 | | ND | 30 | | ND | 15 | | ND | 15 | | ND | 2.9 | | ND | 4.4 | | ND | 7.3 | | ND | 8.4 | | ND |
| Propylene | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 1,3-Butadiene | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Acetone | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Carbon Disulfide | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 2-Propanol | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| trans-1,2-Dichloroethene | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Vinyl Acetate | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 2-Butanone (Methyl Ethyl Ketone) | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Hexane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Tetrahydrofuran | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Cyclohexane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 1,4-Dioxane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Bromodichloromethane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 4-Methyl-2-pentanone | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 2-Hexanone | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Dibromochloromethane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Bromoform | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| 4-Ethyltoluene | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Ethanol | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Methyl tert-Butyl Ether | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |
| Heptane | 2.9 | | ND | 280 | | ND | 120 | | ND | 61 | | ND | 58 | | ND | 12 | | ND | 18 | | ND | 29 | | ND | 34 | | ND |

Samples analyzed by EPA Method TO-14
ND - Not Detected
J- Estimated Value




LEGEND

- SOILGAS POINT
- MONITORING WELL
- SPARGE POINT/VAPOR POINT
- FH FIRE HYDRANT
- SUMP
- D DRAIN
- HOLE IN FLOOR
- P PIPE
- RD ROOF DRAIN
- DRYWELL AT GRADE WITH SOLID COVER

| SGP-8 | |
|---|---|
| Freon 113 | ND |
| 1,1 DCA | 15J |
| CIS 1,2 DCE | 18J |
| Chloroform | ND |
| 1,1,1 TCA | 610 |
| Carbon Tet | ND |
| TCE | 1900 |
| PCE | 14J |

| Sample ID | |
|---|---|
| Freon 113 | |
| 1,1 Dichloroethane | |
| CIS 1,2 Dichloroethene | |
| Chloroform | |
| 1,1,1 Trichloroethane | |
| Carbon Tetrachloride | |
| Trichloroethene | |
| Tetrachloroethene | |

ND NOT DETECED

J ESTIMATED VALUE

** RESULTS REPORTED IN PPBV*

NOTE:

1) PIPE LOCATIONS ARE NOT SURVEYED LOCATIONS THEY ARE ESTIMATED LOCATIONS.

N

0 15 30

SCALE FEET

IT CORPORATION
A Member of The IT Group
101-1 COLIN DRIVE
HOLBROOK, N.Y. 11741
(516) 472-4000

| REV. NO.: | DRAWING DATE: | ACAD FILE: |
|---|---|---|
| | 7/13/99 | 7013SA99 |

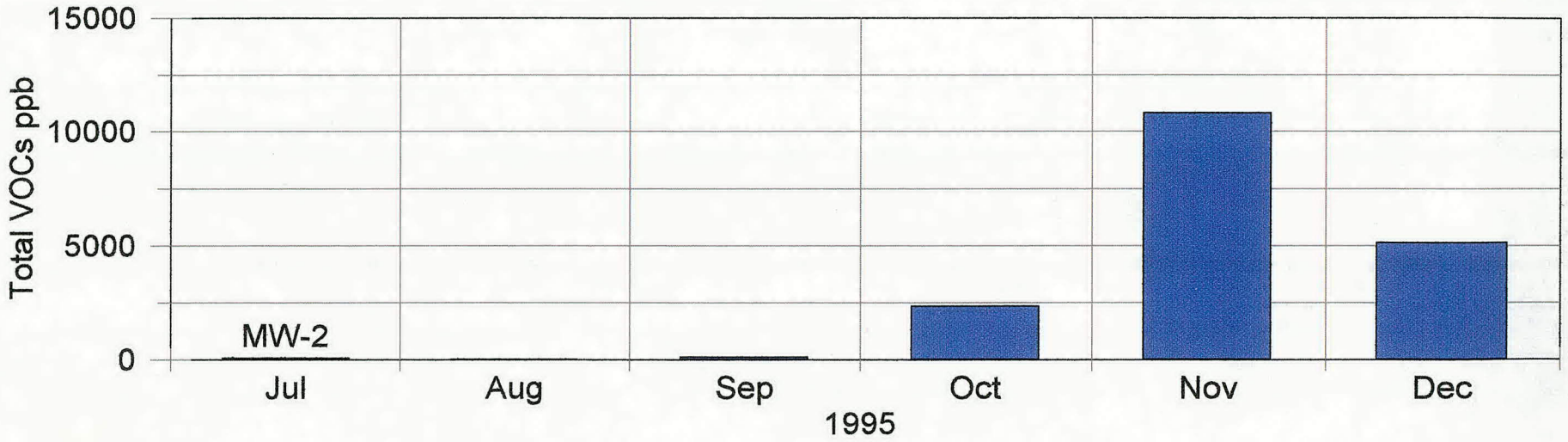
# SUMMARY OF ANALYTICAL RESULTS JUNE 15, 1999

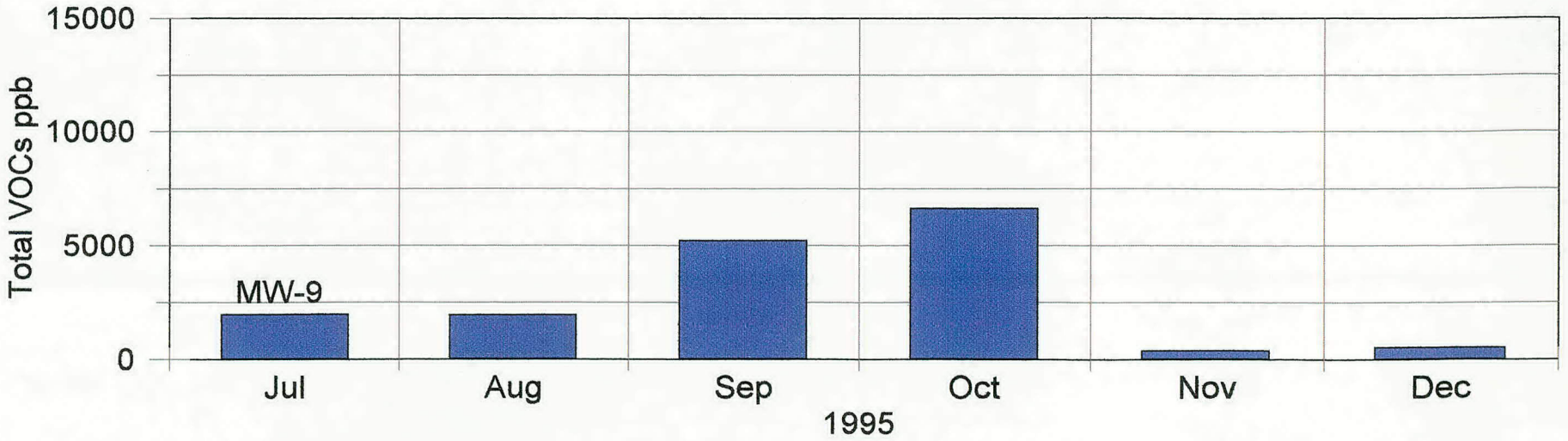
| CLIENT: | PM: |
|---|---|
| WATCH CASE FACTORY SITE | |
| LOCATION: 15 CHURCH STREET SAG HARBOR, NEW YORK | PE/RG: |

