ONSITE VAPOR INTRUSION INVESTIGATION

(As Required by Order on Consent, Index No. B8-0343-90-08)

ARCH CHEMICALS, INC.
ROCHESTER PLANT SITE
ROCHESTER, NEW YORK

NYS Registry No. 828018A

June 2005

ONSITE VAPOR INTRUSION INVESTIGATION

ARCH CHEMICALS
ROCHESTER PLANT SITE
ROCHESTER, NEW YORK

Prepared by

MACTEC Engineering & Consulting, Inc.
Portland, Maine

for

ARCH CHEMICALS, INC.
Charleston, Tennessee

June 2005

Jay Peters
Senior Scientist

Jeffrey E. Brandow, P.E.
Principal Engineer

ONSITE VAPOR INTRUSION INVESTIGATION

ARCH CHEMICALS ROCHESTER PLANT SITE
ROCHESTER, NY

TABLE OF CONTENTS

1.0 INTRODUCTION

MACTEC Engineering and Consulting, Inc. (MACTEC) has been contracted by Arch Chemicals, Inc., (Arch) to perform environmental investigation activities at their facility in Rochester, NY. MACTEC has prepared this report on behalf of Arch to describe the results of an initial investigation of the groundwater to indoor air vapor intrusion pathway for volatile organic compounds related to Arch operations.

1.1 SITE HISTORY

Arch is the current owner of the Rochester Plant located at 100 McKee Road, a private industrial road in the southwestern section of Rochester, New York (Figure 1). The plant property is approximately 15.3 acres.

Manufacturing operations have consisted of organic and inorganic chemical production. The primary products are specialty organic chemicals, many of which are produced in small quantities. Due to the nature of the manufacturing operations at Rochester, a large number of organic raw materials, intermediates, and products have been handled at the plant. In 1948, Genesee Research (a fully-owned subsidiary of the Puritan Company) first established a facility at the site for manufacturing automotive specialty products (e.g., brake fluids, polishes, anti-freeze, and specialty organic chemicals). In 1954, Mathieson Chemical Corporation acquired Puritan and merged with Olin Industries to become Olin Mathieson Chemical Corporation. Production of brake fluid and anti-freeze continued for a time, but in the early 1960s production of specialty organic chemicals including Zinc Omadine™ and chloropyridines began. In 1969, Olin Mathieson changed its name to Olin Corporation (Olin), and in 1999 Olin spun off its specialty chemicals business to form an independent company known as Arch Chemicals, Inc. The Arch Rochester plant is the sole manufacturer of chloropyridines in the United States.

The Rochester Plant has been the subject of various environmental investigations since the early 1980s, including a two-phased RI conducted in 1994-1996. These investigations have documented the presence of site-related chemicals, primarily chloropyridines and volatile organic compounds, in soil and groundwater at the site.

A Feasibility Study (FS) was completed in January 2000, in which a range of possible site remedial actions were evaluated. The FS was performed to fulfill part of the requirements of the previous Order on Consent between the NYSDEC and Olin, dated August 23, 1993.

On March 29, 2002, the NYSDEC issued a Record of Decision that selected a remedial action for addressing impacted groundwater beneath and downgradient of the site. This portion of the overall site remedy, contaminated groundwater, is referred to as Operable Unit No. 2 (OU-2). Contaminated soil and bedrock onsite (i.e., source areas) may be addressed separately in the future as Operable Unit No. 1 (OU-1).

1.2 AUTHORITY

On August 21, 2003, Arch and the NYSDEC entered into an Order on Consent covering the development and implementation of the selected remedial action for OU-2. This Order defines the required actions and schedule for completing the remedial action, and also authorizes the NYSDEC to request that Arch prepare and submit a work plan for additional activities at the site that the Department believes to be necessary to advance the Remedial Program at the Site. In a letter dated March 18, 2004, the Department formally requested that Arch prepare a Vapor Intrusion Supplemental Work Plan. On April 12, 2004, Arch notified the Department that it would submit the requested work plan, and subsequently provided a

draft work plan to the NYSDEC on June 7, 2004. On October 14, 2004, the NYSDEC provided Arch with written comments on the draft work plan. Arch revised the work plan to address those comments, and re-submitted the final work plan on December 20, 2004. The NYSDEC issued a conditional approval of the work plan on January 18, 2005.

1.3 ORGANIZATION OF REPORT

This Investigation Report consists of five sections, and four appendices:

- Section 1 – Introduction to the Arch site and basis for the project
- Section 2 – Sampling Procedures
- Section 3 – Results
- Section 4 – Conclusions and Recommendations
- Section 5 – References

Appendix A includes the Field Data Records. Appendix B contains meterological data, while Appendix C provides the laboratory analytical data. Calculations supporting the risk evaluation are included in Appendix D.

2.0 SAMPLING PROCEDURES

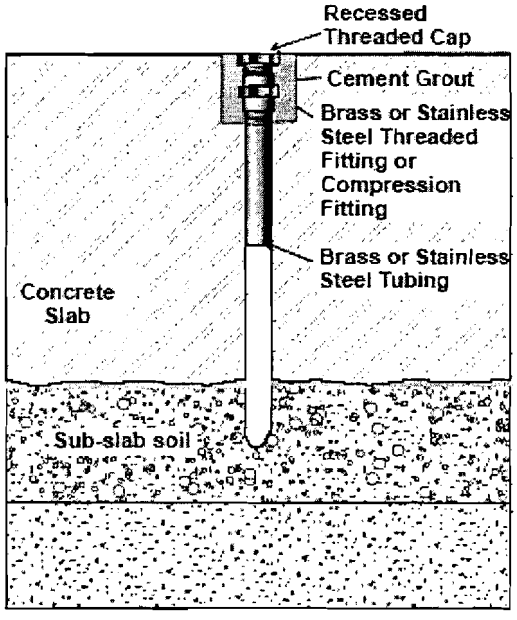
The sampling described in this report is the first phase of an evaluation of the potential for adverse exposure risks that may result from the soil vapor to indoor air pathway at buildings in and adjacent to the Arch Chemicals site. This phase of sampling was limited to onsite locations only, since access agreements with the adjacent property owners were not able to be secured in a timely fashion. Sampling of the offsite properties will take place in the near future, as will onsite sampling for chloropyridines. For further discussion of future sampling, see the Recommendations section of this report.

2.1 VAPOR INTRUSION SAMPLING

The following subsections detail the field procedures and analyses for the on-site vapor intrusion sampling.

2.1.1 Sampling Locations. Soil vapor monitoring probes were installed at various locations at the Arch Chemicals buildings. Locations were reviewed with the NYSDEC prior to installation. The soil vapor monitoring probes were installed at six locations throughout the main plant, including three in the production area, two in the warehouse, and one in the office area, as shown in Figure 2. Each of these locations were designated for both an indoor air and a sub-slab soil vapor sample. In addition, one upwind outdoor air sample was collected concurrently with the indoor and sub-slab sampling.

2.1.2 Soil Vapor Samples. Soil vapor probes were installed through the concrete floor at each sampling location. Vapor probes consist of 0.5-inch outside-diameter (O.D.) stainless steel tubing implanted into the concrete floor slab. A rotary hammer drill was used to initially drill a 1.5-inch diameter socket approximately 2-inches into the concrete floor at each sampling location. A 0.5-inch diameter hole was then advanced through the slab, fully penetrating the concrete and extending slightly (one to two inches) into the sub-slab soil. A 6-inch length of 0.5-inch O.D. tubing with a threaded fitting was inserted into the drilled hole such that, when capped with a threaded plug, the probe was flush with the floor surface. The probe was then grouted in place using a non-shrinking cement grout (anchoring cement). The figure at right shows a typical probe installation (source: USEPA Office of Research and Development).



One round of soil vapor monitoring was performed after completion of the installation of the soil vapor probes. For sample collection, the threaded cap was removed from the probe, a sampling line was attached with a threaded connector, and the procedures described in Section 2.1.4 were followed for sample collection. Once the canister was filled, the sampling tube was removed and the plug replaced in the sampling probe.

2.1.3 Indoor Air Samples. Indoor air sampling locations were co-located with each of the sub-slab soil vapor sampling points.

Sampling was conducted over an 8-hour period between approximately 8 A.M. and 4 P.M. This period was chosen to correspond with the daily exposure period of interest in characterization of risks for

commercial/industrial workers.

2.1.4 Sample Collection Procedures. The following equipment and supplies were used during completion of air sampling:

- 6-L SUMMA® canisters
- Vacuum gauge (0-30 inches of mercury [in. Hg] range)
- Stainless steel inlet filter
- Teflon tubing
- Fixed-orifice flow controller
- ¼-inch Swagelock nuts

The analytical laboratory provided batch-certified SUMMA® canisters that had been evacuated to a pressure of -30 in. Hg prior to sampling. During sampling, canisters collected time-weighted samples by regulating the flow rate into the canister through a stainless steel pre-cleaned flow controller. The controller's orifice was sized appropriately to obtain an 8-hr. time-weighted average sample with a final vacuum pressure less than 5 in. Hg.

The following steps were followed when setting up the canister for sampling:

1. Check the initial vacuum of the labeled canister by removing the brass cap from the canister and connecting the vacuum gauge to the canister, then opening the valve. The pressure should read -30 in. Hg, ± 2 in. Hg. Record the canister starting pressure. Make sure the vacuum gauge is capped off on the outlet or the canister will fill immediately and cannot be used.
2. Close the canister valve (hand tight) and remove the vacuum gauge. Do not overtighten the valve, but ensure the valve is closed. Make sure the valve is closed before removing the gauge or the canister will fill immediately and cannot be used.
3. Remove the brass cap and plastic plug from the flow controller. Fixed-orifice flow controllers will be used, so there is no setting of the flowrate in the field.
4. Connect the flow controller outlet to the canister. Tighten the nut (on the flow controller) 1/4 turn beyond finger tight. Verify the tightness of the connection by attempting to rotate the flow controller. It should <u>not</u> be possible to rotate the controller.
5. Connect the filter to the flow controller inlet. Tighten the filter to the flow controller using a wrench. The filter prevents dust or particulates from entering the flow controller.
6. Once the sampling system is placed at the sampling location, open the canister valve fully to initiate sampling. Record the sample start time.

After sampling was complete, the following procedures were performed:

1. Close the valve on the canister and remove the canister from the sample location.
2. Check the final pressure of the labeled canister by removing the flow controller and filter, connecting the vacuum gauge to the canister, and opening the valve. The pressure should be less than 5 in. Hg. Record the final vacuum on the canister label.
3. Close the canister valve and then remove the vacuum gauge.
4. Send the labeled canister accompanied with a chain-of-custody form to the laboratory for analysis.

A Sampling Data Sheet was used to record all data on sampling times and canister readings (see Appendix A, Field Data Records). To identify actual monitoring locations selected in the field, distances from fixed points (walls, beams, etc.) were recorded in the field log book.

Meteorological data during the sampling event was obtained for the Monroe County airport station, which is within a few miles of the site. Meteorological data obtained included: wind speed, wind direction, temperature, dewpoint, and atmospheric pressure. Data is provided in Appendix B.

For quality control purposes, one trip blank sample was collected and a laboratory duplicate analysis was requested. The trip blank was prepared in the field using two laboratory-provided canisters to make a single blank that functions as both the field blank and trip blank. The laboratory supplied a SUMMA® canister pressurized to 10 psi with purified air along with an evacuated SUMMA® canister that was used as the trip blank. The evacuated trip blank canister was attached to the purified air canister and allowed to reach equilibrium.

2.1.5 Analyses. Soil vapor samples were analyzed for the target parameters shown in the following table, using USEPA Method TO-15.

Summary of Onsite Vapor Intrusion Analytical Program

VOC	Indoor Air	Subslab Soil Vapor
1,2-dichloroethane	X	X
1,2-dichloroethene	X	X
benzene	X	X
bromodichloromethane	X	X
bromoform	X	X
carbon disulfide	X	X
carbon tetrachloride	X	X
chlorobenzene	X	X
chloroform	X	X
chloromethane	X	X
dibromochloromethane	X	X
methylene chloride	X	X
toluene	X	X
tetrachloroethene	X	X
trichloroethene	X	X
vinyl chloride	X	X

3.0 RESULTS

Samples were analyzed at the Severn Trent Laboratories facility in Burlington, Vermont. The laboratory analytical report is included in Appendix C. The following sections provide an evaluation of the reported data for the purpose of identifying target compounds that may have a complete migration pathway from sub-slab soil gas to indoor air in the Arch Chemicals on-site buildings, and to assess the potential health risks associated with exposure to those target compounds in indoor air.