| DESIGNED: | DETAILED: | PROJECT NO.: | FIGURE: |
|---|---|---|---|
| SEE SOURCE | TRS | 01113-7013 | 1 |

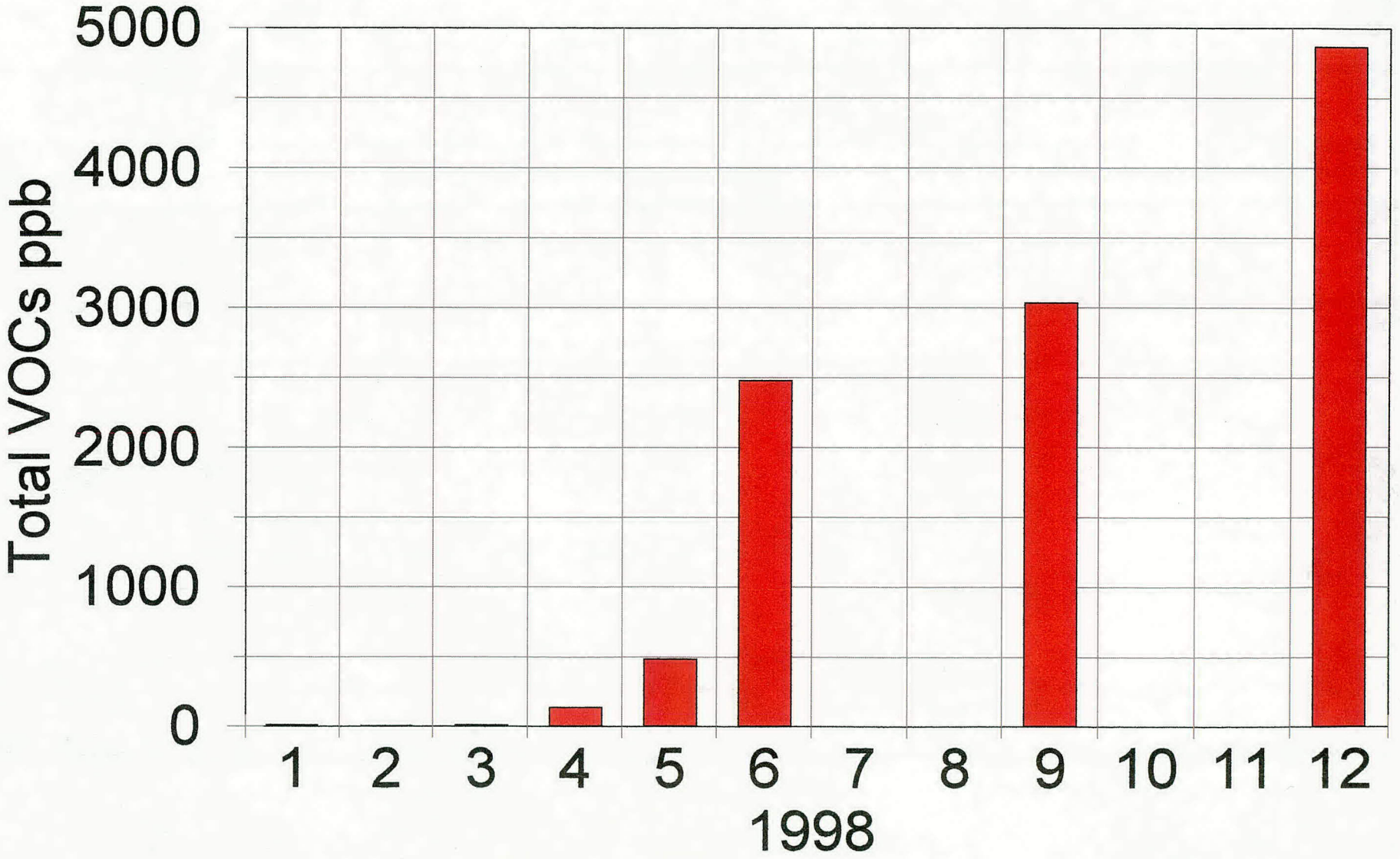
# Spike Travel Time

## Blower Seized June 29, 1995



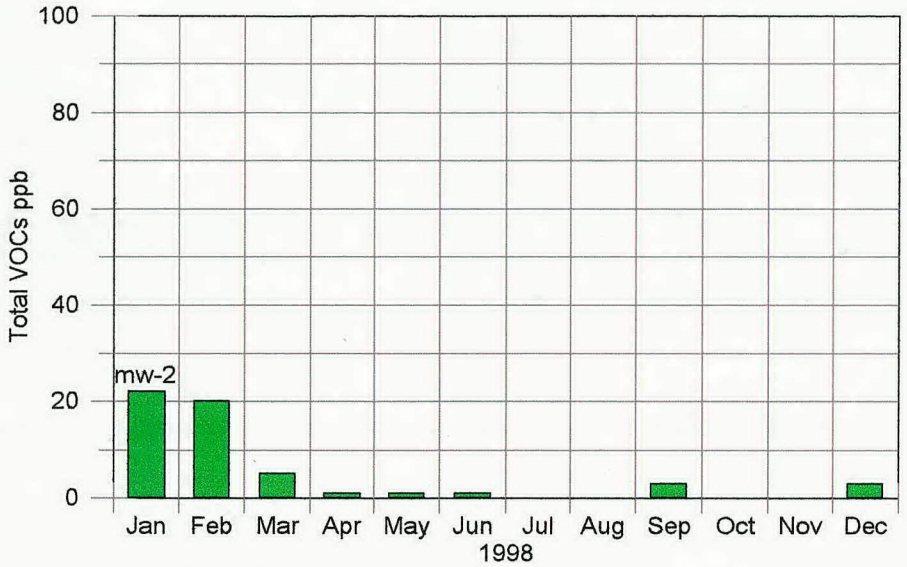



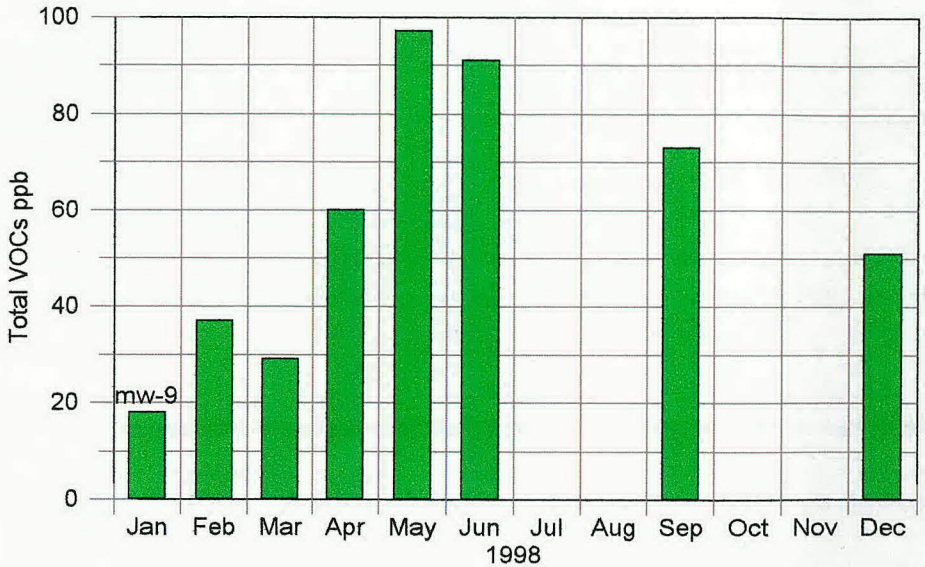
# MW-11 Rebound

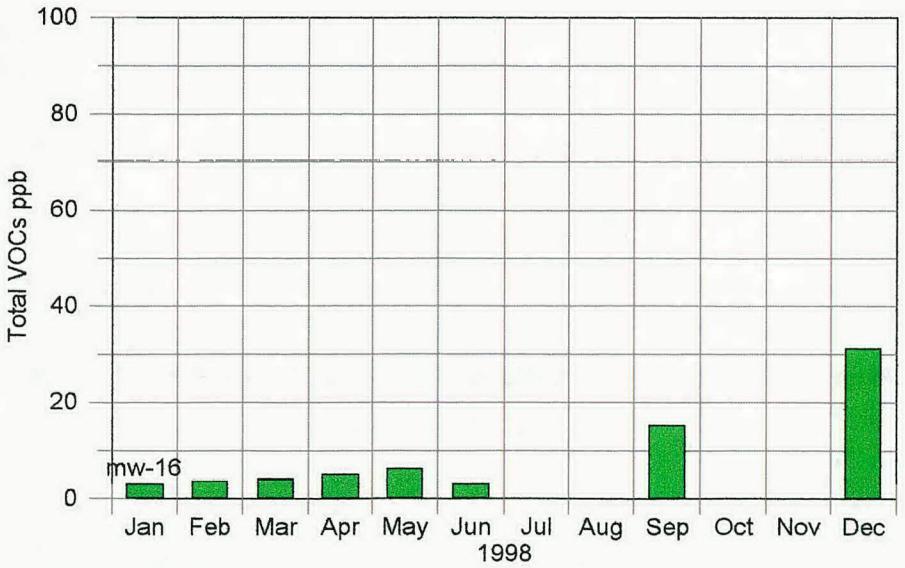


# Downgradient Wells

## MW-2, MW-9, MW-16



**IT Corporation**
*A Member of The IT Group*

# LABORATORY REPORT

# @AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

## WORK ORDER #: 9906318

Work Order Summary

**CLIENT:** Mr. Al Tonn
IT Corporation
101-1 Colins Drive
Holbrook, NY 11741

**BILL TO:** Mr. Robert Weber
Bulova Corp.
1 Buluva Ave.
Woodside, NY 11377-7874

**PHONE:** 516-472-4000
**FAX:** 516-472-4077
**DATE RECEIVED:** 6/17/99
**DATE COMPLETED:** 7/1/99

**P.O. #** NR
**PROJECT #** 1113 7013 Bulova-Sag Harbor

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. |
|---|---|---|---|
| 01A | Ambient Air | TO-14 | 2.0 "Hg |
| 02A | SGP-1 | TO-14 | 1.0 "Hg |
| 03A | SGP-2 | TO-14 | 3.0 "Hg |
| 04A | SGP-3 | TO-14 | 3.5 "Hg |
| 05A | SGP-4 | TO-14 | 2.5 "Hg |
| 06A | SGP-5 | TO-14 | 2.5 "Hg |
| 07A | SGP-6 | TO-14 | 7.0 "Hg |
| 08A | SGP-7 | TO-14 | 2.5 "Hg |
| 09A | SGP-8 | TO-14 | 6.0 "Hg |
| 10A | Method Spike | TO-14 | NA |
| 11A | Lab Blank | TO-14 | NA |

CERTIFIED BY: John Swanson for: DATE: 7-1-99
Laboratory Director

Certification numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA 95630
(916) 985-1000 • (800) 985-5955 • FAX (916) 985-1020

# AIR TOXICS LTD.

**SAMPLE NAME : Ambient Air**

**ID#: 9906318-01A**

**EPA METHOD TO-14 GC/MS Full Scan**

| | | |
|---|---|---|
| File Name: | g062904 | Date of Collection: 6/15/99 |
| Dil. Factor: | 1.44 | Date of Analysis: 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 0.72 | 3.6 | Not Detected | Not Detected |
| Freon 114 | 0.72 | 5.1 | Not Detected | Not Detected |
| Chloromethane | 0.72 | 1.5 | 1.0 J | 2.1 J |
| Vinyl Chloride | 0.72 | 1.9 | Not Detected | Not Detected |
| Bromomethane | 0.72 | 2.8 | Not Detected | Not Detected |
| Chloroethane | 0.72 | 1.9 | Not Detected | Not Detected |
| Freon 11 | 0.72 | 4.1 | 0.95 J | 5.4 J |
| 1,1-Dichloroethene | 0.72 | 2.9 | Not Detected | Not Detected |
| Freon 113 | 0.72 | 5.6 | Not Detected | Not Detected |
| Methylene Chloride | 0.72 | 2.5 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.72 | 3.0 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.72 | 2.9 | Not Detected | Not Detected |
| Chloroform | 0.72 | 3.6 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.72 | 4.0 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.72 | 4.6 | Not Detected | Not Detected |
| Benzene | 0.72 | 2.3 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.72 | 3.0 | Not Detected | Not Detected |
| Trichloroethene | 0.72 | 3.9 | Not Detected | Not Detected |
| 1,2-Dichloropropane | 0.72 | 3.4 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 0.72 | 3.3 | Not Detected | Not Detected |
| Toluene | 0.72 | 2.8 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 0.72 | 3.3 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 0.72 | 4.0 | Not Detected | Not Detected |
| Tetrachloroethene | 0.72 | 5.0 | Not Detected | Not Detected |
| Ethylene Dibromide | 0.72 | 5.6 | Not Detected | Not Detected |
| Chlorobenzene | 0.72 | 3.4 | Not Detected | Not Detected |
| Ethyl Benzene | 0.72 | 3.2 | Not Detected | Not Detected |
| m,p-Xylene | 0.72 | 3.2 | Not Detected | Not Detected |
| o-Xylene | 0.72 | 3.2 | Not Detected | Not Detected |
| Styrene | 0.72 | 3.1 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.72 | 5.0 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.72 | 3.6 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.72 | 3.6 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.72 | 4.4 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.72 | 4.4 | Not Detected | Not Detected |
| Chlorotoluene | 0.72 | 3.8 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.72 | 4.4 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 0.72 | 5.4 | Not Detected | Not Detected |
| Hexachlorobutadiene | 0.72 | 7.8 | Not Detected | Not Detected |
| Propylene | 2.9 | 5.0 | Not Detected | Not Detected |
| 1,3-Butadiene | 2.9 | 6.5 | Not Detected | Not Detected |
| Acetone | 2.9 | 7.0 | Not Detected | Not Detected |

# AIR TOXICS LTD.

**SAMPLE NAME : Ambient Air**

**ID#: 9906318-01A**

**EPA METHOD TO-14 GC/MS Full Scan**

| | | | |
|---|---|---|---|
| **File Name:** | **g062904** | **Date of Collection:** | **6/15/99** |
| **Dil. Factor:** | **1.44** | **Date of Analysis:** | **6/29/99** |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 2.9 | 9.1 | Not Detected | Not Detected |
| 2-Propanol | 2.9 | 7.2 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 2.9 | 12 | Not Detected | Not Detected |
| Vinyl Acetate | 2.9 | 10 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.9 | 8.6 | Not Detected | Not Detected |
| Hexane | 2.9 | 10 | Not Detected | Not Detected |
| Tetrahydrofuran | 2.9 | 8.6 | Not Detected | Not Detected |
| Cyclohexane | 2.9 | 10 | Not Detected | Not Detected |
| 1,4-Dioxane | 2.9 | 11 | Not Detected | Not Detected |
| Bromodichloromethane | 2.9 | 20 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 2.9 | 12 | Not Detected | Not Detected |
| 2-Hexanone | 2.9 | 12 | Not Detected | Not Detected |
| Dibromochloromethane | 2.9 | 25 | Not Detected | Not Detected |
| Bromoform | 2.9 | 30 | Not Detected | Not Detected |
| 4-Ethyltoluene | 2.9 | 14 | Not Detected | Not Detected |
| Ethanol | 2.9 | 5.5 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 2.9 | 11 | Not Detected | Not Detected |
| Heptane | 2.9 | 12 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 93 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-1