3.1 DATA QUALITY

Laboratory analytical results were reviewed for the following parameters:

- Holding Times
- Quality Control Blanks
- Laboratory Control Samples
- Laboratory Duplicate Precision

All criteria were met with the following exception. The trip blank contained detectable quantities of four target compounds: methylene chloride, carbon disulfide, toluene, and ethylbenzene. No target analytes were reported in laboratory blanks, and other laboratory quality control measurements were within acceptable limits, suggesting that results were not due to laboratory contamination. In accordance with standard validation guidelines, action levels were established at ten times the reported concentration in the trip blank for methylene chloride (which is considered a common lab contaminant), and five times the reported concentrations for the other three chemicals. Based on the reviewing chemist's professional judgment, sample results reported at concentrations below these action levels were qualified as estimated values rather than non-detects, and it should be recognized that reported results for these compounds may be biased high or could be false positives.

With this qualification, the data is judged to be usable for its intended purpose.

3.2 EVALUATION APPROACH

In accordance with the work plan (MACTEC, 2004), a three-tier approach is used for evaluating potential vapor intrusion and health risks. The approach consists of first evaluating soil gas and indoor air concentrations using generic indoor air and soil gas screening values from Table 2c of the Vapor Intrusion Guidance (USEPA, 2002a) (Tier I screening evaluation). The values presented in Table 2c of the Vapor Intrusion Guidance are protective for migration of vapors into residential dwellings (houses with basements), and exposure to indoor air under residential occupancy conditions, at a target excess lifetime cancer risk of 1 in 1 million and a non-cancer hazard index of 1. Since the Generic Screening Levels are protective for children and adults who live in a residence, they are conservative for adult employees who work in buildings during work-day hours, on business days only. Hence, soil gas or indoor air concentrations that do not exceed values that are protective for residential exposures would not pose risks of concern for commercial/industrial workers. Therefore, it is appropriate to further evaluate VOCs that are detected at concentrations that exceed the Generic Screening Values. Consequently, a secondary screening of indoor air and soil gas concentrations is performed using risk-based screening values for commercial/industrial (occupational) exposures (Tier II screening evaluation). For exposure areas where indoor air or soil gas concentrations exceed the commercial/industrial (C/I) screening values, additional evaluation is appropriate to characterize the health risks that are associated with intrusion of vapors into air space where exposures may occur (Tier III analysis).

3.3 TIER I AND II SCREENING EVALUATION

Table 1 presents a comparison of soil gas and indoor air data to Generic Screening Levels and calculated C/I risk-based screening levels for VOCs detected in at least one sample at a concentration in excess of the Generic Screening Levels. The C/I screening values were calculated by scaling the Generic Screening Values from 24 hour per day, 365 day per year, 30-year exposure basis to an 8 hour per day, 250 day per year, 25-year exposure basis.

As shown in Table 1, concentrations of benzene, carbon tetrachloride, chloroform, ethylbenzene, and trichloroethene in air samples exceeded C/I risk-based screening levels in one or more samples. All five of these VOCs exceeded C/I screening levels in air samples collected from the production area, but only one (trichloroethene) exceeded C/I screening levels in the air sample collected from the office area, and only two (chloroform and trichloroethene) exceeded C/I screening levels in the air samples collected from the warehouse area. Benzene was detected in the outdoor air sample, representing local background conditions, at a concentration that exceeded the C/I screening level. Concentrations of these VOCs as well as carbon disulfide, methylene chloride, tetrachloroethene, toluene, and vinyl chloride in soil gas exceeded C/I risk-based screening levels in one or more samples collected from beneath the production area. No VOCs were detected in soil gas from beneath the warehouse area or office area at concentrations that exceeded C/I risk-based screening levels.

Based on the Tier I and II screening level evaluations, VOCs were detected in indoor air and soil gas samples at concentrations that exceeded conservative C/I screening levels. Therefore, additional evaluation is appropriate.

3.4 TIER III ANALYSIS

The objective of this analysis is to identify VOCs that may occur in indoor air at concentrations that pose a potential risk of regulatory concern and are present in indoor air as a result of sub-slab soil gas intrusion into the indoor air. This analysis involved characterizing cancer and non-cancer risks to workers who may be exposed to VOCs detected in the indoor air, and evaluation of indoor air data using the soil gas data, background data, and published air guideline values. The background data used in this analysis include the outdoor air sample collected during the air sampling event in March, 2005, as well as ranges of indoor air VOC concentrations developed through a NYSDOH study of homes (1997 – 2003) presented in NYSDOH guidance (NYSDOH, 2005). Air Guideline Values derived by NYSDOH are published for methylene chloride, tetrachloroethene, and trichloroethene (NYSDOH, 2005).

3.4.1 Risk Characterization Methods. Indoor air samples were collected from three areas within the Building: An office (Office), the Warehouse Area (Warehouse), and the Production Area (Production Area). Each of these areas may be occupied daily by workers at the facility. However, the duration of daily exposure at each of these areas for a single worker could range from as little as an hour or less, to as much as a full work-day shift (8 hours). Daily occupancy would not exceed the duration of a work-day shift.

For this evaluation, it was conservatively assumed that workers occupy a single area for a full work-day, each work-day, over their duration of employment at the facility. Consequently, it was assumed that exposure to indoor air at each area (i.e., office, warehouse, production) occurs 8 hours per day, 5 days per week, over a 25 year period. These exposure assumptions correspond to USEPA-recommended reasonable maximum exposure (RME) parameters for full-time indoor workers (USEPA, 2002b).

The exposure point concentrations (EPCs) are the arithmetic mean concentrations for each area. Use of the arithmetic mean concentrations as EPCs are appropriate because:

- Workers move throughout a given work area during the day and, therefore, are exposed to air throughout the area (i.e., they are not stationary at a single point in the Warehouse or Production area, but rather move throughout those areas). In reality, workers likely move throughout the entire facility and are, therefore, likely only exposed to air at a given area (e.g., warehouse) a portion of each day.
- Air is a dynamic medium that is constantly in motion due to mechanical ventilation of the buildings. Consequently, the VOC concentrations measured at a single point in a given area do not represent the concentrations that occur throughout the area.

The Production area EPC is represented by the average VOC concentrations reported in samples IA-001, IA-002, and IA-003. The Warehouse EPC is represented by the average VOC concentrations reported in samples IA-004 and IA-006, and the Office EPC is represented by a single air sample (IA-005). Arithmetic mean concentrations were calculated using a value of one-half the sample quantitation limit for results reported non-detect (i.e., a value equal to one-half the "U" qualified value was used in the averaging).

Risks were calculated using the following algorithms, which are consistent with USEPA guidance (e.g., USEPA 2002a and USEPA 2002b) and generally accepted risk assessment practices.

Cancer Risk:
ELCR = (EPC x EF x ED x ET x URF) / (ATc x CF)

Hazard Index:
HI = (EPC x EF x ED x ET) / (ATn x CF x RfC)

Where:

EPC	=	Exposure Point Concentration for indoor air (ug/m^3)
ELCR	=	Excess lifetime cancer risk (unitless)
HI	=	Hazard Index (unitless)
ATc	=	Averaging time, cancer (70 years or 25550 days)
ATn	=	Averaging time, non-cancer (equal to ED, in days)
CF	=	Conversion factor (24 hours/day)
EF	=	Exposure frequency (250 days/year)
ED	=	Exposure duration (25 years)
ET	=	Exposure time (8 hours/day)
URF	=	Unit risk factor (risk per ug/m^3)
RfC	=	Reference concentration (ug/m^3)

The sources of values for the URF and RfC are the Integrated Risk Information System (IRIS; USEPA on-line data base), USEPA National Center for Environmental Assessment (NCEA), and USEPA Health Effects Assessment Summary Tables (HEAST). The risk calculations referred to in this analysis are presented in Appendix D.

3.4.2 Discussion of Results. This subsection presents the results of the risk evaluation for the on-site buildings at the Arch Chemicals site.

Office Area. Table 2 presents an evaluation and risk analysis for the indoor air quality at the Office location. The total cancer risk among all VOCs detected indoor air is 6E-06, and the hazard index (HI) is 0.02. However, benzene and methylene chloride were detected at higher concentrations in the outdoor air sample. The incremental risk (risk in excess of the background risk associated with the outdoor air sample) is 4E-06 and the HI associated with the indoor air at the office is equal to the HI associated with

the outdoor air sample. A comparison of indoor air sampling results to soil gas sampling results for the soil gas sample collected from beneath the office area indicates that only four VOCs were detected in both indoor air and sub-slab soil gas (benzene, chloroform, ethylbenzene, and toluene). All of these VOCs were detected in indoor air in the Office location at concentrations lower than the outdoor air sample or consistent with the range of concentrations typically found in residential homes that have not been impacted by hazardous waste sites. The cancer risk associated with VOCs that could have a potentially complete migration pathway between soil gas and indoor air is 2E-06 and the HI is 0.02. The cancer risk is attributable to benzene (1E-06), which is likely an ambient air background condition, and chloroform (1E-06).

This analysis indicates that VOCs in indoor air as a result of soil vapor intrusion at the Office area do not pose health risks of concern.

Warehouse Area. Table 3 presents an evaluation and risk analysis for the indoor air quality at the Warehouse area. The total cancer risk among all VOCs detected in indoor air is 9E-06, and the hazard index (HI) is 0.03. Benzene was detected at higher concentration in the outdoor air sample. The incremental risk is 7E-06 and the HI associated with the indoor air at the office is only marginally higher (0.1) than the HI associated with the outdoor air sample. A comparison of indoor air sampling results to soil gas sampling results for the soil gas samples collected from beneath the Warehouse area indicates that only six VOCs were detected in both indoor air and sub-slab soil gas (benzene, carbon tetrachloride, chloromethane, ethylbenzene, tetrachloroethene, and toluene). Among these VOCs, only two (carbon tetrachloride and ethylbenzene) were detected in indoor air in the Warehouse area at concentrations greater than the outdoor air sample or in excess of the range of concentrations typically found in residential homes that have not been impacted by hazardous waste sites. The cancer risk associated with VOCs that could have a potentially complete migration pathway between soil gas and indoor air is 2E-06 and the HI is 0.02. The cancer risk is attributable to benzene (1E-06), which is likely an ambient air background condition, carbon tetrachloride (1E-06), and tetrachloroethene (3E-07).

This analysis indicates that VOCs in indoor air at the Warehouse area do not pose health risks of concern.

Production Area. Table 4 presents an evaluation and risk analysis for the indoor air quality at the Production area. The total cancer risk among all VOCs detected in indoor air is 1E-05, and the hazard index (HI) is 0.04. Benzene was detected at higher concentration in the outdoor air sample. The incremental risk is 8E-06 and the incremental HI is 0.02. A comparison of indoor air sampling results to soil gas sampling results for the soil gas samples collected from beneath the Production area indicates that eight VOCs were detected in both indoor air and sub-slab soil gas (benzene, carbon tetrachloride, chlorobenzene, chloroform, methylene chloride, tetrachloroethene, toluene, and trichloroethene). Among these VOCs, only three (carbon tetrachloride, chlorobenzene, and chloroform) were detected in indoor air in the Production area at concentrations greater than the outdoor air sample or in excess of the range of concentrations typically found in residential homes that have not been impacted by hazardous waste sites. The cancer risk associated with VOCs that could have a potentially complete migration pathway between soil gas and indoor air is 1E-05 and the HI is 0.03. The cancer risk is primarily attributable to carbon tetrachloride (2E-06), chloroform (3E-06), and trichloroethene (4E-06). However, trichloroethene was detected in indoor air at average (0.46 ug/m^3) and maximum (0.7 ug/m^3) concentrations well below the NYSDOH Air Guideline Value of 5 ug/m^3.

This analysis indicates that two VOCs in indoor air at the Production area, carbon tetrachloride and chloroform, may be present in indoor air as a result of soil gas intrusion, exceed background and/or guideline values, and pose risks in excess of the NYSDOH point of departure of 1E-06.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The results of this preliminary evaluation of the soil vapor to indoor air exposure pathway confirm that soil vapors beneath the main plant building at the Arch Chemicals site contain elevated levels of several site-related compounds. However, indoor air concentrations were generally found to be near or below calculated risk-based exposure levels for a commercial/industrial worker scenario, and all levels are well below permissible worker exposure limits established by the Occupational Safety and Health Administration.

Soil vapor concentrations were found to be highest under the building slab in the chemical production area of the plant, and diminish rapidly toward the south (i.e., under the warehouse building) and to the northwest (i.e., beneath the office area). This observed rapid attenuation of soil vapor concentrations moving outward from the assumed original source area indicates that it is unlikely that soil vapors beneath off-site buildings represent an unacceptable exposure risk.

Based on the results of this sampling event, the following recommendations are made:

1. **Sampling for Chloropyridines in Soil Vapor and Indoor Air.** Since chloropyridines are generally co-located with VOCs in the on-site groundwater, and are significantly less volatile, it is recommended that one round of sub-slab and indoor air samples for chloropyridines be conducted at the three production area sample points only. This sampling should be adequate to verify that the soil vapor to indoor air pathway for chloropyridines does not pose an unacceptable exposure risk.

2. **Sampling Off-site Buildings for Soil Vapor and Indoor Air.** The rapid attenuation of soil vapor concentrations beneath the on-site buildings, moving laterally away from the presumed original source area, is consistent with the observations of the long-term groundwater monitoring program which has shown VOCs to be confined largely to the Arch property. Based on these observations, sampling within and beneath off-site structures appears unnecessary, and Arch Chemicals requests that the Department agree to eliminating the off-site portion of the approved work plan for soil vapor intrusion.

3. **Future Sampling of On-site Soil Vapor and Indoor Air.** The elevated soil vapors beneath the production area of the main plant building are at concentrations high enough to justify future monitoring. Annual monitoring is proposed for the three sample locations in the production area for a period of three years. Samples of sub-slab vapors and indoor air will be collected during the winter at each location, and analyzed for a specific list of VOCs to be developed based on the results of the current sampling event. It is not anticipated that sampling for chloropyridines will be included, unless the chloropyridine sampling recommended in Item 1 above indicates a potential for unacceptable exposures due to soil vapor intrusion. After three years of monitoring, Arch Chemicals will propose eliminating regular vapor intrusion monitoring if risk levels remain below levels of potential concern.

5.0 REFERENCES

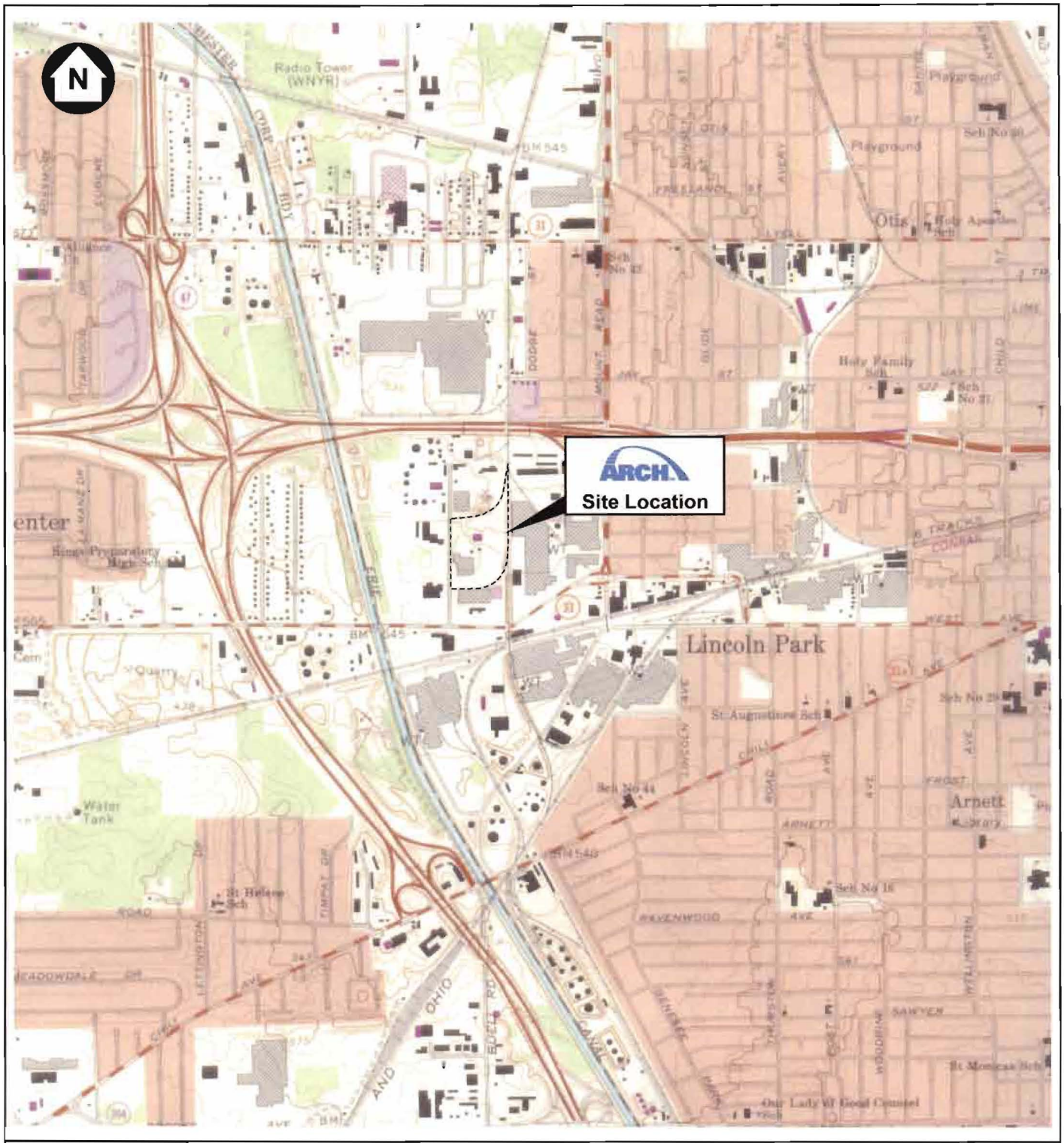
MACTEC, 2004. "Vapor Intrusion Pathway Investigation Work Plan", MACTEC Engineering & Consulting, Inc., Portland, Maine, December 2004.

NYSDOH, 2005. "Guidance for Evaluating Soil Vapor Intrusion in the State of New York – Public Comment Draft", New York State Department of Health, Troy, New York, February 2005.

USEPA, 2002a. "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil", U.S. Environmental Protection Agency, Washington, D.C., November 2002.

USEPA, 2002b. "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites", OSWER 9355.4-24, U.S. Environmental Protection Agency, Washington, D.C., December 2002.

FIGURES

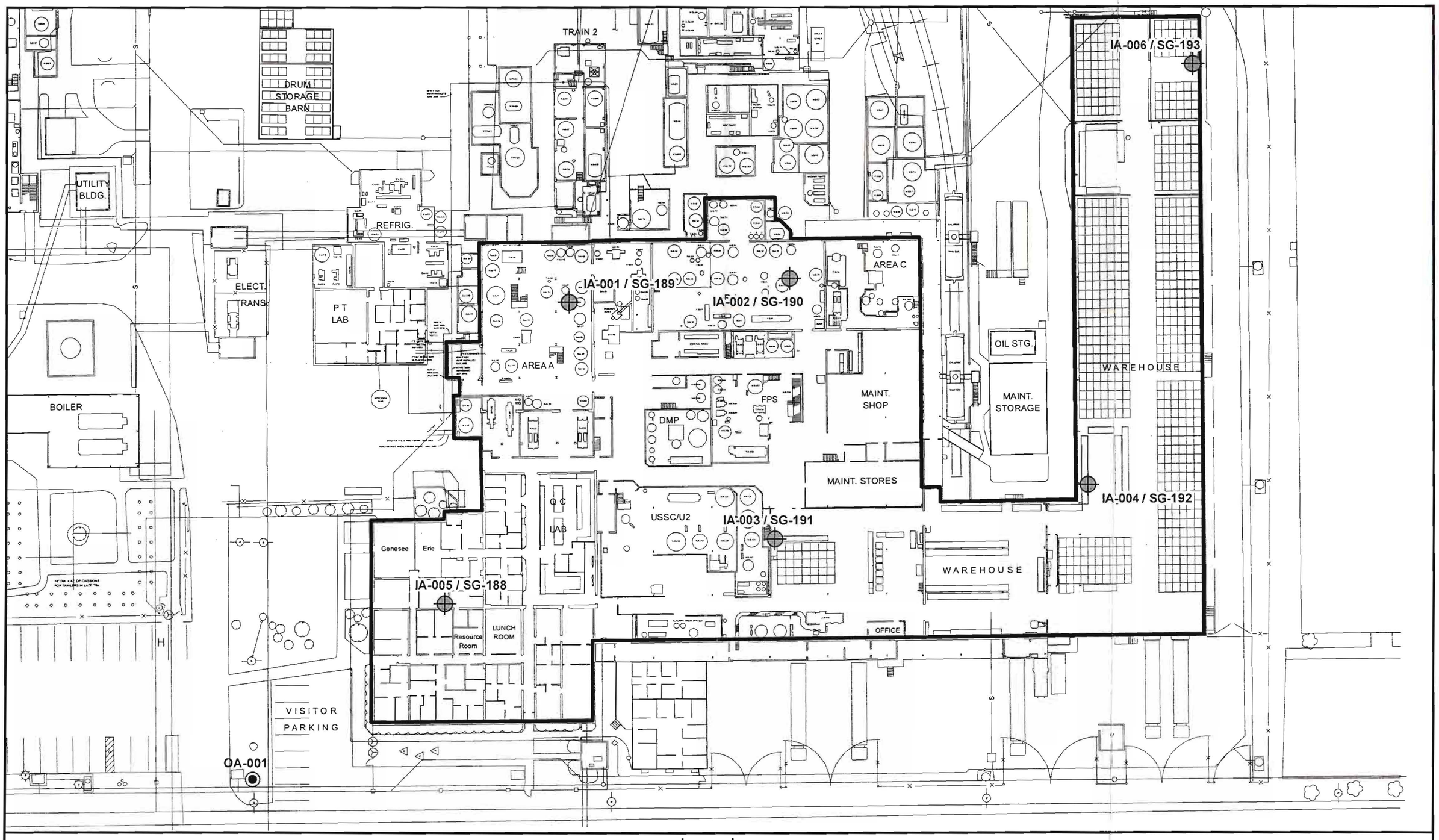


Source: USGS Topographic Quadrangle, 7.5 minute Series, Rochester West, N.Y. 1971 (Photorevised 1978).

FIGURE 1
SITE LOCATION MAP
ARCH CHEMICALS, INC.
ROCHESTER, NEW YORK

MACTEC

W2003035b.cdr



Legend

Indoor / Subslab Samples

Outdoor Air Sample

N 0 25 50 Feet

Prepared by BRP | Checked by JEB

VaporIntrusionStudy_11x17LS.mxd Figure2.pdf

Figure 2
Onsite Sampling Locations
Vapor Intrusion Study
Arch Chemicals
Rochester, NY
MACTEC, Inc.

TABLES

Table 1
Comparison of Indoor Air and Soil Gas Data to Risk-Based Screening Levels