ID#: 9906318-02A

EPA METHOD TO-14 GC/MS Full Scan

| File Name: | g062905 | Date of Collection: 6/15/99 |
|---|---|---|
| Dil. Factor: | 139 | Date of Analysis: 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 70 | 350 | Not Detected | Not Detected |
| Freon 114 | 70 | 490 | Not Detected | Not Detected |
| Chloromethane | 70 | 150 | Not Detected | Not Detected |
| Vinyl Chloride | 70 | 180 | Not Detected | Not Detected |
| Bromomethane | 70 | 270 | Not Detected | Not Detected |
| Chloroethane | 70 | 190 | Not Detected | Not Detected |
| Freon 11 | 70 | 400 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 70 | 280 | Not Detected | Not Detected |
| Freon 113 | 70 | 540 | 150 J | 1200 J |
| Methylene Chloride | 70 | 250 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 70 | 290 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 70 | 280 | 250 J | 1000 J |
| Chloroform | 70 | 340 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 70 | 390 | 19000 | 100000 |
| Carbon Tetrachloride | 70 | 440 | Not Detected | Not Detected |
| Benzene | 70 | 230 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 70 | 290 | Not Detected | Not Detected |
| Trichloroethene | 70 | 380 | 8500 | 47000 |
| 1,2-Dichloropropane | 70 | 330 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 70 | 320 | Not Detected | Not Detected |
| Toluene | 70 | 270 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 70 | 320 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 70 | 390 | Not Detected | Not Detected |
| Tetrachloroethene | 70 | 480 | 100 J | 690 J |
| Ethylene Dibromide | 70 | 540 | Not Detected | Not Detected |
| Chlorobenzene | 70 | 330 | Not Detected | Not Detected |
| Ethyl Benzene | 70 | 310 | Not Detected | Not Detected |
| m,p-Xylene | 70 | 310 | Not Detected | Not Detected |
| o-Xylene | 70 | 310 | Not Detected | Not Detected |
| Styrene | 70 | 300 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 70 | 480 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 70 | 350 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 70 | 350 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 70 | 420 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 70 | 420 | Not Detected | Not Detected |
| Chlorotoluene | 70 | 370 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 70 | 420 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 70 | 520 | Not Detected | Not Detected |
| Hexachlorobutadiene | 70 | 750 | Not Detected | Not Detected |
| Propylene | 280 | 490 | Not Detected | Not Detected |
| 1,3-Butadiene | 280 | 630 | Not Detected | Not Detected |
| Acetone | 280 | 670 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-1

ID#: 9906318-02A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062905 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 139 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 280 | 880 | Not Detected | Not Detected |
| 2-Propanol | 280 | 690 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 280 | 1100 | Not Detected | Not Detected |
| Vinyl Acetate | 280 | 990 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 280 | 830 | Not Detected | Not Detected |
| Hexane | 280 | 1000 | Not Detected | Not Detected |
| Tetrahydrofuran | 280 | 830 | Not Detected | Not Detected |
| Cyclohexane | 280 | 970 | Not Detected | Not Detected |
| 1,4-Dioxane | 280 | 1000 | Not Detected | Not Detected |
| Bromodichloromethane | 280 | 1900 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 280 | 1200 | Not Detected | Not Detected |
| 2-Hexanone | 280 | 1200 | Not Detected | Not Detected |
| Dibromochloromethane | 280 | 2400 | Not Detected | Not Detected |
| Bromoform | 280 | 2900 | Not Detected | Not Detected |
| 4-Ethyltoluene | 280 | 1400 | Not Detected | Not Detected |
| Ethanol | 280 | 530 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 280 | 1000 | Not Detected | Not Detected |
| Heptane | 280 | 1200 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | 70-130 |
| Toluene-d8 | 94 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-2

ID#: 9906318-03A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062906 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 59.6 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 30 | 150 | Not Detected | Not Detected |
| Freon 114 | 30 | 210 | Not Detected | Not Detected |
| Chloromethane | 30 | 63 | Not Detected | Not Detected |
| Vinyl Chloride | 30 | 77 | Not Detected | Not Detected |
| Bromomethane | 30 | 120 | Not Detected | Not Detected |
| Chloroethane | 30 | 80 | Not Detected | Not Detected |
| Freon 11 | 30 | 170 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 30 | 120 | Not Detected | Not Detected |
| Freon 113 | 30 | 230 | 36 J | 280 J |
| Methylene Chloride | 30 | 110 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 30 | 120 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 30 | 120 | 74 J | 300 J |
| Chloroform | 30 | 150 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 30 | 170 | 6300 | 35000 |
| Carbon Tetrachloride | 30 | 190 | Not Detected | Not Detected |
| Benzene | 30 | 97 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 30 | 120 | Not Detected | Not Detected |
| Trichloroethene | 30 | 160 | 3000 | 16000 |
| 1,2-Dichloropropane | 30 | 140 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 30 | 140 | Not Detected | Not Detected |
| Toluene | 30 | 110 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 30 | 140 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 30 | 170 | Not Detected | Not Detected |
| Tetrachloroethene | 30 | 210 | Not Detected | Not Detected |
| Ethylene Dibromide | 30 | 230 | Not Detected | Not Detected |
| Chlorobenzene | 30 | 140 | Not Detected | Not Detected |
| Ethyl Benzene | 30 | 130 | Not Detected | Not Detected |
| m,p-Xylene | 30 | 130 | Not Detected | Not Detected |
| o-Xylene | 30 | 130 | Not Detected | Not Detected |
| Styrene | 30 | 130 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 30 | 210 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 30 | 150 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 30 | 150 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 30 | 180 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 30 | 180 | Not Detected | Not Detected |
| Chlorotoluene | 30 | 160 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 30 | 180 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 30 | 220 | Not Detected | Not Detected |
| Hexachlorobutadiene | 30 | 320 | Not Detected | Not Detected |
| Propylene | 120 | 210 | Not Detected | Not Detected |
| 1,3-Butadiene | 120 | 270 | Not Detected | Not Detected |
| Acetone | 120 | 290 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-2

ID#: 9906318-03A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062906 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 59.6 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 120 | 380 | Not Detected | Not Detected |
| 2-Propanol | 120 | 300 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 120 | 480 | Not Detected | Not Detected |
| Vinyl Acetate | 120 | 430 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 120 | 360 | Not Detected | Not Detected |
| Hexane | 120 | 430 | Not Detected | Not Detected |
| Tetrahydrofuran | 120 | 360 | Not Detected | Not Detected |
| Cyclohexane | 120 | 420 | Not Detected | Not Detected |
| 1,4-Dioxane | 120 | 440 | Not Detected | Not Detected |
| Bromodichloromethane | 120 | 810 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 120 | 500 | Not Detected | Not Detected |
| 2-Hexanone | 120 | 500 | Not Detected | Not Detected |
| Dibromochloromethane | 120 | 1000 | Not Detected | Not Detected |
| Bromoform | 120 | 1300 | Not Detected | Not Detected |
| 4-Ethyltoluene | 120 | 600 | Not Detected | Not Detected |
| Ethanol | 120 | 230 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 120 | 440 | Not Detected | Not Detected |
| Heptane | 120 | 500 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 90 | 70-130 |
| 4-Bromofluorobenzene | 97 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-3

ID#: 9906318-04A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062907 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 30.4 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 15 | 76 | Not Detected | Not Detected |
| Freon 114 | 15 | 110 | Not Detected | Not Detected |
| Chloromethane | 15 | 32 | Not Detected | Not Detected |
| Vinyl Chloride | 15 | 39 | Not Detected | Not Detected |
| Bromomethane | 15 | 60 | Not Detected | Not Detected |
| Chloroethane | 15 | 41 | Not Detected | Not Detected |
| Freon 11 | 15 | 87 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 15 | 61 | Not Detected | Not Detected |
| Freon 113 | 15 | 120 | 23 J | 180 J |
| Methylene Chloride | 15 | 54 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 15 | 63 | 25 J | 100 J |
| cis-1,2-Dichloroethene | 15 | 61 | 53 J | 210 J |
| Chloroform | 15 | 75 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 15 | 84 | 3500 | 20000 |
| Carbon Tetrachloride | 15 | 97 | Not Detected | Not Detected |
| Benzene | 15 | 49 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 15 | 63 | Not Detected | Not Detected |
| Trichloroethene | 15 | 83 | 3200 | 17000 |
| 1,2-Dichloropropane | 15 | 71 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 15 | 70 | Not Detected | Not Detected |
| Toluene | 15 | 58 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 15 | 70 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 15 | 84 | Not Detected | Not Detected |
| Tetrachloroethene | 15 | 100 | 30 J | 210 J |
| Ethylene Dibromide | 15 | 120 | Not Detected | Not Detected |
| Chlorobenzene | 15 | 71 | Not Detected | Not Detected |
| Ethyl Benzene | 15 | 67 | Not Detected | Not Detected |
| m,p-Xylene | 15 | 67 | Not Detected | Not Detected |
| o-Xylene | 15 | 67 | Not Detected | Not Detected |
| Styrene | 15 | 66 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 15 | 110 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 15 | 76 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 15 | 76 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 15 | 93 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 15 | 93 | Not Detected | Not Detected |
| Chlorotoluene | 15 | 80 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 15 | 93 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 15 | 110 | Not Detected | Not Detected |
| Hexachlorobutadiene | 15 | 160 | Not Detected | Not Detected |
| Propylene | 61 | 110 | Not Detected | Not Detected |
| 1,3-Butadiene | 61 | 140 | Not Detected | Not Detected |
| Acetone | 61 | 150 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-3

ID#: 9906318-04A

EPA METHOD TO-14 GC/MS Full Scan

| | | |
|---|---|---|
| File Name: | g062907 | Date of Collection: 6/15/99 |
| Dil. Factor: | 30.4 | Date of Analysis: 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 61 | 190 | Not Detected | Not Detected |
| 2-Propanol | 61 | 150 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 61 | 250 | Not Detected | Not Detected |
| Vinyl Acetate | 61 | 220 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 61 | 180 | Not Detected | Not Detected |
| Hexane | 61 | 220 | Not Detected | Not Detected |
| Tetrahydrofuran | 61 | 180 | Not Detected | Not Detected |
| Cyclohexane | 61 | 210 | Not Detected | Not Detected |
| 1,4-Dioxane | 61 | 220 | Not Detected | Not Detected |
| Bromodichloromethane | 61 | 410 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 61 | 250 | Not Detected | Not Detected |
| 2-Hexanone | 61 | 250 | Not Detected | Not Detected |
| Dibromochloromethane | 61 | 530 | Not Detected | Not Detected |
| Bromoform | 61 | 640 | Not Detected | Not Detected |
| 4-Ethyltoluene | 61 | 300 | Not Detected | Not Detected |
| Ethanol | 61 | 120 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 61 | 220 | Not Detected | Not Detected |
| Heptane | 61 | 250 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 92 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-4