		Air Samples									Soil Gas Samples								
		Risk-Based Screening Values		production area			warehouse		office	outdoor	Risk-Based Screening Values		production area			warehouse		office	
		Indoor Air Generic (Residential)	Indoor Air Commercial/ Industrial	IA-001	IA-002	IA-003	IA-004	IA-006	IA-005	OA-001	Soil Gas Generic (Residential)	Soil Gas Commercial/ Industrial	SG-189 (IA-001)	SG-190 (IA-002)	SG-191 (IA-003)	SG-192 (IA-004)	SG-193 (IA-006)	SG-188 (IA-005)	
1,2-Dichloroethane	ug/m3	0.094	--	0.16 U	0.4 U	0.13 U	0.065	0.25 U	0.081 U	0.16 U	--	--	8100 U	81 U	400 U	0.81 U	0.81 U	0.81 U	
1,2-Dichloroethene (total)	ug/m3	--	--	0.16 U	0.4 U	0.13 U	0.04 U	0.25 U	0.079 U	0.16 U	--	--	7900 U	79 U	400 U	0.79 U	0.79 U	0.79 U	
Benzene	ug/m3	0.31	1.6	1.9	0.73	1.1	1.5	1.5	1.6	1.7	3.1	16	6400 U	210	320 U	2.4	0.73	1.5	
Bromodichloromethane	ug/m3	--	--	0.27 U	0.67 U	0.22 U	0.067 U	0.42 U	0.13 U	0.27 U	--	--	13000 U	130 U	670 U	1.3 U	1.3 U	1.3 U	
Bromoform	ug/m3	--	--	0.41 U	1 U	0.34 U	0.1 U	0.64 U	0.21 U	0.41 U	--	--	21000 U	210 U	1000 U	2.1 U	2.1 U	2.1 U	
Carbon Disulfide	ug/m3	--	--	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	7000	30660	50000	160 U	1000	4.4 J	3.7 J	5.6 J	
Carbon Tetrachloride	ug/m3	0.16	0.84	0.63 J	0.69	4.3	0.69	0.82	0.69	0.57	1.6	8.4	13000 U	8800	630 U	1.8	1.3 U	1.3 U	
Chlorobenzene	ug/m3	60	--	0.92 U	6	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U	600	2628	9200 U	830	460 U	0.92 U	0.92 U	0.92 U	
Chloroform	ug/m3	0.11	0.58	0.2 U	2.2	2.7	1.8	0.98	0.41	0.2 U	1.1	5.8	980000	18000	73000	0.98 U	0.98 U	1.4	
Chloromethane	ug/m3	2.4	--	1.4	1.6	1.6	1.2	1.9	1.5	1 U	24	--	10000 U	100 U	520 U	2.9	1 U	1 U	
Dibromochloromethane	ug/m3	--	--	0.34 U	0.85 U	0.28 U	0.085 U	0.53 U	0.17 U	0.34 U	--	--	17000 U	170 U	850 U	1.7 U	1.7 U	1.7 U	
Ethylbenzene	ug/m3	2.2	12	1.4 J	30	0.91 J	1.2 J	6.1 J	2.6 J	0.61	22	--	8700 U	87 U	430 U	6.1 J	6.9 J	3.3 J	
Methylene Chloride	ug/m3	5.2	27	5.6 J	11 J	5.9 J	6.3 J	25	5.6 J	5.6 J	52	273	130000	520	2700	1.7 U	1.7 U	1.7 U	
Tetrachloroethene	ug/m3	0.81	4.3	0.52	2.3	0.95	0.53	0.5	0.6	0.36	8.1	43	88000	6300	1600	6.5	1.4 U	1.4 U	
Toluene	ug/m3	400	--	11 J	4.1 J	4.9 J	3.3 J	6.4 J	6 J	4.5 J	4000	17520	57000	410	720	68 J	49 J	45 J	
Trichloroethene	ug/m3	0.022	0.12	0.41	0.54 U	0.7	0.32	0.49	0.33	0.21 U	0.22	1.2	11000 U	160	540 U	1.1 U	1.1 U	1.1 U	
Vinyl Chloride	ug/m3	--	--	0.1 U	0.26 U	0.084 U	0.026 U	0.16 U	0.051 U	0.1 U	2.8	15	5100 U	89	260 U	0.51 U	0.51 U	0.51 U	

Generic Indoor Air Screening Values are taken from Table 2c of the EPA Vapor Intrusion Guidance (EPA, 2002) and are based on a target cancer risk of 1E-06 and a target hazard index of 1 for residential exposures to indoor air.

Generic Soil Gas Screening Values are taken from Table 2c of the EPA Vapor Intrusion Guidance, and are based on an attenuation factor of 0.1 and atarget cancer risk of 1E-06 and a target hazard index of 1 for migration of soil gas to residences with basements and subsequent residential exposures to indoor air.

The Commercial/Industrial indoor air and soil gas screening values were derived by adjusting the generic (residential-based) values for exposure time, exposure frequency, and exposure duration applicable to full-time occupational exposures, as follows:

For risk-based values based on cancer risk, the adjustment to an exposure of 8-hours per day, 250 days per year, for 25 years is: (24/8) x (365/250) x (30/25) = 5.25.

For risk-based values based on non-cancer risk, the adjustemtn to an exposrue of 8-hours per day, 250 days per year is: (24/8) x (365/250) = 4.38.

Shading indicates that a detected concentration exceeds the Commercial/Industrial risk-based value

-- - Not applicable: constituent not detected at a concentration greater than screening value.

EPA, 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. OSWER. November 29, 2002.

Prepared by JHP
Checked by BJR

Table 2
Pathway Completeness and Risk Analysis
Office

		Indoor Air	Soil Gas	Outdoor Air									
		IA-005	SG-188 (IA-005)	OA-001	Published Background	NYSDOH Air Guideline	Detected in Indoor Air?	Indoor Air > Outdoor Air?	Indoor Air > Published Background or NYSDOH Guideline?	Detected in Soil Gas?	Pathway Potentially Complete?	Pathway Potentially Complete & Indoor Air > Background or Guideline Value?
1,2-Dichloroethane	ug/m3	0.081 U	0.81 U	0.16 U			N			N	N	N
1,2-Dichloroethene (total)	ug/m3	0.079 U	0.79 U	0.16 U			N			N	N	N
Benzene	ug/m3	1.6	1.5	1.7	1.2 - 5.7		Y	N	N	Y	Y	N
Bromodichloromethane	ug/m3	0.13 U	1.3 U	0.27 U			N			N	N	N
Bromoform	ug/m3	0.21 U	2.1 U	0.41 U			N			N	N	N
Carbon Disulfide	ug/m3	1.6 U	5.6 J	1.6 U			N			Y	N	N
Carbon Tetrachloride	ug/m3	0.69	1.3 U	0.57	<0.25 - 0.68		Y	Y	Y	N	N	N
Chlorobenzene	ug/m3	0.92 U	0.92 U	0.92 U			N			N	N	N
Chloroform	ug/m3	0.41	1.4	0.2 U	<0.5 - 0.54		Y	Y	N	Y	Y	N
Chloromethane	ug/m3	1.5	1 U	1 U	<0.25 - 2.0		Y	Y	N	N	N	N
Dibromochloromethane	ug/m3	0.17 U	1.7 U	0.34 U			N			N	N	N
Ethylbenzene	ug/m3	2.6 J	3.3 J	0.61	0.43 - 2.8		Y	Y	N	Y	Y	N
Methylene Chloride	ug/m3	5.6 J	1.7 U	5.6 J	0.38 - 6.3	60	Y	N	N	N	N	N
Tetrachloroethene	ug/m3	0.6	1.4 U	0.36	<0.25 - 1.2	100	Y	Y	N	N	N	N
Toluene	ug/m3	6 J	45 J	4.5 J	4.2 - 25		Y	Y	N	Y	Y	N
Trichloroethene	ug/m3	0.33	1.1 U	0.21 U		5	Y	Y	N	N	N	N
Vinyl Chloride	ug/m3	0.051 U	0.51 U	0.1 U			N			N	N	N
					Excess Lifetime Cancer Risk [a]		6E-06	[b] 4E-06	[c]		2E-06	[d]
					Hazard Index [a]		0.02	[b] 0	[c]		0.02	[d]

Notes:
Shaded values in Indoor air, Soil gas, or Outdoor Air indicate that the detected concentration exceeded the commercial/industrial risk-based value presented in Table 1.
Published Background is the NYSDOH background data base for homes in NYS (1997 - 2003) (NYSDOH, 2005)
The NYSDOH Guideline value is the Air Guideline Value (NYSDOH, 2005)
NYSDOH, 2005: Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Public Comment Draft. February, 2005
[a] Risks are calculated in Attachment A and are based on full-time commercial/industrial worker exposures.
[b] Risks for constituents detected in indoor air are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
[c] Risks for constituents detected in indoor air > Outdoor air represent the incremental risk (risk for constituents detected in indoor air minus risk for constituents detected in outdoor air).
[b] Risks for constituents with a potentially complete pathway are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
Y - Yes
N - No
-- Not applicable

Prepared by: JHP
Checked by: BJR

Table 3
Pathway Completeness and Risk Analysis
Warehouse

		Indoor Air		Soil Gas		Outdoor Air								
		IA-004	IA-006	SG-192 (IA-004)	SG-193 (IA-006)	OA-001	Published Background	NYSDOH Air Guideline	Detected in Indoor Air?	Indoor Air > Outdoor Air?	Indoor Air > Published Background or NYSDOH Guideline?	Detected in Soil Gas?	Pathway Potentially Complete?	Pathway Potentially Complete & Indoor Air > Background or Guideline Value?
1,2-Dichloroethane	ug/m3	0.065	0.25 U	0.81 U	0.81 U	0.16 U			Y	Y	--	N	N	N
1,2-Dichloroethene (total)	ug/m3	0.04 U	0.25 U	0.79 U	0.79 U	0.16 U			N			N	N	N
Benzene	ug/m3	1.5	1.5	2.4	0.73	1.7	1.2 - 5.7		Y	N	N	Y	Y	N
Bromodichloromethane	ug/m3	0.067 U	0.42 U	1.3 U	1.3 U	0.27 U			N			N	N	N
Bromoform	ug/m3	0.1 U	0.64 U	2.1 U	2.1 U	0.41 U			N			N	N	N
Carbon Disulfide	ug/m3	1.6 U	1.6 U	4.4 J	3.7 J	1.6 U			N			Y	N	N
Carbon Tetrachloride	ug/m3	0.69	0.82	1.8	1.3 U	0.57	<0.25 - 0.68		Y	Y	Y	Y	Y	Y
Chlorobenzene	ug/m3	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U			N			N	N	N
Chloroform	ug/m3	1.8	0.98	0.98 U	0.98 U	0.2 U	<0.5 - 0.54		Y	Y	Y	N	N	N
Chloromethane	ug/m3	1.2	1.9	2.9	1 U	1 U	<0.25 - 2.0		Y	Y	N	Y	Y	N
Dibromochloromethane	ug/m3	0.085 U	0.53 U	1.7 U	1.7 U	0.34 U			N			N	N	N
Ethylbenzene	ug/m3	1.2 J	6.1 J	6.1 J	6.9 J	0.61	0.43 - 2.8		Y	Y	Y	Y	Y	Y
Methylene Chloride	ug/m3	6.3 J	25	1.7 U	1.7 U	5.6 J	0.38 - 6.3	60	Y	Y	N	N	N	N
Tetrachloroethene	ug/m3	0.53	0.5	6.5	1.4 U	0.36	<0.25 - 1.2	100	Y	Y	N	Y	Y	N
Toluene	ug/m3	3.3 J	6.4 J	68 J	49 J	4.5 J	4.2 - 25		Y	Y	N	Y	Y	N
Trichloroethene	ug/m3	0.32	0.49	1.1 U	1.1 U	0.21 U		5	Y	Y	N	N	N	N
Vinyl Chloride	ug/m3	0.026 U	0.16 U	0.51 U	0.51 U	0.1 U			N			N	N	N
								Excess Lifetime Cancer Risk [a]	9E-06	[b] 7E-06	[c]		2E-06	[d]
								Hazard Index [a]	0.03	[b] 0.01	[c]		0.02	[d]

Notes:
Shaded values in Indoor air, Soil gas, or Outdoor Air indicate that the detected concentration exceeded the commercial/industrial risk-based value presented in Table 1.
Published Background is the NYSDOH background data base for homes in NYS (1997 - 2003) (NYSDOH, 2005)
The NYSDOH Guideline value is the Air Guideline Value (NYSDOH, 2005)
NYSDOH, 2005: Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Public Comment Draft. February, 2005
[a] Risks are calculated in Attachment A and are based on full-time commercial/industrial worker exposures.
[b] Risks for constituents detected in indoor air are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
[c] Risks for constituents detected in indoor air > Outdoor air represent the incremental risk (risk for constituents detected in indoor air minus risk for constituents detected in outdoor air).
[b] Risks for constituents with a potentially complete pathway are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
Y - Yes
N - No
-- Not applicable

Prepared by: JHP
Checked by: BJR

Table 4
Pathway Completeness and Risk Analysis
Production Area

		Indoor Air			Soil Gas			Outdoor Air								
		IA-001	IA-002	IA-003	SG-189 (IA-001)	SG-190 (IA-002)	SG-191 (IA-003)	OA-001	Published Background	NYSDOH Air Guideline	Detected in Indoor Air?	Indoor Air > Outdoor Air?	Indoor Air > Published Background or NYSDOH Guideline?	Detected in Soil Gas?	Pathway Potentially Complete?	Pathway Potentially Complete & Indoor Air > Background or Guideline Value?
1,2-Dichloroethane	ug/m3	0.16 U	0.4 U	0.13 U	8100 U	81 U	400 U	0.16 U			N			N	N	N
1,2-Dichloroethene (total)	ug/m3	0.16 U	0.4 U	0.13 U	7900 U	79 U	400 U	0.16 U			N			N	N	N
Benzene	ug/m3	1.9	0.73	1.1	6400 U	210	320 U	1.7	1.2 - 5.7		Y	Y	N	Y	Y	N
Bromodichloromethane	ug/m3	0.27 U	0.67 U	0.22 U	13000 U	130 U	670 U	0.27 U			N			N	N	N
Bromoform	ug/m3	0.41 U	1 U	0.34 U	21000 U	210 U	1000 U	0.41 U			N			N	N	N
Carbon Disulfide	ug/m3	1.6 U	1.6 U	1.6 U	50000	160 U	1000	1.6 U			N			Y	N	N
Carbon Tetrachloride	ug/m3	0.63 J	0.69	4.3	13000 U	8800	630 U	0.57	<0.25 - 0.68		Y	Y	Y	Y	Y	Y
Chlorobenzene	ug/m3	0.92 U	6	0.92 U	9200 U	830	460 U	0.92 U			Y	Y	--	Y	Y	Y
Chloroform	ug/m3	0.2 U	2.2	2.7	980000	18000	73000	0.2 U	<0.5 - 0.54		Y	Y	Y	Y	Y	Y
Chloromethane	ug/m3	1.4	1.6	1.6	10000 U	100 U	520 U	1 U	<0.25 - 2.0		Y	Y	N	N	N	N
Dibromochloromethane	ug/m3	0.34 U	0.85 U	0.28 U	17000 U	170 U	850 U	0.34 U			N			N	N	N
Ethylbenzene	ug/m3	1.4 J	30	0.91 J	8700 U	87 U	430 U	0.61	0.43 - 2.8		Y	Y	Y	N	N	N
Methylene Chloride	ug/m3	5.6 J	11 J	5.9 J	130000	520	2700	5.6 J	0.38 - 6.3	60	Y	Y	N	Y	Y	N
Tetrachloroethene	ug/m3	0.52	2.3	0.95	88000	6300	1600	0.36	<0.25 - 1.2	100	Y	Y	N	Y	Y	N
Toluene	ug/m3	11 J	4.1 J	4.9 J	57000	410	720	4.5 J	4.2 - 25		Y	Y	N	Y	Y	N
Trichloroethene	ug/m3	0.41	0.54 U	0.7	11000 U	160	540 U	0.21 U		5	Y	Y	N	Y	Y	N
Vinyl Chloride	ug/m3	0.1 U	0.26 U	0.084 U	5100 U	89	260 U	0.1 U			N			Y	N	N
											Excess Lifetime Cancer Risk [a]	1E-05	[b] 8E-06	[c]		1E-05	[d]
											Hazard Index [a]	0.04	[b] 0.02	[c]		0.03	[d]

Notes:
Shaded values in Indoor air, Soil gas, or Outdoor Air indicate that the detected concentration exceeded the commercial/industrial risk-based value presented in Table 1.
Published Background is the NYSDOH background data base for homes in NYS (1997 - 2003) (NYSDOH, 2005)
The NYSDOH Guideline value is the Air Guideline Value (NYSDOH, 2005)
NYSDOH, 2005: Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Public Comment Draft. February, 2005
[a] Risks are calculated in Attachment A and are based on full-time commercial/industrial worker exposures.
[b] Risks for constituents detected in indoor air are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
[c] Risks for constituents detected in indoor air > Outdoor air represent the incremental risk (risk for constituents detected in indoor air minus risk for constituents detected in outdoor air).
[b] Risks for constituents with a potentially complete pathway are calculated for each constituent denoted with a "Y" and summed to yield total cancer risk and hazard index values.
Y - Yes
N - No
-- Not applicable

Prepared by: JHP
Checked by: BJR

APPENDIX A

FIELD DATA RECORDS

Site Location: ARCH Chemical, Rochester, N.Y.			Sampled By: Wolfgang Calicchio				
Project Number: 3616036009.01			Sampling Date: 4/6/05				
Sample ID	**Sampling Location**	**Start Time**	**End Time**	**Total Sample Time**		**Canister Start Pressure (in. Hg)**	**Canister End Pressure (in. Hg)**
IA-001	loc. 5 can 6802	0832	1545	7 Hrs. 13 mins.		-29.8	-4.9
SG-188	loc 5 can 6873	0834	1545	7 Hrs. 11 mins.		-29.8	-0.8
IA-002	loc 1 can 6864	0844	1600	7 Hrs. 16 mins.		-29.8	-4.3
SG-189	" 1 can 6919	0845	1615	7 Hrs. 30 mins.		-29.8	-4.1
IA-003	" 2 can 6606	0852	1700	8 Hrs. 8 mins.		-30.0	② *
SG-190	" 2 " 6730	0851	1700	8 Hrs. 9 mins.		-29.9	-3.2
IA-004	" 3 " 6913	0858	1707	8 Hrs. 5 mins.		-29.9	-4.0
SG-191	" 3 " 6892	0859	1707	8 Hrs. 4 mins.		-30.0	-3.1
IA-005	" 4 " 6443	0908	1712	8 Hrs. 4 mins.		-29.8	-2.7
SG-192	" 4 " 6206	0909	1712	8 Hrs. 3 mins.		-29.7	-0.6
IA-006	" 6 " 6758	1010	1745	7 Hrs. 35 mins.		-29.7	-1.5
SG-193	" 6 " 6741	1015	1745	7 Hrs. 30 mins.		-29.8	-3.5
OA-001	can 7066 Background	0817	1632	8 Hrs. 15 mins.		-29.7	-3.1
TB-001	can 6607 Trip blank	0810	1350	5 Hrs. 40 mins.		-29.8	-6.9
				Hrs. mins.			
				Hrs. mins.			
				Hrs. mins.			
				Hrs. mins.			
Comments:							
* regulator	725209 3 stuck	② -5	in. Hg				

SEVERN TRENT STL

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to:
Company: MACTEC	Company:
Address: 511 Congress St. Portland ME 04112	Address:
Contact: Jeff Brandow	Contact:
Phone: (207) 775-5401	Phone:
Fax: (207) 772-4762	Fax:
Contract/ Quote: 361603600 9.01	

Sampler's Name: Wolfgang Calicchio

Sampler's Signature:

Proj. No.: 361603600 9.01

Project Name: ARCH - Rochester Soil Vapor Investigation

No/Type of Containers²: 10/0

ANALYSIS REQUESTED: TO-15, 6L summa

Lab Use Only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y

Intact N / Y

Screened For Radioactivity ☐

Matrix¹	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	Lab/Sample ID (Lab Use Only)
A	4/6/05	1545	X		IA-001 (Can 6802)	1				✓
A		1545	X		SG-188 (" 6873)	1				✓
A		1600	X		IA-002 (" 6864)	1				✓
A		1615	X		SG-189 (" 6919)	1				✓
A		1700	X		IA-003 (" 6606)	1				✓
A		1700	X		SG-190 (" 6930)	1				✓
A		1707	X		IA-004 (" 6913)	1				✓
A		1707	X		SG-191 (" 6892)	1				✓
A		1712	X		IA-005 (" 6443)	1				✓
A	↓	1712	X		SG-192 (" 6206)	1				✓

Relinquished by (Signature)	Date	Time	Received by (Signature	Date	Time	Remarks
	4/6/05	1800				
Relinquished by (Signature)	Date	Time	Received by (Signature	Date	Time	
Relinquished by (Signature)	Date	Time	Received by (Signature	Date	Time	Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

¹Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil

²Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other 6L - Summa

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT STL

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:
Company: MACTEC
Address: 511 Congress St.
Portland, ME 04112
Contact: Jeff Brandow
Phone: (207) 775-5401
Fax: (207) 772-4762
Contract/ Quote: 361603609.01

Invoice to:
Company:
Address:
Contact:
Phone:
Fax:

Sampler's Name: Wolfgang Calicchio
Sampler's Signature:

Proj. No.: 361603609.01
Project Name: ARCH - Rochester Soil Vapor Investigation
No/Type of Containers: 4/O

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	TO-15 6L Summa	Lab/Sample ID (Lab Use Only)
A	4/6/05	1745	X		IA-006 (Can 6758)	1				✓	
A	"	1745	X		SG-193 (" 6741)	1				✓	
A	"	1632	X		OA-001 (" 7066)	1				✓	
A	↓	1350	X		TB-001 (" 6607)	1				✓	

ANALYSIS REQUESTED

Lab Use Only
Due Date:

Temp. of coolers when received (C°):
1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time
Wolfgang Calicchio	4/6/05	800			
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time

Remarks

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - ~~Plastic or~~ other 6L Summa

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

APPENDIX B

METEROLOGICAL DATA

www.crh.noaa.gov

Weather observations for the past two days

Greater Rochester International Airport

Enter Your "City, ST" Go

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F) Air	Dwpt	6 hour Max.	6 hour Min.	Pressure altimeter (in)	Pressure sea level (mb)	Precipitation 1 hr	Precipitation 3 hr	Precipitation 6 hr
07	09:54	S 7	10.00	Overcast	FEW110 BKN140 OVC180	59	46			29.81	1009.5			
07	08:54	S 6	10.00	Overcast	SCT140 OVC200	57	46			29.81	1009.4			
07	07:54	W 5	10.00	Overcast	SCT140 OVC200	55	46	56	45	29.83	1010.3			
07	06:54	SW 10	10.00	Overcast	OVC110	55	46			29.81	1009.6			
07	05:54	SW 9	10.00	Overcast	SCT110 OVC140	53	46			29.81	1009.6			
07	04:54	S 8	10.00	Overcast	FEW090 OVC110	51	45			29.82	1010.1			
07	03:54	SW 5	10.00	A Few Clouds	FEW140	48	41			29.84	1010.6			
07	02:54	S 3	10.00	A Few Clouds	FEW140	48	38			29.87	1011.5			
07	01:54	S 6	10.00	A Few Clouds	FEW140	45	39	55	45	29.91	1013.0			
07	00:54	S 3	10.00	A Few Clouds	FEW140	48	36			29.93	1013.8			
06	23:54	E 5	10.00	A Few Clouds	FEW150	49	37			29.97	1014.9			
06	22:54	NE 7	10.00	A Few Clouds	FEW150	51	36			30.00	1016.0			
06	21:54	NE 6	10.00	Fair	CLR	51	37			30.01	1016.4			
06	20:54	E 7	10.00	Mostly Cloudy	BKN150	53	36			30.03	1017.1			
06	19:54	E 5	10.00	Overcast	FEW100 OVC150	54	36	60	54	30.03	1017.0			
06	18:54	NE 8	10.00	Mostly Cloudy	FEW100 SCT150 BKN180	55	36			30.03	1017.0			
06	17:54	N 9	10.00	Mostly Cloudy	FEW100 BKN180	56	36			30.04	1017.5			
06	16:54	N 14	10.00	Partly Cloudy	SCT250	57	36			30.04	1017.6			
06	15:54	N 6	10.00	Mostly Cloudy	BKN250	60	38			30.05	1017.6			
06	14:54	NE 7	10.00	A Few Clouds	FEW250	57	39			30.06	1018.1			
06	13:54	N 7	10.00	Partly Cloudy	SCT250	58	38	59	41	30.08	1018.8			
06	12:54	N 6	10.00	Mostly Cloudy	BKN250	56	36			30.09	1019.2			
06	11:54	N 7	10.00	Overcast	FEW140 OVC200	53	36			30.10	1019.5			
06	10:54	N 5	10.00	Overcast	FEW100 OVC200	48	35			30.11	1019.9			
06	09:54	N 7	10.00	Overcast	FEW095 OVC200	45	35			30.11	1019.9			
06	08:54	N 7	10.00	Overcast	SCT095	43	37			30.09	1019.3			

Met. ob's during vapor intrusion sampling

					OVC200							
06	07:54	N 3	10.00	Partly Cloudy	SCT090	41	36	48	39	30.08	1018.8	
06	06:54	N 3	10.00	Overcast	OVC095	43	35			30.05	1018.0	
06	05:54	NE 3	10.00	Partly Cloudy	SCT085	41	34			30.02	1016.9	
06	04:54	N 3	10.00	A Few Clouds	FEW200	40	34			30.01	1016.4	
06	03:54	N 6	10.00	A Few Clouds	FEW200	41	34			30.00	1016.0	
06	02:54	Calm	10.00	A Few Clouds	FEW200	44	34			30.00	1016.0	
06	01:54	Calm	10.00	Partly Cloudy	FEW085 SCT200	46	31	54	46	30.02	1016.6	
06	00:54	S 3	10.00	Partly Cloudy	FEW140 SCT200	48	27			30.02	1016.9	
05	23:54	SE 3	10.00	Partly Cloudy	FEW085 SCT180	48	24			30.04	1017.4	
05	22:54	E 6	10.00	Mostly Cloudy	FEW130 BKN180	49	24			30.06	1018.1	
05	21:54	E 8	10.00	Partly Cloudy	SCT180	51	23			30.06	1018.3	
05	20:54	E 10	10.00	Mostly Cloudy	BKN180	52	23			30.05	1018.0	
05	19:54	E 9	10.00	Mostly Cloudy	FEW150 BKN200	54	27	60	54	30.04	1017.7	
05	18:54	SE 10	10.00	Mostly Cloudy	BKN200	57	28			30.03	1017.3	
05	17:54	E 13	10.00	Mostly Cloudy	BKN200	60	26			30.04	1017.6	
05	16:54	E 10	10.00	Mostly Cloudy	BKN200	60	22			30.06	1018.2	
05	15:54	SE 5	10.00	Overcast	FEW160 OVC250	59	20			30.09	1019.2	
05	14:54	SW 7	10.00	Overcast	SCT075 BKN160 OVC250	58	28			30.12	1020.3	
05	13:54	Vrbl 6	10.00	Mostly Cloudy	FEW160 BKN250	56	25	56	35	30.14	1020.9	
05	12:54	Vrbl 6	10.00	Partly Cloudy	FEW160 SCT250	53	24			30.17	1022.1	
05	11:54	W 5	10.00	Mostly Cloudy	FEW200 BKN250	51	25			30.17	1022.0	
05	10:54	S 5	10.00	Partly Cloudy	SCT250	49	28			30.17	1021.9	
05	09:54	S 7	10.00	Partly Cloudy	SCT250	44	31			30.16	1021.7	
Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air	Dwpt	Max. 6 hour	Min. 6 hour	altimeter (in)	sea level (mb)	1 hr / 3 hr / 6 hr
						Temperature (°F)				Pressure		Precipitation

APPENDIX C

LABORATORY ANALYTICAL REPORT

Project: ARCH Rochester Soil Gas **Method :** TO-15
Project #: 3616036009.01 **Laboratory and SDG:** STL 106385
Date: 5/10/05 **Reviewer:** WOLF CALLAHAN
REVISED BBL

Sample IDs: IA-001, IA-002, IA-003, IA-004, IA-005, IA-006, SG-192, SG-188, SG-188REP, SG-189, SG-190, SG-191, SG-192, SG-193, OA-001 and TB-001.