ID#: 9906318-05A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062908 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 29.2 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 15 | 73 | Not Detected | Not Detected |
| Freon 114 | 15 | 100 | Not Detected | Not Detected |
| Chloromethane | 15 | 31 | Not Detected | Not Detected |
| Vinyl Chloride | 15 | 38 | Not Detected | Not Detected |
| Bromomethane | 15 | 58 | Not Detected | Not Detected |
| Chloroethane | 15 | 39 | Not Detected | Not Detected |
| Freon 11 | 15 | 83 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 15 | 59 | Not Detected | Not Detected |
| Freon 113 | 15 | 110 | Not Detected | Not Detected |
| Methylene Chloride | 15 | 52 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 15 | 60 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 15 | 59 | Not Detected | Not Detected |
| Chloroform | 15 | 72 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 15 | 81 | 2700 | 15000 |
| Carbon Tetrachloride | 15 | 93 | Not Detected | Not Detected |
| Benzene | 15 | 47 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 15 | 60 | Not Detected | Not Detected |
| Trichloroethene | 15 | 80 | 1500 | 8000 |
| 1,2-Dichloropropane | 15 | 69 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 15 | 67 | Not Detected | Not Detected |
| Toluene | 15 | 56 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 15 | 67 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 15 | 81 | Not Detected | Not Detected |
| Tetrachloroethene | 15 | 100 | 16 J | 110 J |
| Ethylene Dibromide | 15 | 110 | Not Detected | Not Detected |
| Chlorobenzene | 15 | 68 | Not Detected | Not Detected |
| Ethyl Benzene | 15 | 64 | Not Detected | Not Detected |
| m,p-Xylene | 15 | 64 | Not Detected | Not Detected |
| o-Xylene | 15 | 64 | Not Detected | Not Detected |
| Styrene | 15 | 63 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 15 | 100 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 15 | 73 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 15 | 73 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 15 | 89 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 15 | 89 | Not Detected | Not Detected |
| Chlorotoluene | 15 | 77 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 15 | 89 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 15 | 110 | Not Detected | Not Detected |
| Hexachlorobutadiene | 15 | 160 | Not Detected | Not Detected |
| Propylene | 58 | 100 | Not Detected | Not Detected |
| 1,3-Butadiene | 58 | 130 | Not Detected | Not Detected |
| Acetone | 58 | 140 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-4

ID#: 9906318-05A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062908 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 29.2 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 58 | 180 | Not Detected | Not Detected |
| 2-Propanol | 58 | 150 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 58 | 240 | Not Detected | Not Detected |
| Vinyl Acetate | 58 | 210 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 58 | 180 | Not Detected | Not Detected |
| Hexane | 58 | 210 | Not Detected | Not Detected |
| Tetrahydrofuran | 58 | 180 | Not Detected | Not Detected |
| Cyclohexane | 58 | 200 | Not Detected | Not Detected |
| 1,4-Dioxane | 58 | 210 | Not Detected | Not Detected |
| Bromodichloromethane | 58 | 400 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 58 | 240 | Not Detected | Not Detected |
| 2-Hexanone | 58 | 240 | Not Detected | Not Detected |
| Dibromochloromethane | 58 | 510 | Not Detected | Not Detected |
| Bromoform | 58 | 610 | Not Detected | Not Detected |
| 4-Ethyltoluene | 58 | 290 | Not Detected | Not Detected |
| Ethanol | 58 | 110 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 58 | 210 | Not Detected | Not Detected |
| Heptane | 58 | 240 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 115 | 70-130 |
| Toluene-d8 | 91 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-5

ID#: 9906318-06A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062909 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 5.84 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 2.9 | 15 | Not Detected | Not Detected |
| Freon 114 | 2.9 | 21 | Not Detected | Not Detected |
| Chloromethane | 2.9 | 6.1 | Not Detected | Not Detected |
| Vinyl Chloride | 2.9 | 7.6 | Not Detected | Not Detected |
| Bromomethane | 2.9 | 12 | Not Detected | Not Detected |
| Chloroethane | 2.9 | 7.8 | Not Detected | Not Detected |
| Freon 11 | 2.9 | 17 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 2.9 | 12 | Not Detected | Not Detected |
| Freon 113 | 2.9 | 23 | Not Detected | Not Detected |
| Methylene Chloride | 2.9 | 10 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 2.9 | 12 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 2.9 | 12 | 24 | 96 |
| Chloroform | 2.9 | 14 | 16 | 79 |
| 1,1,1-Trichloroethane | 2.9 | 16 | 65 | 360 |
| Carbon Tetrachloride | 2.9 | 19 | 27 | 170 |
| Benzene | 2.9 | 9.5 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 2.9 | 12 | Not Detected | Not Detected |
| Trichloroethene | 2.9 | 16 | 600 | 3300 |
| 1,2-Dichloropropane | 2.9 | 14 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 2.9 | 13 | Not Detected | Not Detected |
| Toluene | 2.9 | 11 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 2.9 | 13 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 2.9 | 16 | Not Detected | Not Detected |
| Tetrachloroethene | 2.9 | 20 | 14 | 98 |
| Ethylene Dibromide | 2.9 | 23 | Not Detected | Not Detected |
| Chlorobenzene | 2.9 | 14 | Not Detected | Not Detected |
| Ethyl Benzene | 2.9 | 13 | Not Detected | Not Detected |
| m,p-Xylene | 2.9 | 13 | Not Detected | Not Detected |
| o-Xylene | 2.9 | 13 | Not Detected | Not Detected |
| Styrene | 2.9 | 13 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 2.9 | 20 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 2.9 | 15 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 2.9 | 15 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 2.9 | 18 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 2.9 | 18 | Not Detected | Not Detected |
| Chlorotoluene | 2.9 | 15 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 2.9 | 18 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 2.9 | 22 | Not Detected | Not Detected |
| Hexachlorobutadiene | 2.9 | 32 | Not Detected | Not Detected |
| Propylene | 12 | 20 | Not Detected | Not Detected |
| 1,3-Butadiene | 12 | 26 | Not Detected | Not Detected |
| Acetone | 12 | 28 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-5

ID#: 9906318-06A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062909 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 5.84 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 12 | 37 | Not Detected | Not Detected |
| 2-Propanol | 12 | 29 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 12 | 47 | Not Detected | Not Detected |
| Vinyl Acetate | 12 | 42 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 12 | 35 | Not Detected | Not Detected |
| Hexane | 12 | 42 | Not Detected | Not Detected |
| Tetrahydrofuran | 12 | 35 | Not Detected | Not Detected |
| Cyclohexane | 12 | 41 | Not Detected | Not Detected |
| 1,4-Dioxane | 12 | 43 | Not Detected | Not Detected |
| Bromodichloromethane | 12 | 80 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 12 | 49 | Not Detected | Not Detected |
| 2-Hexanone | 12 | 49 | Not Detected | Not Detected |
| Dibromochloromethane | 12 | 100 | Not Detected | Not Detected |
| Bromoform | 12 | 120 | Not Detected | Not Detected |
| 4-Ethyltoluene | 12 | 58 | Not Detected | Not Detected |
| Ethanol | 12 | 22 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 12 | 43 | Not Detected | Not Detected |
| Heptane | 12 | 49 | Not Detected | Not Detected |

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 89 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-6

ID#: 9906318-07A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062910 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 8.75 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 4.4 | 22 | Not Detected | Not Detected |
| Freon 114 | 4.4 | 31 | Not Detected | Not Detected |
| Chloromethane | 4.4 | 9.2 | Not Detected | Not Detected |
| Vinyl Chloride | 4.4 | 11 | Not Detected | Not Detected |
| Bromomethane | 4.4 | 17 | Not Detected | Not Detected |
| Chloroethane | 4.4 | 12 | Not Detected | Not Detected |
| Freon 11 | 4.4 | 25 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 4.4 | 18 | Not Detected | Not Detected |
| Freon 113 | 4.4 | 34 | Not Detected | Not Detected |
| Methylene Chloride | 4.4 | 15 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 4.4 | 18 | 21 | 85 |
| cis-1,2-Dichloroethene | 4.4 | 18 | 87 | 350 |
| Chloroform | 4.4 | 22 | 28 | 140 |
| 1,1,1-Trichloroethane | 4.4 | 24 | 330 | 1800 |
| Carbon Tetrachloride | 4.4 | 28 | 28 | 180 |
| Benzene | 4.4 | 14 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 4.4 | 18 | Not Detected | Not Detected |
| Trichloroethene | 4.4 | 24 | 1000 | 5700 |
| 1,2-Dichloropropane | 4.4 | 21 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 4.4 | 20 | Not Detected | Not Detected |
| Toluene | 4.4 | 17 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 4.4 | 20 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 4.4 | 24 | Not Detected | Not Detected |
| Tetrachloroethene | 4.4 | 30 | 31 | 210 |
| Ethylene Dibromide | 4.4 | 34 | Not Detected | Not Detected |
| Chlorobenzene | 4.4 | 20 | Not Detected | Not Detected |
| Ethyl Benzene | 4.4 | 19 | Not Detected | Not Detected |
| m,p-Xylene | 4.4 | 19 | Not Detected | Not Detected |
| o-Xylene | 4.4 | 19 | Not Detected | Not Detected |
| Styrene | 4.4 | 19 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 4.4 | 31 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 4.4 | 22 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 4.4 | 22 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 4.4 | 27 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 4.4 | 27 | Not Detected | Not Detected |
| Chlorotoluene | 4.4 | 23 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 4.4 | 27 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 4.4 | 33 | Not Detected | Not Detected |
| Hexachlorobutadiene | 4.4 | 47 | Not Detected | Not Detected |
| Propylene | 18 | 31 | Not Detected | Not Detected |
| 1,3-Butadiene | 18 | 39 | Not Detected | Not Detected |
| Acetone | 18 | 42 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-6

ID#: 9906318-07A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062910 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 8.75 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 18 | 55 | Not Detected | Not Detected |
| 2-Propanol | 18 | 44 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 18 | 71 | Not Detected | Not Detected |
| Vinyl Acetate | 18 | 63 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 18 | 52 | Not Detected | Not Detected |
| Hexane | 18 | 63 | Not Detected | Not Detected |
| Tetrahydrofuran | 18 | 52 | Not Detected | Not Detected |
| Cyclohexane | 18 | 61 | Not Detected | Not Detected |
| 1,4-Dioxane | 18 | 64 | Not Detected | Not Detected |
| Bromodichloromethane | 18 | 120 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 18 | 73 | Not Detected | Not Detected |
| 2-Hexanone | 18 | 73 | Not Detected | Not Detected |
| Dibromochloromethane | 18 | 150 | Not Detected | Not Detected |
| Bromoform | 18 | 180 | Not Detected | Not Detected |
| 4-Ethyltoluene | 18 | 87 | Not Detected | Not Detected |
| Ethanol | 18 | 34 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 18 | 64 | Not Detected | Not Detected |
| Heptane | 18 | 73 | Not Detected | Not Detected |

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 116 | 70-130 |
| Toluene-d8 | 88 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-7