1. Case Narrative and Data Package Completeness

Not available.

2. Holding Time

All hold times met.

3. QC Blanks

Trip Blank: Methylene chloride, carbon disulfide, toluene and ethylbenzene were reported in the trip blank (TB-001) associated with all samples. Action limits were established at ten times the reported concentration for methylene chloride and five times the reported concentration for carbon disulfide, toluene and ethylbenzene. See Table 1 for action limits.

Due to the relatively elevated concentration of toluene and detections of other target analytes, the laboratory tracked the sample history of the trip blank canister and the source canister. The laboratory indicated that toluene was previously detected in samples that were collected in these canisters, however detections were below 1 ppbv. No target analytes were reported in laboratory blanks and laboratory QC were within limits, indicating that results were not due to laboratory contamination. Therefore, sample results for methylene chloride, carbon disulfide, toluene and ethylbenzene may be biased high. Validation guidelines suggest qualifying sample results below the action level as non-detect (U), however, based on professional judgement, results for methylene chloride, carbon disulfide, toluene and ethylbenzene that were less than the action levels were qualified as estimated (J).

Table 1

Analyte	Blank Conc. (ppbv)	Action Limit (ppbv)
Methylene chloride	0.72	7.2
Carbon disulfide	0.94	4.7
Toluene	17	85
Ethylbenzene	0.73	3.6

The result for methylene chloride in samples IA-001, IA-002, IA-003, IA-004, IA-005 and OA-001; carbon disulfide in samples IA-001, SG-188, SG-188REP, SG-192 and SG-193; toluene in samples IA-001, IA-002, IA-003, IA-004, IA-005, IA-006, OA-001, SG-188, SG-188REP, SG-192 and SG-193 and; ethylbenzene in samples IA-001, IA-003, IA-004, IA-005, IA-006, OA-001 SG-188, SG-188REP, SG-192 and SG-193 were less than the action limits and were qualified as estimated (J).

4. Initial Calibration Results

Not available.

5. Continuing Calibration Results

Not available.

6. Laboratory Control Sample Review

The percent recovery criteria were met. Percent recoveries ranged from 85 to 120.

7. Field Duplicate Precision

Not applicable.

8. Laboratory Duplicate precision

The laboratory performed a duplicate analysis on sample SG-188. All relative percent difference criteria were met. See attached.

9. Matrix Spike Results (if applicable)

Not applicable.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-188

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613856

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613856

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/30/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.28	
56-23-5	Carbon Tetrachloride	0.20	U
71-43-2	Benzene	0.47	
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	12	UJ
127-18-4	Tetrachloroethene	0.20	U
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	0.77	UJ
75-15-0	Carbon Disulfide	1.8	UJ
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

5/2/16 664

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-188REP

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613856DP

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613856DP

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/30/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.29	
56-23-5	Carbon Tetrachloride	0.20	U
71-43-2	Benzene	0.54	
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	14	~~U~~ J
127-18-4	Tetrachloroethene	0.20	U
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	0.88	~~U~~ J
75-15-0	Carbon Disulfide	1.9	~~U~~ J
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

STIGS BALL

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-189

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613858

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613858D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 10000.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	5000	U
75-01-4	Vinyl Chloride	2000	U
75-09-2	Methylene Chloride	38000	
67-66-3	Chloroform	200000	
56-23-5	Carbon Tetrachloride	2000	U
71-43-2	Benzene	2000	U
107-06-2	1,2-Dichloroethane	2000	U
79-01-6	Trichloroethene	2000	U
108-88-3	Toluene	15000	
127-18-4	Tetrachloroethene	13000	
108-90-7	Chlorobenzene	2000	U
100-41-4	Ethylbenzene	2000	U
75-15-0	Carbon Disulfide	16000	
124-48-1	Dibromochloromethane	2000	U
75-25-2	Bromoform	2000	U
75-27-4	Bromodichloromethane	2000	U
540-59-0	1,2-Dichloroethene (total)	2000	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-190

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613860

Sample wt/vol: 100.0 (g/mL) ML Lab File ID: 613860D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 100.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	50	U
75-01-4	Vinyl Chloride	35	
75-09-2	Methylene Chloride	150	
67-66-3	Chloroform	3700	
56-23-5	Carbon Tetrachloride	1400	
71-43-2	Benzene	67	
107-06-2	1,2-Dichloroethane	20	U
79-01-6	Trichloroethene	29	
108-88-3	Toluene	110	
127-18-4	Tetrachloroethene	930	
108-90-7	Chlorobenzene	180	
100-41-4	Ethylbenzene	20	U
75-15-0	Carbon Disulfide	50	U
124-48-1	Dibromochloromethane	20	U
75-25-2	Bromoform	20	U
75-27-4	Bromodichloromethane	20	U
540-59-0	1,2-Dichloroethene (total)	20	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-191

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613862

Sample wt/vol: 80.00 (g/mL) ML Lab File ID: 613862D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 500.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	250	U
75-01-4	Vinyl Chloride	100	U
75-09-2	Methylene Chloride	770	
67-66-3	Chloroform	15000	
56-23-5	Carbon Tetrachloride	100	U
71-43-2	Benzene	100	U
107-06-2	1,2-Dichloroethane	100	U
79-01-6	Trichloroethene	100	U
108-88-3	Toluene	190	
127-18-4	Tetrachloroethene	240	
108-90-7	Chlorobenzene	100	U
100-41-4	Ethylbenzene	100	U
75-15-0	Carbon Disulfide	320	
124-48-1	Dibromochloromethane	100	U
75-25-2	Bromoform	100	U
75-27-4	Bromodichloromethane	100	U
540-59-0	1,2-Dichloroethene (total)	100	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-192

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613864

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613864

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/30/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	1.4	
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.20	U
56-23-5	Carbon Tetrachloride	0.29	
71-43-2	Benzene	0.76	
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	18	~~J~~
127-18-4	Tetrachloroethene	0.96	
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	1.4	~~J~~
75-15-0	Carbon Disulfide	1.4	~~J~~
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

SG-193

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613866

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613866

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.20	U
56-23-5	Carbon Tetrachloride	0.20	U
71-43-2	Benzene	0.23	
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	13	~~U~~ J
127-18-4	Tetrachloroethene	0.20	U
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	1.6	~~U~~ J
75-15-0	Carbon Disulfide	1.2	~~U~~ J
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

5/10/05 BAV

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

TB-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613868

Sample wt/vol: 15.00 (g/mL) ML Lab File ID: 613868D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 33.3

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.33	U
540-59-0	1,2-Dichloroethene (total)	0.33	U
67-66-3	Chloroform	0.33	U
56-23-5	Carbon Tetrachloride	0.33	U
71-43-2	Benzene	0.33	U
107-06-2	1,2-Dichloroethane	0.33	U
79-01-6	Trichloroethene	0.33	U
75-27-4	Bromodichloromethane	0.33	U
108-88-3	Toluene	17	
127-18-4	Tetrachloroethene	0.33	U
124-48-1	Dibromochloromethane	0.33	U
100-41-4	Ethylbenzene	0.73	
75-25-2	Bromoform	0.33	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

TB-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613868

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613868

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-09-2	Methylene Chloride	0.72	
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.94	

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKC1

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: VBLKC1

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: FUB01G

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-09-2	Methylene Chloride	0.50	U
108-88-3	Toluene	0.20	U
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

VBLKD3

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: VBLKD3

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: CCDB01A

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.20	U
56-23-5	Carbon Tetrachloride	0.20	U
71-43-2	Benzene	0.20	U
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	0.20	U
127-18-4	Tetrachloroethene	0.20	U
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ABLKD7

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: ABLKD7

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: CCDB04B

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.20	U
75-09-2	Methylene Chloride	0.50	U
67-66-3	Chloroform	0.20	U
56-23-5	Carbon Tetrachloride	0.20	U
71-43-2	Benzene	0.20	U
107-06-2	1,2-Dichloroethane	0.20	U
79-01-6	Trichloroethene	0.20	U
108-88-3	Toluene	0.20	U
127-18-4	Tetrachloroethene	0.20	U
108-90-7	Chlorobenzene	0.20	U
100-41-4	Ethylbenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U
124-48-1	Dibromochloromethane	0.20	U
75-25-2	Bromoform	0.20	U
75-27-4	Bromodichloromethane	0.20	U
540-59-0	1,2-Dichloroethene (total)	0.20	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ABLKD5

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: ABLKD5

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAEB001A

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.010	U
540-59-0	1,2-Dichloroethene (total)	0.010	U
67-66-3	Chloroform	0.010	U
56-23-5	Carbon Tetrachloride	0.010	U
71-43-2	Benzene	0.010	U
107-06-2	1,2-Dichloroethane	0.010	U
79-01-6	Trichloroethene	0.010	U
75-27-4	Bromodichloromethane	0.010	U
108-88-3	Toluene	0.010	U
127-18-4	Tetrachloroethene	0.010	U
124-48-1	Dibromochloromethane	0.010	U
100-41-4	Ethylbenzene	0.010	U
75-25-2	Bromoform	0.010	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ABLKD6

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: ABLKD6

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAEB001B

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.010	U
540-59-0	1,2-Dichloroethene (total)	0.010	U
67-66-3	Chloroform	0.010	U
56-23-5	Carbon Tetrachloride	0.010	U
71-43-2	Benzene	0.010	U
107-06-2	1,2-Dichloroethane	0.010	U
79-01-6	Trichloroethene	0.010	U
75-27-4	Bromodichloromethane	0.010	U
108-88-3	Toluene	0.010	U
127-18-4	Tetrachloroethene	0.010	U
124-48-1	Dibromochloromethane	0.010	U
100-41-4	Ethylbenzene	0.010	U
75-25-2	Bromoform	0.010	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

D5LCS

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: D5LCS

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAE10AQ2

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.099	
540-59-0	1,2-Dichloroethene (total)	0.18	
67-66-3	Chloroform	0.11	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.10	
107-06-2	1,2-Dichloroethane	0.10	
79-01-6	Trichloroethene	0.092	
75-27-4	Bromodichloromethane	0.11	
108-88-3	Toluene	0.093	
127-18-4	Tetrachloroethene	0.098	
124-48-1	Dibromochloromethane	0.10	
100-41-4	Ethylbenzene	0.099	
75-25-2	Bromoform	0.34	

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

D5LCSD

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: D5LCSD

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAE10AQD

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.10	
540-59-0	1,2-Dichloroethene (total)	0.17	
67-66-3	Chloroform	0.11	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.10	
107-06-2	1,2-Dichloroethane	0.10	
79-01-6	Trichloroethene	0.090	
75-27-4	Bromodichloromethane	0.11	
108-88-3	Toluene	0.094	
127-18-4	Tetrachloroethene	0.092	
124-48-1	Dibromochloromethane	0.11	
100-41-4	Ethylbenzene	0.10	
75-25-2	Bromoform	0.34	

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

D6LCS

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: D6LCS

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAE10BQD

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.088	
540-59-0	1,2-Dichloroethene (total)	0.20	
67-66-3	Chloroform	0.10	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.11	
107-06-2	1,2-Dichloroethane	0.10	
79-01-6	Trichloroethene	0.10	
75-27-4	Bromodichloromethane	0.11	
108-88-3	Toluene	0.12	
127-18-4	Tetrachloroethene	0.11	
124-48-1	Dibromochloromethane	0.11	
100-41-4	Ethylbenzene	0.11	
75-25-2	Bromoform	0.34	

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

D6LCSD

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: D6LCSD

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: EAE10BQ2

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.086	
540-59-0	1,2-Dichloroethene (total)	0.20	
67-66-3	Chloroform	0.10	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.11	
107-06-2	1,2-Dichloroethane	0.10	
79-01-6	Trichloroethene	0.096	
75-27-4	Bromodichloromethane	0.10	
108-88-3	Toluene	0.10	
127-18-4	Tetrachloroethene	0.099	
124-48-1	Dibromochloromethane	0.10	
100-41-4	Ethylbenzene	0.098	
75-25-2	Bromoform	0.33	

FORM 3
AIR VOLATILE LAB CONTROL SAMPLE

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix Spike - Sample No.: D5LCS

COMPOUND	SPIKE ADDED (ppbv)	SAMPLE CONCENTRATION (ug/L)	LCS CONCENTRATION (ppbv)	LCS % REC #	QC. LIMITS REC.
Vinyl Chloride	0.10		0.099	99	70-130
1,2-Dichloroethene (tot	0.20		0.18	90	70-130
Chloroform	0.10		0.11	110	70-130
Carbon Tetrachloride	0.10		0.11	110	70-130
Benzene	0.10		0.10	100	70-130
1,2-Dichloroethane	0.10		0.10	100	70-130
Trichloroethene	0.10		0.092	92	70-130
Bromodichloromethane	0.10		0.11	110	70-130
Toluene	0.10		0.093	93	70-130
Tetrachloroethene	0.10		0.098	98	70-130
Dibromochloromethane	0.10		0.10	100	70-130
Ethylbenzene	0.10		0.099	99	70-130
Bromoform	0.40		0.34	85	70-130

COMPOUND	SPIKE ADDED (ppbv)	LCSD CONCENTRATION (ppbv)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Vinyl Chloride	0.10	0.10	100	1	40	70-130
1,2-Dichloroethene (tot	0.20	0.17	85	6	40	70-130
Chloroform	0.10	0.11	110	0	40	70-130
Carbon Tetrachloride	0.10	0.11	110	0	40	70-130
Benzene	0.10	0.10	100	0	40	70-130
1,2-Dichloroethane	0.10	0.10	100	0	40	70-130
Trichloroethene	0.10	0.090	90	2	40	70-130
Bromodichloromethane	0.10	0.11	110	0	40	70-130
Toluene	0.10	0.094	94	1	40	70-130
Tetrachloroethene	0.10	0.092	92	6	40	70-130
Dibromochloromethane	0.10	0.11	110	10	40	70-130
Ethylbenzene	0.10	0.10	100	1	40	70-130
Bromoform	0.40	0.34	85	0	40	70-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 13 outside limits
Spike Recovery: 0 out of 26 outside limits

COMMENTS: _____

FORM 3
AIR VOLATILE LAB CONTROL SAMPLE

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix Spike - Sample No.: D6LCS

COMPOUND	SPIKE ADDED (ppbv)	SAMPLE CONCENTRATION (ug/L)	LCS CONCENTRATION (ppbv)	LCS % REC #	QC. LIMITS REC.
Vinyl Chloride	0.10		0.088	88	70-130
1,2-Dichloroethene (tot	0.20		0.20	100	70-130
Chloroform	0.10		0.10	100	70-130
Carbon Tetrachloride	0.10		0.11	110	70-130
Benzene	0.10		0.11	110	70-130
1,2-Dichloroethane	0.10		0.10	100	70-130
Trichloroethene	0.10		0.10	100	70-130
Bromodichloromethane	0.10		0.11	110	70-130
Toluene	0.10		0.12	120	70-130
Tetrachloroethene	0.10		0.11	110	70-130
Dibromochloromethane	0.10		0.11	110	70-130
Ethylbenzene	0.10		0.11	110	70-130
Bromoform	0.40		0.34	85	70-130

COMPOUND	SPIKE ADDED (ppbv)	LCSD CONCENTRATION (ppbv)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Vinyl Chloride	0.10	0.086	86	2	40	70-130
1,2-Dichloroethene (tot	0.20	0.20	100	0	40	70-130
Chloroform	0.10	0.10	100	0	40	70-130
Carbon Tetrachloride	0.10	0.11	110	0	40	70-130
Benzene	0.10	0.11	110	0	40	70-130
1,2-Dichloroethane	0.10	0.10	100	0	40	70-130
Trichloroethene	0.10	0.096	96	4	40	70-130
Bromodichloromethane	0.10	0.10	100	10	40	70-130
Toluene	0.10	0.10	100	18	40	70-130
Tetrachloroethene	0.10	0.099	99	10	40	70-130
Dibromochloromethane	0.10	0.10	100	10	40	70-130
Ethylbenzene	0.10	0.098	98	12	40	70-130
Bromoform	0.40	0.33	82	4	40	70-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 13 outside limits
Spike Recovery: 0 out of 26 outside limits

COMMENTS: _____

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

ABLKD5

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Lab File ID: EAEB001A Lab Sample ID: ABLKD5

Date Analyzed: 04/28/05 Time Analyzed: 1510

GC Column: RTX-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

Instrument ID: E

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	D5LCS	D5LCS	EAE10AQ2	1311
02	D5LCSD	D5LCSD	EAE10AQD	1406
03	IA-002	613857	613857D	1745
04	IA-004	613861	613861	1937
05	IA-005	613863	613863D	2028
06	IA-001	613855	613855D2	2348
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS:

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

ABLKD6

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Lab File ID: EAEB001B Lab Sample ID: ABLKD6

Date Analyzed: 04/29/05 Time Analyzed: 1425

GC Column: RTX-624 ID: 0.32 (mm) Heated Purge: (Y/N) N

Instrument ID: E

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	D6LCS	D6LCS	EAE10BQD	1209
02	D6LCSD	D6LCSD	EAE10BQ2	1303
03	IA-003	613859	613859D	1516
04	IA-006	613865	613865D2	1606
05	OA-001	613867	613867D2	1656
06	TB-001	613868	613868D2	1746
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS:

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613855

Sample wt/vol: 125.0 (g/mL) ML Lab File ID: 613855D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 4.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.040	U
540-59-0	1,2-Dichloroethene (total)	0.040	U
67-66-3	Chloroform	0.040	U
56-23-5	Carbon Tetrachloride	0.10	J
71-43-2	Benzene	0.60	
107-06-2	1,2-Dichloroethane	0.040	U
79-01-6	Trichloroethene	0.077	
75-27-4	Bromodichloromethane	0.040	U
108-88-3	Toluene	2.8	J
127-18-4	Tetrachloroethene	0.076	
124-48-1	Dibromochloromethane	0.040	U
100-41-4	Ethylbenzene	0.33	J
75-25-2	Bromoform	0.040	U

5/10/05 OSA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613855

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613855

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.69	
75-09-2	Methylene Chloride	1.6	~~J~~
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-002

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613857

Sample wt/vol: 50.00 (g/mL) ML Lab File ID: 613857D

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 10.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.10	U
540-59-0	1,2-Dichloroethene (total)	0.10	U
67-66-3	Chloroform	0.46	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.23	
107-06-2	1,2-Dichloroethane	0.10	U
79-01-6	Trichloroethene	0.10	U
75-27-4	Bromodichloromethane	0.10	U
108-88-3	Toluene	1.1	UJ
127-18-4	Tetrachloroethene	0.34	
124-48-1	Dibromochloromethane	0.10	U
100-41-4	Ethylbenzene	6.9	
75-25-2	Bromoform	0.10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-002

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613857

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613857

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.76	
75-09-2	Methylene Chloride	3.3	UJ
108-90-7	Chlorobenzene	1.3	
75-15-0	Carbon Disulfide	0.50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-003

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613859

Sample wt/vol: 150.0 (g/mL) ML Lab File ID: 613859D

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 3.3

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.033	U
540-59-0	1,2-Dichloroethene (total)	0.033	U
67-66-3	Chloroform	0.56	
56-23-5	Carbon Tetrachloride	0.69	
71-43-2	Benzene	0.33	
107-06-2	1,2-Dichloroethane	0.033	U
79-01-6	Trichloroethene	0.13	
75-27-4	Bromodichloromethane	0.033	U
108-88-3	Toluene	1.3	U
127-18-4	Tetrachloroethene	0.14	
124-48-1	Dibromochloromethane	0.033	U
100-41-4	Ethylbenzene	0.21	U
75-25-2	Bromoform	0.033	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-003

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613859

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613859

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.78	
75-09-2	Methylene Chloride	1.7	U
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

STL IL 5 04/26

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-004

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613861

Sample wt/vol: 500.0 (g/mL) ML Lab File ID: 613861

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.010	U
540-59-0	1,2-Dichloroethene (total)	0.010	U
67-66-3	Chloroform	0.36	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.46	
107-06-2	1,2-Dichloroethane	0.016	
79-01-6	Trichloroethene	0.059	
75-27-4	Bromodichloromethane	0.010	U
108-88-3	Toluene	~~1.9~~	~~E~~ B
127-18-4	Tetrachloroethene	0.078	
124-48-1	Dibromochloromethane	0.010	U
100-41-4	Ethylbenzene	0.28	J
75-25-2	Bromoform	0.010	U

5/10/05

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-004

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613861

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613861

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.59	
75-09-2	Methylene Chloride	1.8	~~U~~ J
108-88-3	Toluene	0.87	~~U~~ J
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-005

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613863

Sample wt/vol: 250.0 (g/mL) ML Lab File ID: 613863D

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/28/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 2.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.020	U
540-59-0	1,2-Dichloroethene (total)	0.020	U
67-66-3	Chloroform	0.083	
56-23-5	Carbon Tetrachloride	0.11	
71-43-2	Benzene	0.49	
107-06-2	1,2-Dichloroethane	0.020	U
79-01-6	Trichloroethene	0.061	
75-27-4	Bromodichloromethane	0.020	U
108-88-3	Toluene	1.6	UJ
127-18-4	Tetrachloroethene	0.088	
124-48-1	Dibromochloromethane	0.020	U
100-41-4	Ethylbenzene	0.61	UJ
75-25-2	Bromoform	0.020	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-005

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613863

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613863

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.74	
75-09-2	Methylene Chloride	1.6	J+I
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

5/16/05

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-006

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613865

Sample wt/vol: 80.00 (g/mL) ML Lab File ID: 613865D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 6.2

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.062	U
540-59-0	1,2-Dichloroethene (total)	0.062	U
67-66-3	Chloroform	0.20	
56-23-5	Carbon Tetrachloride	0.13	
71-43-2	Benzene	0.48	
107-06-2	1,2-Dichloroethane	0.062	U
79-01-6	Trichloroethene	0.091	
75-27-4	Bromodichloromethane	0.062	U
108-88-3	Toluene	1.7	UJ
127-18-4	Tetrachloroethene	0.073	
124-48-1	Dibromochloromethane	0.062	U
100-41-4	Ethylbenzene	1.4	UJ
75-25-2	Bromoform	0.062	U

5/10/05 pdg

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

IA-006

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613865

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613865

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.92	
75-09-2	Methylene Chloride	7.3	
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

OA-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613867

Sample wt/vol: 125.0 (g/mL) ML Lab File ID: 613867D2

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/29/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 4.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
75-01-4	Vinyl Chloride	0.040	U
540-59-0	1,2-Dichloroethene (total)	0.040	U
67-66-3	Chloroform	0.040	U
56-23-5	Carbon Tetrachloride	0.090	
71-43-2	Benzene	0.52	
107-06-2	1,2-Dichloroethane	0.040	U
79-01-6	Trichloroethene	0.040	U
75-27-4	Bromodichloromethane	0.040	U
108-88-3	Toluene	1.2	J
127-18-4	Tetrachloroethene	0.053	
124-48-1	Dibromochloromethane	0.040	U
100-41-4	Ethylbenzene	0.14	J
75-25-2	Bromoform	0.040	U

5/10/05 ✓

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

MACTE3 SAMPLE NO.