ID#: 9906318-08A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062911 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 14.6 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 7.3 | 37 | Not Detected | Not Detected |
| Freon 114 | 7.3 | 52 | Not Detected | Not Detected |
| Chloromethane | 7.3 | 15 | Not Detected | Not Detected |
| Vinyl Chloride | 7.3 | 19 | Not Detected | Not Detected |
| Bromomethane | 7.3 | 29 | Not Detected | Not Detected |
| Chloroethane | 7.3 | 20 | Not Detected | Not Detected |
| Freon 11 | 7.3 | 42 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 7.3 | 29 | Not Detected | Not Detected |
| Freon 113 | 7.3 | 57 | Not Detected | Not Detected |
| Methylene Chloride | 7.3 | 26 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 7.3 | 30 | 33 | 140 |
| cis-1,2-Dichloroethene | 7.3 | 29 | 59 | 240 |
| Chloroform | 7.3 | 36 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 7.3 | 40 | 580 | 3200 |
| Carbon Tetrachloride | 7.3 | 47 | 13 J | 82 J |
| Benzene | 7.3 | 24 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 7.3 | 30 | Not Detected | Not Detected |
| Trichloroethene | 7.3 | 40 | 2200 | 12000 |
| 1,2-Dichloropropane | 7.3 | 34 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 7.3 | 34 | Not Detected | Not Detected |
| Toluene | 7.3 | 28 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 7.3 | 34 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 7.3 | 40 | Not Detected | Not Detected |
| Tetrachloroethene | 7.3 | 50 | 16 J | 110 J |
| Ethylene Dibromide | 7.3 | 57 | Not Detected | Not Detected |
| Chlorobenzene | 7.3 | 34 | Not Detected | Not Detected |
| Ethyl Benzene | 7.3 | 32 | Not Detected | Not Detected |
| m,p-Xylene | 7.3 | 32 | Not Detected | Not Detected |
| o-Xylene | 7.3 | 32 | Not Detected | Not Detected |
| Styrene | 7.3 | 32 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 7.3 | 51 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 7.3 | 36 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 7.3 | 36 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 7.3 | 45 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 7.3 | 45 | Not Detected | Not Detected |
| Chlorotoluene | 7.3 | 38 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 7.3 | 45 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 7.3 | 55 | Not Detected | Not Detected |
| Hexachlorobutadiene | 7.3 | 79 | Not Detected | Not Detected |
| Propylene | 29 | 51 | Not Detected | Not Detected |
| 1,3-Butadiene | 29 | 66 | Not Detected | Not Detected |
| Acetone | 29 | 71 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-7

ID#: 9906318-08A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062911 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 14.6 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 29 | 92 | Not Detected | Not Detected |
| 2-Propanol | 29 | 73 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 29 | 120 | Not Detected | Not Detected |
| Vinyl Acetate | 29 | 100 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 29 | 88 | Not Detected | Not Detected |
| Hexane | 29 | 100 | Not Detected | Not Detected |
| Tetrahydrofuran | 29 | 88 | Not Detected | Not Detected |
| Cyclohexane | 29 | 100 | Not Detected | Not Detected |
| 1,4-Dioxane | 29 | 110 | Not Detected | Not Detected |
| Bromodichloromethane | 29 | 200 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 29 | 120 | Not Detected | Not Detected |
| 2-Hexanone | 29 | 120 | Not Detected | Not Detected |
| Dibromochloromethane | 29 | 250 | Not Detected | Not Detected |
| Bromoform | 29 | 310 | Not Detected | Not Detected |
| 4-Ethyltoluene | 29 | 150 | Not Detected | Not Detected |
| Ethanol | 29 | 56 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 29 | 110 | Not Detected | Not Detected |
| Heptane | 29 | 120 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 116 | 70-130 |
| Toluene-d8 | 87 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-8

ID#: 9906318-09A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062912 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 16.8 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 8.4 | 42 | Not Detected | Not Detected |
| Freon 114 | 8.4 | 60 | Not Detected | Not Detected |
| Chloromethane | 8.4 | 18 | Not Detected | Not Detected |
| Vinyl Chloride | 8.4 | 22 | Not Detected | Not Detected |
| Bromomethane | 8.4 | 33 | Not Detected | Not Detected |
| Chloroethane | 8.4 | 23 | Not Detected | Not Detected |
| Freon 11 | 8.4 | 48 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 8.4 | 34 | Not Detected | Not Detected |
| Freon 113 | 8.4 | 65 | Not Detected | Not Detected |
| Methylene Chloride | 8.4 | 30 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 8.4 | 35 | 15 J | 62 J |
| cis-1,2-Dichloroethene | 8.4 | 34 | 18 J | 72 J |
| Chloroform | 8.4 | 42 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 8.4 | 47 | 610 | 3400 |
| Carbon Tetrachloride | 8.4 | 54 | Not Detected | Not Detected |
| Benzene | 8.4 | 27 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 8.4 | 35 | Not Detected | Not Detected |
| Trichloroethene | 8.4 | 46 | 1900 | 11000 |
| 1,2-Dichloropropane | 8.4 | 39 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 8.4 | 39 | Not Detected | Not Detected |
| Toluene | 8.4 | 32 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 8.4 | 39 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 8.4 | 47 | Not Detected | Not Detected |
| Tetrachloroethene | 8.4 | 58 | 14 J | 95 J |
| Ethylene Dibromide | 8.4 | 66 | Not Detected | Not Detected |
| Chlorobenzene | 8.4 | 39 | Not Detected | Not Detected |
| Ethyl Benzene | 8.4 | 37 | Not Detected | Not Detected |
| m,p-Xylene | 8.4 | 37 | Not Detected | Not Detected |
| o-Xylene | 8.4 | 37 | Not Detected | Not Detected |
| Styrene | 8.4 | 36 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 8.4 | 59 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 8.4 | 42 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 8.4 | 42 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 8.4 | 51 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 8.4 | 51 | Not Detected | Not Detected |
| Chlorotoluene | 8.4 | 44 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 8.4 | 51 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 8.4 | 63 | Not Detected | Not Detected |
| Hexachlorobutadiene | 8.4 | 91 | Not Detected | Not Detected |
| Propylene | 34 | 59 | Not Detected | Not Detected |
| 1,3-Butadiene | 34 | 76 | Not Detected | Not Detected |
| Acetone | 34 | 81 | Not Detected | Not Detected |

# AIR TOXICS LTD.

SAMPLE NAME : SGP-8

ID#: 9906318-09A

EPA METHOD TO-14 GC/MS Full Scan

| | | | |
|---|---|---|---|
| File Name: | g062912 | Date of Collection: | 6/15/99 |
| Dil. Factor: | 16.8 | Date of Analysis: | 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 34 | 110 | Not Detected | Not Detected |
| 2-Propanol | 34 | 84 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 34 | 140 | Not Detected | Not Detected |
| Vinyl Acetate | 34 | 120 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 34 | 100 | Not Detected | Not Detected |
| Hexane | 34 | 120 | Not Detected | Not Detected |
| Tetrahydrofuran | 34 | 100 | Not Detected | Not Detected |
| Cyclohexane | 34 | 120 | Not Detected | Not Detected |
| 1,4-Dioxane | 34 | 120 | Not Detected | Not Detected |
| Bromodichloromethane | 34 | 230 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 34 | 140 | Not Detected | Not Detected |
| 2-Hexanone | 34 | 140 | Not Detected | Not Detected |
| Dibromochloromethane | 34 | 290 | Not Detected | Not Detected |
| Bromoform | 34 | 350 | Not Detected | Not Detected |
| 4-Ethyltoluene | 34 | 170 | Not Detected | Not Detected |
| Ethanol | 34 | 64 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 34 | 120 | Not Detected | Not Detected |
| Heptane | 34 | 140 | Not Detected | Not Detected |

J = Below the low point of the curve, if calibrated compound; estimated value, if TIC.

**Container Type: 6 Liter Summa Canister**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 114 | 70-130 |
| Toluene-d8 | 94 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

# AIR TOXICS LTD.

SAMPLE NAME : Method Spike

ID#: 9906318-10A

EPA METHOD TO-14 GC/MS Full Scan

| File Name: | g062902 | Date of Collection: NA |
|---|---|---|
| Dil. Factor: | 1.00 | Date of Analysis: 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | % Recovery |
|---|---|---|---|
| Freon 12 | 0.50 | 2.5 | 121 |
| Freon 114 | 0.50 | 3.6 | 108 |
| Chloromethane | 0.50 | 1.0 | 95 |
| Vinyl Chloride | 0.50 | 1.3 | 88 |
| Bromomethane | 0.50 | 2.0 | 79 |
| Chloroethane | 0.50 | 1.3 | 61 Q |
| Freon 11 | 0.50 | 2.9 | 111 |
| 1,1-Dichloroethene | 0.50 | 2.0 | 86 |
| Freon 113 | 0.50 | 3.9 | 94 |
| Methylene Chloride | 0.50 | 1.8 | 80 |
| 1,1-Dichloroethane | 0.50 | 2.1 | 93 |
| cis-1,2-Dichloroethene | 0.50 | 2.0 | 90 |
| Chloroform | 0.50 | 2.5 | 106 |
| 1,1,1-Trichloroethane | 0.50 | 2.8 | 109 |
| Carbon Tetrachloride | 0.50 | 3.2 | 111 |
| Benzene | 0.50 | 1.6 | 103 |
| 1,2-Dichloroethane | 0.50 | 2.1 | 119 |
| Trichloroethene | 0.50 | 2.7 | 113 |
| 1,2-Dichloropropane | 0.50 | 2.3 | 99 |
| cis-1,3-Dichloropropene | 0.50 | 2.3 | 99 |
| Toluene | 0.50 | 1.9 | 106 |
| trans-1,3-Dichloropropene | 0.50 | 2.3 | 94 |
| 1,1,2-Trichloroethane | 0.50 | 2.8 | 100 |
| Tetrachloroethene | 0.50 | 3.4 | 98 |
| Ethylene Dibromide | 0.50 | 3.9 | 104 |
| Chlorobenzene | 0.50 | 2.3 | 100 |
| Ethyl Benzene | 0.50 | 2.2 | 95 |
| m,p-Xylene | 0.50 | 2.2 | 96 |
| o-Xylene | 0.50 | 2.2 | 95 |
| Styrene | 0.50 | 2.2 | 91 |
| 1,1,2,2-Tetrachloroethane | 0.50 | 3.5 | 101 |
| 1,3,5-Trimethylbenzene | 0.50 | 2.5 | 98 |
| 1,2,4-Trimethylbenzene | 0.50 | 2.5 | 92 |
| 1,3-Dichlorobenzene | 0.50 | 3.1 | 97 |
| 1,4-Dichlorobenzene | 0.50 | 3.1 | 98 |
| Chlorotoluene | 0.50 | 2.6 | 93 |
| 1,2-Dichlorobenzene | 0.50 | 3.1 | 98 |
| 1,2,4-Trichlorobenzene | 0.50 | 3.8 | 91 |
| Hexachlorobutadiene | 0.50 | 5.4 | 91 |
| Propylene | 2.0 | 3.5 | 93 |
| 1,3-Butadiene | 2.0 | 4.5 | 89 |
| Acetone | 2.0 | 4.8 | 86 |

# AIR TOXICS LTD.

**SAMPLE NAME : Method Spike**

**ID#: 9906318-10A**

**EPA METHOD TO-14 GC/MS Full Scan**

| | | |
|---|---|---|
| **File Name:** | **g062902** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/99** |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | % Recovery |
|---|---|---|---|
| Carbon Disulfide | 2.0 | 6.3 | 85 |
| 2-Propanol | 2.0 | 5.0 | 71 |
| trans-1,2-Dichloroethene | 2.0 | 8.1 | 82 |
| Vinyl Acetate | 2.0 | 7.2 | 85 |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | 6.0 | 84 |
| Hexane | 2.0 | 7.2 | 70 |
| Tetrahydrofuran | 2.0 | 6.0 | 77 |
| Cyclohexane | 2.0 | 7.0 | 84 |
| 1,4-Dioxane | 2.0 | 7.3 | 101 |
| Bromodichloromethane | 2.0 | 14 | 121 |
| 4-Methyl-2-pentanone | 2.0 | 8.3 | 90 |
| 2-Hexanone | 2.0 | 8.3 | 81 |
| Dibromochloromethane | 2.0 | 17 | 106 |
| Bromoform | 2.0 | 21 | 106 |
| 4-Ethyltoluene | 2.0 | 10 | 85 |
| Ethanol | 2.0 | 3.8 | 77 |
| Methyl tert-Butyl Ether | 2.0 | 7.3 | 77 |
| Heptane | 2.0 | 8.3 | 90 |

Q = Exceeds Quality Control limits.