OA-001

Lab Name: STL BURLINGTON Contract: 25000

Lab Code: STLVT Case No.: 25000 SAS No.: SDG No.: 106385

Matrix: (soil/water) AIR Lab Sample ID: 613867

Sample wt/vol: 200.0 (g/mL) ML Lab File ID: 613867

Level: (low/med) LOW Date Received: 04/07/05

% Moisture: not dec. _____ Date Analyzed: 04/24/05

GC Column: RTX-624 ID: 0.32 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) PPBV	Q
74-87-3	Chloromethane	0.50	U
75-09-2	Methylene Chloride	1.6	J
108-90-7	Chlorobenzene	0.20	U
75-15-0	Carbon Disulfide	0.50	U

APPENDIX D

RISK CALCULATIONS

TABLE D-1
INHALATION EXPOSURE TO INDOOR AIR
OUTDOOR AIR (BACKGROUND)

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK $(ug/m^3)^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

*For noncarcinogenic effects: AT = ED

TABLE D-1
INHALATION EXPOSURE TO INDOOR AIR
OUTDOOR AIR (BACKGROUND)

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.70E+00	1.4E-01	8.30E-06	1.2E-06
Carbon Tetrachloride	5.70E-01	4.6E-02	1.50E-05	7.0E-07
Chloroform			2.30E-05	
Methylene Chloride	5.60E+00	4.6E-01	4.70E-07	2.1E-07
Tetrachloroethene	3.60E-01	2.9E-02	5.90E-06	1.7E-07
Trichloroethene			1.10E-04	
		SUMMARY CANCER RISK		2E-06

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-1
INHALATION EXPOSURE TO INDOOR AIR
OUTDOOR AIR (BACKGROUND)

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.70E+00	3.9E-01	3.00E+01	1.3E-02
Carbon Tetrachloride	5.70E-01	1.3E-01		
Chlorobenzene			6.00E+01	
Chloroform			4.80E+01	
Chloromethane			9.00E+01	
Ethylbenzene	6.10E-01	1.4E-01	1.00E+03	1.4E-04
Methylene Chloride	5.60E+00	1.3E+00	3.00E+03	4.3E-04
Tetrachloroethene	3.60E-01	8.2E-02	4.90E+02	1.7E-04
Toluene	4.50E+00	1.0E+00	4.00E+02	2.6E-03
Trichloroethene			4.00E+01	
		SUMMARY HAZARD INDEX		2E-02

NA - not available

TABLE D-2
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK $(ug/m^3)^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

*For noncarcinogenic effects: AT = ED

TABLE D-2
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.60E+00	1.3E-01	8.30E-06	1.1E-06
Carbon Tetrachloride	6.90E-01	5.6E-02	1.50E-05	8.4E-07
Chloroform	4.10E-01	3.3E-02	2.30E-05	7.7E-07
Methylene Chloride	5.60E+00	4.6E-01	4.70E-07	2.1E-07
Tetrachloroethene	6.00E-01	4.9E-02	5.90E-06	2.9E-07
Trichloroethene	3.30E-01	2.7E-02	1.10E-04	3.0E-06
			SUMMARY CANCER RISK	6E-06

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-2
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.60E+00	3.7E-01	3.00E+01	1.2E-02
Carbon Tetrachloride	6.90E-01	1.6E-01		
Chlorobenzene			6.00E+01	
Chloroform	4.10E-01	9.4E-02	4.80E+01	2.0E-03
Chloromethane	1.50E+00	3.4E-01	9.00E+01	3.8E-03
Ethylbenzene	2.60E+00	5.9E-01	1.00E+03	5.9E-04
Methylene Chloride	5.60E+00	1.3E+00	3.00E+03	4.3E-04
Tetrachloroethene	6.00E-01	1.4E-01	4.90E+02	2.8E-04
Toluene	6.00E+00	1.4E+00	4.00E+02	3.4E-03
Trichloroethene	3.30E-01	7.5E-02	4.00E+01	1.9E-03
		SUMMARY HAZARD INDEX		2E-02

NA - not available

TABLE D-3
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK (ug/m^3)$^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

*For noncarcinogenic effects: AT = ED

TABLE D-3
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.60E+00	1.3E-01	8.30E-06	1.1E-06
Carbon Tetrachloride			1.50E-05	
Chloroform	4.10E-01	3.3E-02	2.30E-05	7.7E-07
Methylene Chloride			4.70E-07	
Tetrachloroethene			5.90E-06	
Trichloroethene			1.10E-04	
		SUMMARY CANCER RISK		2E-06

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-3
INHALATION EXPOSURE TO INDOOR AIR
OFFICE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.60E+00	3.7E-01	3.00E+01	1.2E-02
Carbon Tetrachloride				
Chlorobenzene			6.00E+01	
Chloroform	4.10E-01	9.4E-02	4.80E+01	2.0E-03
Chloromethane			9.00E+01	
Ethylbenzene	2.60E+00	5.9E-01	1.00E+03	5.9E-04
Methylene Chloride			3.00E+03	
Tetrachloroethene			4.90E+02	
Toluene	6.00E+00	1.4E+00	4.00E+02	3.4E-03
Trichloroethene			4.00E+01	
		SUMMARY HAZARD INDEX		2E-02

NA - not available

TABLE D-4
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK (ug/m^3)$^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

*For noncarcinogenic effects: AT = ED

TABLE D-4
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane	9.50E-02		2.60E-05	
Benzene	1.50E+00	1.2E-01	8.30E-06	1.0E-06
Carbon Tetrachloride	8.00E-01	6.5E-02	1.50E-05	9.8E-07
Chloroform	1.40E+00	1.1E-01	2.30E-05	2.6E-06
Methylene Chloride	1.57E+01	1.3E+00	4.70E-07	6.0E-07
Tetrachloroethene	5.15E-01	4.2E-02	5.90E-06	2.5E-07
Trichloroethene	4.05E-01	3.3E-02	1.10E-04	3.6E-06
			SUMMARY CANCER RISK	9E-06

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-4
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane	9.50E-02	2.2E-02	4.90E+00	4.4E-03
Benzene	1.50E+00	3.4E-01	3.00E+01	1.1E-02
Carbon Tetrachloride	8.00E-01	1.8E-01		
Chlorobenzene			6.00E+01	
Chloroform	1.40E+00	3.2E-01	4.80E+01	6.7E-03
Chloromethane	1.60E+00	3.7E-01	9.00E+01	4.1E-03
Ethylbenzene	3.65E+00	8.3E-01	1.00E+03	8.3E-04
Methylene Chloride	1.57E+01	3.6E+00	3.00E+03	1.2E-03
Tetrachloroethene	5.15E-01	1.2E-01	4.90E+02	2.4E-04
Toluene	4.85E+00	1.1E+00	4.00E+02	2.8E-03
Trichloroethene	4.05E-01	9.2E-02	4.00E+01	2.3E-03
		SUMMARY HAZARD INDEX		3E-02

NA - not available

TABLE D-5
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK (ug/m^3)$^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

***For noncarcinogenic effects: AT = ED**

TABLE D-5
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.50E+00	1.2E-01	8.30E-06	1.0E-06
Carbon Tetrachloride	8.00E-01	6.5E-02	1.50E-05	9.8E-07
Chloroform			2.30E-05	
Methylene Chloride			4.70E-07	
Tetrachloroethene	5.15E-01	4.2E-02	5.90E-06	2.5E-07
Trichloroethene			1.10E-04	
		SUMMARY CANCER RISK		2E-06

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-5
INHALATION EXPOSURE TO INDOOR AIR
WAREHOUSE - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.50E+00	3.4E-01	3.00E+01	1.1E-02
Carbon Tetrachloride	8.00E-01	1.8E-01		
Chlorobenzene			6.00E+01	
Chloroform			4.80E+01	
Chloromethane	1.60E+00	3.7E-01	9.00E+01	4.1E-03
Ethylbenzene	3.65E+00	8.3E-01	1.00E+03	8.3E-04
Methylene Chloride			3.00E+03	
Tetrachloroethene	5.15E-01	1.2E-01	4.90E+02	2.4E-04
Toluene	4.85E+00	1.1E+00	4.00E+02	2.8E-03
Trichloroethene			4.00E+01	
		SUMMARY HAZARD INDEX		2E-02

NA - not available

TABLE D-6
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK ($ug/m^3)^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

***For noncarcinogenic effects: AT = ED**

TABLE D-6
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.24E+00	1.0E-01	8.30E-06	8.4E-07
Carbon Tetrachloride	1.87E+00	1.5E-01	1.50E-05	2.3E-06
Chloroform	1.67E+00	1.4E-01	2.30E-05	3.1E-06
Methylene Chloride	7.50E+00	6.1E-01	4.70E-07	2.9E-07
Tetrachloroethene	1.26E+00	1.0E-01	5.90E-06	6.0E-07
Trichloroethene	4.60E-01	3.8E-02	1.10E-04	4.1E-06
			SUMMARY CANCER RISK	1E-05

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-6
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - ALL CONSTITUENTS DETECTED IN INDOOR AIR

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.24E+00	2.8E-01	3.00E+01	9.4E-03
Carbon Tetrachloride	1.87E+00	4.3E-01		
Chlorobenzene	2.31E+00	5.3E-01	6.00E+01	8.8E-03
Chloroform	1.67E+00	3.8E-01	4.80E+01	7.9E-03
Chloromethane	1.53E+00	3.5E-01	9.00E+01	3.9E-03
Ethylbenzene	1.08E+01	2.5E+00	1.00E+03	2.5E-03
Methylene Chloride	7.50E+00	1.7E+00	3.00E+03	5.7E-04
Tetrachloroethene	1.26E+00	2.9E-01	4.90E+02	5.9E-04
Toluene	6.67E+00	1.5E+00	4.00E+02	3.8E-03
Trichloroethene	4.60E-01	1.1E-01	4.00E+01	2.6E-03
		SUMMARY HAZARD INDEX		4E-02

NA - not available

TABLE D-7
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
AIR CONCENTRATION	[CA]air	Calculated	ug/m^3	Measured
CONVERSION FACTOR 1	CF1	24	hours/day	
EXPOSURE TIME DAILY	ET	8	hours/day	EPA, 2002
EXPOSURE FREQUENCY	EF	250	days/year	EPA, 2002
EXPOSURE DURATION	ED	25	years	EPA, 2002
CONVERSION FACTOR 2	CF2	365	days/year	
AVERAGING TIME CANCER	AT	70	years	EPA, 2002
AVERAGING TIME NONCANCER	AT	25	years	EPA, 2002

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. Values for indoor commercial/industrial worker.

Prepared by: JHP
Checked by: BJR

EQUATIONS

CANCER RISK = AVG. CONC. (ug/m^3) * CANCER UNIT RISK (ug/m^3)$^{-1}$
HAZARD QUOTIENT = AVG.CONC.(ug/m^3)/REF. CONC. (ug/m^3)

$$\text{AVG. EXPOSURE CONC.} = \frac{[CA]air * EF * ET * ED}{AT * CF1 * CF2}$$

***For noncarcinogenic effects: AT = ED**

TABLE D-7
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

CARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION LIFETIME (ug/m^3)	INHALATION CANCER UNIT RISK $(ug/m^3)^{-1}$	CANCER RISK
1,2-Dichloroethane			2.60E-05	
Benzene	1.24E+00	1.0E-01	8.30E-06	8.4E-07
Carbon Tetrachloride	1.87E+00	1.5E-01	1.50E-05	2.3E-06
Chloroform	1.67E+00	1.4E-01	2.30E-05	3.1E-06
Methylene Chloride	7.50E+00	6.1E-01	4.70E-07	2.9E-07
Tetrachloroethene	1.26E+00	1.0E-01	5.90E-06	6.0E-07
Trichloroethene	4.60E-01	3.8E-02	1.10E-04	4.1E-06
		SUMMARY CANCER RISK		1E-05

NC - not potentially carcinogenic or no unit risk factor available.

TABLE D-7
INHALATION EXPOSURE TO INDOOR AIR
PRODUCTION AREA - CONSTITUENTS WITH COMPLETE PATHWAYS ONLY

ARCH CHEMICAL
ROCHESTER, NY

NONCARCINOGENIC EFFECTS

COMPOUND	INDOOR AIR CONCENTRATION (ug/m^3)	AVERAGE AIR CONCENTRATION FOR TIME PERIOD (ug/m^3)	CHRONIC INHALATION RfC [1] (ug/m^3)	HAZARD QUOTIENT
1,2-Dichloroethane			4.90E+00	
Benzene	1.24E+00	2.8E-01	3.00E+01	9.4E-03
Carbon Tetrachloride	1.87E+00	4.3E-01		
Chlorobenzene	2.31E+00	5.3E-01	6.00E+01	8.8E-03
Chloroform	1.67E+00	3.8E-01	4.80E+01	7.9E-03
Chloromethane			9.00E+01	
Ethylbenzene			1.00E+03	
Methylene Chloride	7.50E+00	1.7E+00	3.00E+03	5.7E-04
Tetrachloroethene	1.26E+00	2.9E-01	4.90E+02	5.9E-04
Toluene	6.67E+00	1.5E+00	4.00E+02	3.8E-03
Trichloroethene	4.60E-01	1.1E-01	4.00E+01	2.6E-03
		SUMMARY HAZARD INDEX		3E-02

NA - not available