**Container Type: NA**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 106 | 70-130 |

# AIR TOXICS LTD.

**SAMPLE NAME : Lab Blank**

**ID#: 9906318-11A**

**EPA METHOD TO-14 GC/MS Full Scan**

| | | |
|---|---|---|
| File Name: | g062903 | Date of Collection: NA |
| Dil. Factor: | 1.00 | Date of Analysis: 6/29/99 |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Freon 12 | 0.50 | 2.5 | Not Detected | Not Detected |
| Freon 114 | 0.50 | 3.6 | Not Detected | Not Detected |
| Chloromethane | 0.50 | 1.0 | Not Detected | Not Detected |
| Vinyl Chloride | 0.50 | 1.3 | Not Detected | Not Detected |
| Bromomethane | 0.50 | 2.0 | Not Detected | Not Detected |
| Chloroethane | 0.50 | 1.3 | Not Detected | Not Detected |
| Freon 11 | 0.50 | 2.9 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.50 | 2.0 | Not Detected | Not Detected |
| Freon 113 | 0.50 | 3.9 | Not Detected | Not Detected |
| Methylene Chloride | 0.50 | 1.8 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.50 | 2.1 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.50 | 2.0 | Not Detected | Not Detected |
| Chloroform | 0.50 | 2.5 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.50 | 2.8 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.50 | 3.2 | Not Detected | Not Detected |
| Benzene | 0.50 | 1.6 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.50 | 2.1 | Not Detected | Not Detected |
| Trichloroethene | 0.50 | 2.7 | Not Detected | Not Detected |
| 1,2-Dichloropropane | 0.50 | 2.3 | Not Detected | Not Detected |
| cis-1,3-Dichloropropene | 0.50 | 2.3 | Not Detected | Not Detected |
| Toluene | 0.50 | 1.9 | Not Detected | Not Detected |
| trans-1,3-Dichloropropene | 0.50 | 2.3 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 0.50 | 2.8 | Not Detected | Not Detected |
| Tetrachloroethene | 0.50 | 3.4 | Not Detected | Not Detected |
| Ethylene Dibromide | 0.50 | 3.9 | Not Detected | Not Detected |
| Chlorobenzene | 0.50 | 2.3 | Not Detected | Not Detected |
| Ethyl Benzene | 0.50 | 2.2 | Not Detected | Not Detected |
| m,p-Xylene | 0.50 | 2.2 | Not Detected | Not Detected |
| o-Xylene | 0.50 | 2.2 | Not Detected | Not Detected |
| Styrene | 0.50 | 2.2 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.50 | 3.5 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.50 | 2.5 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.50 | 2.5 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.50 | 3.1 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.50 | 3.1 | Not Detected | Not Detected |
| Chlorotoluene | 0.50 | 2.6 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.50 | 3.1 | Not Detected | Not Detected |
| 1,2,4-Trichlorobenzene | 0.50 | 3.8 | Not Detected | Not Detected |
| Hexachlorobutadiene | 0.50 | 5.4 | Not Detected | Not Detected |
| Propylene | 2.0 | 3.5 | Not Detected | Not Detected |
| 1,3-Butadiene | 2.0 | 4.5 | Not Detected | Not Detected |
| Acetone | 2.0 | 4.8 | Not Detected | Not Detected |

# AIR TOXICS LTD.

**SAMPLE NAME : Lab Blank**

**ID#: 9906318-11A**

**EPA METHOD TO-14 GC/MS Full Scan**

| | | | |
|---|---|---|---|
| **File Name:** | **g062903** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/99** | |

| Compound | Det. Limit (ppbv) | Det. Limit (uG/m3) | Amount (ppbv) | Amount (uG/m3) |
|---|---|---|---|---|
| Carbon Disulfide | 2.0 | 6.3 | Not Detected | Not Detected |
| 2-Propanol | 2.0 | 5.0 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 2.0 | 8.1 | Not Detected | Not Detected |
| Vinyl Acetate | 2.0 | 7.2 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | 6.0 | Not Detected | Not Detected |
| Hexane | 2.0 | 7.2 | Not Detected | Not Detected |
| Tetrahydrofuran | 2.0 | 6.0 | Not Detected | Not Detected |
| Cyclohexane | 2.0 | 7.0 | Not Detected | Not Detected |
| 1,4-Dioxane | 2.0 | 7.3 | Not Detected | Not Detected |
| Bromodichloromethane | 2.0 | 14 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 2.0 | 8.3 | Not Detected | Not Detected |
| 2-Hexanone | 2.0 | 8.3 | Not Detected | Not Detected |
| Dibromochloromethane | 2.0 | 17 | Not Detected | Not Detected |
| Bromoform | 2.0 | 21 | Not Detected | Not Detected |
| 4-Ethyltoluene | 2.0 | 10 | Not Detected | Not Detected |
| Ethanol | 2.0 | 3.8 | Not Detected | Not Detected |
| Methyl tert-Butyl Ether | 2.0 | 7.3 | Not Detected | Not Detected |
| Heptane | 2.0 | 8.3 | Not Detected | Not Detected |

**Container Type: NA**

| Surrogates | % Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 108 | 70-130 |
| Toluene-d8 | 94 | 70-130 |
| 4-Bromofluorobenzene | 94 | 70-130 |

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

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(916) 985-1000 FAX: (916) 985-1020

# CHAIN-OF-CUSTODY RECORD

Nº 020348

Page 1 of 1

Contact Person: AL Toan
Company: IT Corporation
Address: 10 (-1 Colin Dr. City: Holbrook State: NY Zip: 11741
Phone: ~~(516) 475-4000~~ (516) 472-4000 FAX: (516) 472-4077
Collected By: Signature: Erik Gustafson

**Project info:**
P.O. #:
Project #: 111370.17
Project Name: Bulova - Sag Harbor

**Turn Around Time:**
☒ Normal
☐ Rush ____ Specify

(CO) 6-18-99

| Lab I.D. | Field Sample I.D. | Date & Time | Analyses Requested | Canister Pressure / Vacuum Initial | Final | Receipt |
|---|---|---|---|---|---|---|
| 01A | Ambient Air | 6/15 0935 | VOCs by TO-14 | 28.5 | 1.0 | 2.0" Hg |
| 02A | SGP-1 | 1100 | | 28.7 | 0.8 | 1.5" Hg |
| 03A | SGP-2 | 1128 | | 28.6 | 1.5 | 3.5" Hg |
| 04A | SGP-3 | 1146 | | 28.8 | 3.0 | 3.5" Hg |
| 05A | SGP-4 | 1158 | | 28.7 | 2.2 | 2.5" Hg (RG) 6-21-99 |
| 06A | SGP-5 | 1210 | | 28.7 | 2.1 | 2.5" Hg |
| 07A | SGP-6 | 1226 | | 28.6 | 6.8 | 7.0" Hg |
| 08A | SGP-7 | 1415 | | 28.5 | 2.5 | 2.5" Hg |
| 09A | SGP-8 | 1400 | | 28.8 | 6.0 | 6.0" Hg |
| | | | | | | |

**Relinquished By:** (Signature) Date/Time: 6/15/99 1500 — Print Name: Erik Gustafson
Received By: (Signature) Date/Time: 6/17/99 11:60
Relinquished By: (Signature) Date/Time
Received By: (Signature) Date/Time

Notes:

**Lab Use Only**

| Shipper Name | Air Bill # | Opened By: | Date/Time | Temp. (°C) | Condition | Custody Seals Intact? | Work Order # |
|---|---|---|---|---|---|---|---|
| Fed Ex | 811471970526 | | 6/17/99 11:60 | — | (wood) | Yes No (None) N/A | 9906318 |

Form 1293 rev. 06

APPENDIX
B

**IT Corporation**
*A Member of The IT Group*

# MODELING APPROACH FOR VOLATILIZATION FROM SOIL GAS INTO INDOOR AIR REPORT

**MODELING APPROACH FOR VOLATILIZATION FROM SOIL GAS INTO INDOOR AIR**
**WATCH CASE FACTORY SITE**
**SAG HARBOR, NEW YORK**

Vapor migration is based on the principles of simple diffusion. A fate and transport model (Jury et. al., 1983) was used to estimate indoor air concentrations from volatile compounds in the soil gas that could potentially migrate into the indoor air of the site building assuming future residential use. Soil gas samples were collected from eight soil gas samples and one ambient air sample as shown in **Table 1** via EPA Method TO14 in June of 1999. The results of the soil gas samples to be used in the vapor transport model are shown in **Table 2**. This table presents the frequency of detect, range of detected concentrations, with the location of the minimum and maximum detect. For the most part, the highest concentrations were located in SGP-1.

The five steps utilized in the model are as follows:

**STEP 1: Calculation of Vadose Zone Characteristics**

Soil in the vadose zone is comprised of three components: soil particles, pore water, and pore gas. Each of these components comprises a fraction of the total soil volume. The porosity of a soil, *n*, is the fraction of the volume that is not taken up by soil particles. Thus, the fraction of the volume occupied by particles is equal to 1-*n*. The void volume is equivalent to the porosity times the total volume of the soil. This volume can be occupied by either pore gas or pore water. Using the moisture content of the soil, W, the water filled porosity, $n_w$, can be determined by the following equation.

$$n_w = \frac{P_b * W}{P_w}$$

in which:

$P_b$ = the bulk density of the soil
$P_w$ = the density of water

The air filled porosity, $n_a$, can then be determined as $n - n_w$, since the sum of air filled porosity and water filled porosity equals total porosity.

**STEP 2: Calculation of an Effective Diffusion Coefficient**

Diffusion coefficients describe the transport of a compound in a media that is caused by the intermolecular collisions resulting from concentration gradients (Lyman, *et al.*, 1990). In soil, diffusion can occur in both the pore gas and the pore water. Values of diffusion coefficients for a wide variety of compounds in both air, $D_a$, and water, $D_w$, are available in the literature. However the unadjusted use of these values for evaluating the diffusion of compounds in soil is not recommended (Jury, *et al.*, 1983). The reasoning for this is two-fold. First, diffusion in soil takes place only in the pore space. Thus, the area of flow is reduced and the effective distance traveled is increased. Second, when a compound diffuses in soil it is subject to partitioning with the three phases, previously described, in which it can exist. Thus the diffusion is slower than if only one phase existed.

To account for the reduced flow in soil, the diffusion coefficients are multiplied by a tortuosity factor. This tortuosity factor has been defined by the Millington-Quirk model (Farmer, *et al.*, 1972). In this model the fractional volume occupied by that matrix in the soil, raised to a power of 3.33, is divided by the total porosity, raised to a power of 2. Thus, the coefficient of diffusion in soil gas, $D_{sg}$, is defined by:

$$D_{sg} = \frac{n_a^{3.33}}{n^2} * D_a$$

and the coefficient of diffusion in pore water, $D_{sw}$, is defined by:

$$D_{sw} = \frac{n_w^{3.33}}{n^2} * D_w$$

Since diffusion can occur in both the pore water and the pore gas, and since compounds partition into the three phases, an effective diffusion coefficient, $D_e$, has been defined by Jury, *et al.* (1983) which incorporates both $D_{sg}$ and $D_{sw}$:

$$D_e = \frac{H * D_{sg} + D_{sw}}{P_b * K_d + n_w + n_a * H}$$

in which:

$$K_d = K_{oc} * f_{oc}$$

where:

$K_{oc}$ = organic carbon partition coefficient
$f_{oc}$ = fraction organic carbon content
H = dimensionless Henry's Law constant

**STEP 3: Calculation of Emission Rate**

The California Site Mitigation Tree Manual (DHS, 1986) recommends the following equation be used in the estimation of volatile emissions from covered landfills and other buried wastes:

$$Q = \frac{D_a * \frac{n_a^{3.33}}{n_w^2} * C_a * A}{L}$$

in which:

Q = emission rate
L = depth to contamination
A = surface area of contamination

Substitution of $D_e$ for $D_a$ and the tortuosity factor gives:

$$Q = \frac{D_e * C_a * A}{L}$$

This equation can be used to calculate the emission rate of volatile compounds from a subsurface source to the soil surface.

**STEP 4: Calculation of Emission Rate Through Foundation**

Adjustment of the emission rate to the soil to account for the emission rate through a concrete foundation involves the use of an attenuation factor. The rate of emission through the foundation, $Q_f$, would equal the rate of emission through the soil, Q, multiplied by this factor, AF. Based on measurements of the permeability of concrete (PCA, 1979) the usage of an attenuation factor of 0.01 is recommended.

**STEP 5: Calculation of Indoor Air Concentration**

The concentration of compound in indoor air, $C_{air}$, is calculated by dividing the emission rate through the foundation, $Q_f$, by the building ventilation rate, VR. The building ventilation rate accounts for dilution in total building volume and air exchange within the building, and is obtained by multiplying the volume of the building, $V_b$, by the air exchange rate, E. Thus, the concentration of the compound in indoor air is determined through the following equation.

$$C_i = \frac{Q_f}{V_b * E}$$

where:

$C_i$ = concentration of compound in indoor air
$V_b$ = volume of building
E = air exchange rate

The indoor air calculations for the future residence are presented in **Table 3**.

**Modeling Assumptions:**

As shown in the mathematical equations presented above conservative assumptions were made to estimate indoor air concentrations from the measured soil gas concentrations. For example the model assumes the following:

- diffusion of vapors from the subsurface through the foundation is the only contributor of the compounds to the air in a building,
- indoor air exchange with the outside air is the only mechanism for dilution of these compounds in the air in the building,
- vapor concentrations in the building and in the soil pore spaces are at steady state and in equilibrium with a constant soil concentration,
- diffusion, as quantified by diffusivity coefficients and concentration gradients, is equal in all directions (vertical and horizontal), and
- all soil gas beneath a building contains equal concentrations of the volatile compounds.

As a result of these conservative assumptions it is likely that indoor air concentrations modeled from soil gas are overestimated which ensures protection of human health.

## VAPOR TRANSPORT MODEL PARAMETERS

The fate and transport model described above was used to estimate indoor air concentrations into a future residential home from soil gas. The following section describes the parameters used in the model.

**Concentration in soil gas:** The maximum soil gas concentrations from June 1999 were used as shown in **Table 2.**

**Chemical Parameters.** Chemical parameters required include the organic carbon-water partition coefficient ($K_{oc}$), Henry's Law constant, and diffusion coefficients in both air and water as shown in **Table 3**.

**Soil Parameters.** Soil at the site is primarily composed of fine to medium sand. A porosity value for medium to fine sand of 0.34 was determined based upon published literature values. A value of 0.10 was used for the water content. A bulk density of 1.749 kg/L and a fraction organic carbon content of 0.006 was used for the other soil physical parameters based on site soil conditions. These soil parameters are presented on **Table 3**.

**Building Parameters.** Site specific building information was obtained from the site plan. The indoor air exchange rate for the residence was assumed based upon professional judgement and typical residential exchange rates as shown in **Table 3**.

Using these the equations and parameters present above, estimated indoor air concentrations for a future residential home were calculated. The estimated indoor air concentrations are used to estimate potential risk from inhalation of indoor air in **Table 4**.

***On-site Resident Exposed To Volatiles In The Indoor Air***

Volatiles from the soil gas may migrate into indoor air of the site building which in the future may be used as a residence. The exposure point concentration ($C_{air}$) was based on the maximum measured soil gas concentration modeled into indoor air. A daily inhalation rate (IR) rate of 15 $m^3$/day for an adult and 10 $m^3$/day for a child during a normal day was used as the inhalation rate (IR). The exposure frequency (EF) assumed that a resident would be at home 350 days/year; this value represents an overestimation of how many days per year (including a two-week vacation period) a resident would actually spend in the home. The exposure duration (ED) is 24 years for an adult and 6 years for a child which is an upper bound estimate for an individual at one residence. The body weight (BW) is 70 kg for an adult and 10 kg for a child in accordance with USEPA and NYSDOH guidelines. This value represents the average body weight for male and female adults. The estimated exposure associated with inhalation of indoor air by an on-site resident is calculated as shown in **Table 4**.

## RESULTS OF EXPOSURE AND RISK ESTIMATES

The results of this assessment as shown in **Table 4** indicate that the total cancer risk for a future on-site resident (child and adult) is $5 \times 10^{-6}$ with a hazard index of 0.31 for non-carcinogenic endpoints. The chemical driving the total risk to a on-site resident is trichloroethene ($5 \times 10^{-6}$). This cancer risk is lower than the cancer risk estimate of $7 \times 10^{-6}$ that was calculated during the original risk assessment and which was incorporated into the Record of Decision. The estimated cancer risk and hazard index for pathways other than inhalation of trichloroethene are below the acceptable NYSDOH cancer risk of $1 \times 10^{-6}$ and a hazard index of 1.0, respectively. Therefore, a condition of no significant risk to human health exists at the site from volatiles migrating from soil gas into indoor air.

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**TABLE 1**

Summary of Soil Gas Analytical Results

Results reported in micrograms per cubic meter ($ug/m^3$)

Watch Case Factory Site

Sag Harbor, New York

| **Sample Location**<br>**Sample Collected**<br>**Sample Analyzed**<br>**Chemical** | **Ambient Air**<br>06/15/99<br>06/29/99 | **SGP-1**<br>06/15/99<br>06/28/99 | **SGP-2**<br>06/15/99<br>06/29/99 | **SGP-3**<br>06/15/99<br>06/29/99 | **SGP-4**<br>06/15/99<br>06/28/99 | **SGP-5**<br>06/15/99<br>06/28/99 | **SGP-6**<br>06/15/99<br>06/28/99 | **SGP-7**<br>06/15/99<br>06/28/99 | **SGP-8**<br>06/15/99<br>06/29/99 |
|---|---|---|---|---|---|---|---|---|---|
| Carbon Tetrachloride | <4.6 | <440 | <190 | <97 | <93 | 170 | 180 | 82J | <54 |
| Chloroform | <3.6 | <340 | <150 | <75 | <72 | 79 | 140 | <36 | <42 |
| Chloromethane | 2.1J | <150 | <83 | <32 | <31 | <6.1 | <9.2 | <15 | <18 |
| 1,1-Dichloroethane | <3.0 | <290 | <120 | 100J | <60 | <12 | 85 | 140 | 62J |
| cis-1,2-Dichloroethene | <2.9 | 1,000J | 300J | 210J | <59 | 96 | 350 | 240 | 72J |
| Freon 11 (trichloromonofluoromethane) | 5.4J | <400 | <170 | <87 | <83 | <17 | <25 | <42 | <48 |
| Freon 113 (trichlorofluoroethane) | <5.6 | 1,200J | 280J | 180J | <110 | <23 | <34 | <57 | <65 |
| Tetrachloroethene | <5.0 | 690J | <210 | 210J | 110J | 98 | 210 | 110J | 95J |
| 1,1,1-Trichloroethane | <4.0 | 100,000 | 35,000 | 20,000 | 15,000 | 360 | 1,800 | 3,200 | 3,400 |
| Trichloroethene | <3.9 | 47,000 | 16,000 | 17,000 | 8,000 | 3,300 | 5,700 | 12,000 | 11,000 |

**Notes:**

Soil gas samples analyzed via EPA Method TO-14

J = below the low point of the curve, if calibrated compound: estimated value, if TIC.

< = less than reported detection limit reported as not detected.

TIC = tenatively identified compound

## TABLE 2

Summary of Soil Gas Results
Results reported in micrograms per cubic meter ($ug/m^3$)

Watch Case Factory Site
Sag Harbor, New York

| Chemical | Number of Detects | Number of Samples (a) | Minimum Detect | Location of Minimum | Maximum Detect | Location of Maximum |
|---|---|---|---|---|---|---|
| Carbon Tetrachloride | 3 | 8 | 82J | SGP-7 | 180 | SGP-6 |
| Chloroform | 2 | 8 | 79 | SGP-5 | 140 | SGP-6 |
| Chloromethane | 0 | 8 | ND | --- | ND | --- |
| 1,1-Dichloroethane | 4 | 8 | 62J | SGP-8 | 140 | SGP-7 |
| cis-1,2-Dichloroethene | 7 | 8 | 72J | SGP-8 | 1,000J | SGP-1 |
| Freon 11 (trichloromonofluoromethane) | 0 | 8 | ND | --- | ND | --- |
| Freon 113 (trichlorofluoroethane) | 3 | 8 | 180J | SGP-3 | 1,200J | SGP-1 |
| Tetrachloroethene | 7 | 8 | 95J | SGP-8 | 690J | SGP-1 |
| 1,1,1-Trichloroethane | 8 | 8 | 360 | SGP-5 | 100,000 | SGP-1 |
| Trichloroethene | 8 | 8 | 3,300 | SGP-5 | 47,000 | SGP-1 |

**Notes:**
(a) does not include ambient air sample
ND = not detected
J = below the low point of the curve, if calibrated compound; estimated value, if TIC.
TIC = tenatively identified compound
-- = not applicable

**TABLE 3**
Estimation of Indoor Air Concentrations from Soil Gas
Results reported in micrograms per cubic meter ($ug/m^3$)

Watch Case Factory Site
Sag Harbor, New York

***Calculation of Effective Diffusion Coefficient***

EQUATIONS:

$$Kd = Koc * foc$$
$$nw = Pb * W / Pw$$
$$na = n - nw$$
$$Pb = Pp * (1 - n)$$
$$Dsg = (na^{3.33} / n^2) * Da$$
$$Dsw = (nw^{3.33} / n^2) * Dw$$
$$De = (H * Dsg + Dsw)/(Pb * Kd + nw + na * H)$$

| Parameter | Description | Units | Value | Reference |
|---|---|---|---|---|
| Da | Diffusion coefficient in air | $cm^2/s$ | See below | Lyman et al, 1991 |
| Dw | Diffusion coefficient in water | $cm^2/s$ | See below | Lyman et al, 1991 |
| Dsg | Diffusion coefficient in soil gas | $cm^2/s$ | See below | Calculated |
| Dsw | Diffusion coefficient in soil water | $cm^2/s$ | See below | Calculated |
| De | Effective diffusion coefficient | $cm^2/s$ | See below | Calculated |
| Koc | Soil organic carbon partition coefficient | ml/kg | See below | Montgomery, 1996 |
| foc | Soil fraction organic carbon | unitless | 0.0006 | fine/medium sand |
| W | Soil moisture content | unitless | 0.1 | fine/medium sand |
| n | Total soil porosity | unitless | 0.34 | fine/medium sand |
| na | Air-filled soil porosity | unitless | 0.17 | Calculated |
| nw | Water filled soil | unitless | 0.17 | Calculated |
| H | Henry's Law Constant | unitless | See below | Montgomery, 1996 |
| Kd | Distribution coefficient | L/kg | See below | Calculated |
| Pw | Density of water | kg/L | 1 | Constant |
| Pp | Soil particle density | kg/L | 2.65 | Freeze and Cherry, 1979 |
| Pb | Dry soil bulk density | kg/L | 1.749 | Calculated |

| Compound | Koc | Da | Dw | Kd | H | Dsg | Dsw | De |
|---|---|---|---|---|---|---|---|---|
| Carbon Tetrachloride | 437 | 2.34E-02 | 9.00E-06 | 0.26 | 1.22E+00 | 5.03E-04 | 2.34E-07 | 7.35E-04 |
| Chloroform | 93 | 2.54E-02 | 1.00E-05 | 0.06 | 1.41E-01 | 5.46E-04 | 2.60E-07 | 2.61E-04 |
| Chloromethane | 8 | 2.79E-02 | 1.49E-05 | 0.00 | 3.68E-01 | 5.99E-04 | 3.88E-07 | 9.05E-04 |
| 1,1-Dichloroethane | 62 | 2.29E-02 | 9.80E-06 | 0.04 | 2.27E-01 | 4.92E-04 | 2.55E-07 | 4.04E-04 |
| cis-1,2-Dichloroethene | 49 | 2.37E-02 | 1.10E-05 | 0.03 | 1.70E-01 | 5.09E-04 | 2.86E-07 | 3.41E-04 |
| Freon 11 (trichloromonofluoromethane) | 158 | 2.53E-02 | 9.30E-06 | 0.09 | 4.58E+00 | 5.43E-04 | 2.42E-07 | 2.27E-03 |
| Freon 113 (trichlorofluoroethane) | 363 | 7.98E-03 | 7.90E-06 | 0.22 | 1.02E+01 | 1.71E-04 | 2.06E-07 | 7.81E-04 |
| Tetrachloroethene | 2512 | 2.24E-02 | 8.70E-06 | 1.51 | 8.50E-02 | 4.81E-04 | 2.26E-07 | 1.46E-05 |
| 1,1,1-Trichloroethane | 309 | 2.24E-02 | 8.90E-06 | 0.19 | 9.63E-01 | 4.81E-04 | 2.32E-07 | 7.03E-04 |
| Trichloroethene | 263 | 2.30E-02 | 9.40E-06 | 0.16 | 3.80E-01 | 4.94E-04 | 2.45E-07 | 3.66E-04 |

***Calculation of Indoor Air Concentrations***

EQUATIONS:

$$Q = De * Csg * A * CF1 * CF2 / L$$
$$Qf = Q * AF$$
$$Cair = \frac{Qf * CF3}{Vb * E}$$

| Parameter | Description | Units | Value | Reference |
|---|---|---|---|---|
| Q | Emission rate from soil gas | µg/s | See below | Calculated |
| De | Effective diffusion coefficient | cm2/s | See below | Calculated |
| Csg | Soil gas concentration | $ug/m^3$ | See below | Measured maximum |
| A | Area of building | $m^2$ | 3037.74 | Assumes 32,698 $ft^2$ |
| L | Depth to contamination | m | 3.05 | Assumes 10 ft dtw |
| CF1 | Conversion factor, $cm^2$ to $m^2$ | $m^2/cm^2$ | 0.0001 | Constant |
| CF2 | Conversion factor, L to $m^3$ | $L/m^3$ | 1000 | Constant |
| Qf | Emission rate through foundation | µg/s | See below | Calculated |
| AF | Attenuation factor | unitless | 0.01 | PCA, 1979 |
| Vb | Volume of building | $m^3$ | 9259.04 | Assumes 10 ft ceilings |
| E | Air exchange rate | 1/hour | 1 | USEPA, 1996 |
| CF3 | Conversion factor, s to hr | s/hour | 3600 | Constant |
| Cair | Indoor air concentration | $µg/m^3$ | See below | Calculated |

| Compound | De | Csg | Q | Qf | Cair |
|---|---|---|---|---|---|
| Carbon Tetrachloride | 7.35E-04 | 1.80E+02 | 1.32E+01 | 1.32E-01 | 5.13E-02 |
| Chloroform | 2.61E-04 | 1.40E+02 | 3.65E+00 | 3.65E-02 | 1.42E-02 |
| Chloromethane | 9.05E-04 | 0.00E+00 | --- | --- | --- |
| 1,1-Dichloroethane | 4.04E-04 | 1.40E+02 | 5.63E+00 | 5.63E-02 | 2.19E-02 |
| cis-1,2-Dichloroethene | 3.41E-04 | 1.00E+03 | 3.40E+01 | 3.40E-01 | 1.32E-01 |
| Freon 11 (trichloromonofluoromethane) | 2.27E-03 | 0.00E+00 | --- | --- | --- |
| Freon 113 (trichlorofluoroethane) | 7.81E-04 | 1.20E+03 | 9.34E+01 | 9.34E-01 | 3.63E-01 |
| Tetrachloroethene | 1.46E-05 | 6.90E+02 | 1.00E+00 | 1.00E-02 | 3.89E-03 |
| 1,1,1-Trichloroethane | 7.03E-04 | 1.00E+05 | 7.01E+03 | 7.01E+01 | 2.73E+01 |
| Trichloroethene | 3.66E-04 | 4.70E+04 | 1.71E+03 | 1.71E+01 | 6.67E+00 |

**Notes:**
--- = not applicable

**TABLE 4**

Summary of Estimated Risks for a Future Resident Inhaling Indoor Air

Watch Case Factory Site
Sag Harbor, New York

**Exposure:** On-site resident inhaling volatiles from soil gas migrating into indoor air
**Exposure Point:** Indoor Air
**Exposure Route:** Inhalation
**Exposure and Risk Equations:**

*Hazard Index (HI) = (((Cair * IR * EF * ED * CF) / (BW * ATnc)) / RfDi*

*Cancer Risk = (((Cair * IR * EF * ED * CF) / (BW * ATc)) * CSFi*

| Parameter | | Description | Units | Child Value | Adult Value | Reference |
|---|---|---|---|---|---|---|
| Cair | = | Concentration in indoor air | $ug/m^3$ | see below | see below | modeled |
| IR | = | Inhalation rate | $m^3/day$ | 10 | 15 | USEPA, 1989 |
| EF | = | Exposure frequency | days/year | 350 | 350 | USEPA, 1989 |
| ED | = | Exposure duration | years | 6 | 24 | USEPA, 1989 |
| BW | = | Body weight | kg | 15 | 70 | USEPA, 1989 |
| ATnc | = | Averaging time non-carcinogens | days | 2,190 | 8,760 | USEPA, 1989 |
| ATc | = | Averaging time carcinogens | days | 25,550 | 25,550 | USEPA, 1989 |
| RfDi | = | Inhalation reference dose | mg/kg-day | see below | see below | IRIS/HEAST/NCEA, 1999 |
| CSFi | = | Inhalation cancer slope factor | $(mg/kg\text{-}day)^{-1}$ | see below | see below | IRIS/HEAST/NCEA, 1999 |
| CF | = | Conversion factor | mg/ug | 0.001 | 0.001 | constant |
| HI | = | Hazard index | unitless | see below | see below | calculated |
| Risk | = | Cancer risk | unitless | see below | see below | calculated |

| Chemical | Cair | Indoor Air Background (a) | Exceeds Background | RfDi | CSFi | Child | | Adult | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | HI | Risk | HI | Risk |
| Carbon Tetrachloride | 0.051 | 1 | no | 5.71E-04 | 5.30E-02 | 0.05742 | 1.49E-07 | 0.01846 | 1.91E-07 |
| Chloroform | 0.014 | 3 | no | 8.60E-05 | 8.10E-02 | 0.10543 | 6.30E-08 | 0.03389 | 8.09E-08 |
| Chloromethane | --- | no data | --- | 8.60E-02 | 6.30E-03 | --- | --- | --- | --- |
| 1,1-Dichloroethane | 0.022 | no data | --- | 1.40E-01 | --- | 0.00010 | --- | 0.00003 | --- |
| cis-1,2-Dichloroethene (b) | 0.132 | no data | --- | 9.00E-03 | --- | 0.00939 | --- | 0.00302 | --- |
| Freon 11 (trichloromonofluoromethane) | --- | no data | --- | 2.00E-01 | --- | --- | --- | --- | --- |
| Freon 113 (trichlorofluoroethane) | 0.363 | no data | --- | 8.60E+00 | --- | 0.00003 | --- | 0.00001 | --- |
| Tetrachloroethene | 0.004 | 11 | no | 1.40E-01 | 2.00E-03 | 0.00002 | 4.27E-10 | 0.00001 | 5.49E-10 |
| 1,1,1-Trichloroethane | 27.254 | 30 | no | 2.86E-01 | --- | 0.06092 | --- | 0.01958 | --- |
| Trichloroethene | 6.667 | 5 | yes | --- | 6.00E-03 | --- | 2.19E-06 | --- | 2.82E-06 |
| | | | | | | **TOTAL ADULT AND CHILD RESIDENT HAZARD INDEX** | | | **0.31** |
| | | | | | | **TOTAL ADULT AND CHILD RESIDENT CANCER RISK** | | | **5.E-06** |

**Notes:**
--- = not available or not applicable
(a) National Volatiles Indoor Air Database 75% upper quartile value from over 2000 samples (Shah & Singh, 1989)
(b) No RfDi; used oral reference dose
IRIS = Integrated Risk Information System
HEAST = Health Effects Assessment Summary Tables
NCEA = National Center for Exposure Assessment