

GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Soil Vapor Intrusion Investigation Report



NYSDEC Site No. 152021

50 Engineers Lane
Farmingdale, New York

Prepared For:
NYSDEC Site No. 152021
Project Engineer
New York State Department of Environmental Conservation
Remedial Action, Bureau A
Albany, New York 12233-7015

Prepared By:
GEI Consultants, Inc., P. C.
110 Walt Whitman Road, Suite 204
Huntington Station, New York 11746
631.760.9300

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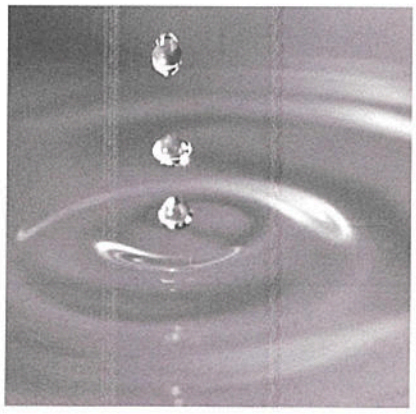


Table of Contents

Executive Summary ii

1. Introduction 1
- 1.1 Property Description 1
- 1.2 Current and Historical Site Uses 1
- 1.3 Previous Reports 2

2. Scope of Work 5
- 2.1 Soil Vapor Intrusion Investigation Procedures 5
- 2.2 Field and Sampling Protocols 6
- 2.3 Laboratory Analysis 6

3. Findings 8

4. Conclusions and Recommendations 10
- 4.1 Conclusions 10
- 4.2 Recommendations 10

Table

1. Analytical Results of Soil Vapor, Ambient Air Samples, and Outdoor Air Samples

Figures

1. Site Location Map
2. Sample Location Map

Appendices

A. Photographs
B. Inventory Sheet
C. Site Questionnaire
D. Laboratory Data Sheets and Chain-of-Custody Record

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Executive Summary

GEI Consultants, Inc., P. C. was retained by LJM Associates, to conduct a soil vapor intrusion investigation (SVI) at the properties (the Site) located at 50 Engineers Lane in Farmingdale, New York (**Figure 1**). The SVI investigation was conducted in order to evaluate the current sub-slab soil vapor concentrations in the area of prior remedial activities and determine the effectiveness of the sub-slab depressurization system that was historically in operation. The investigation was conducted on January 28, 2014 and included the collection of sub-slab, indoor and outdoor air samples (**Figure 2**).

The site consisted of two-story building comprised of a warehouse area and office area and is currently leased by a furniture distribution company which stores furniture in the former chemical warehouse. Operations at the site currently include the loading, unloading, and storage of furniture by tractor trailers and other smaller delivery trucks. However, the site was in operation as a chemical re-packer, manufacturer, and distributer of paint products between at least 1975 and 1990.

Results

No concentrations of indoor and outdoor air sampled were above established guidelines.

No criteria have been established for soil vapor quality; however, criteria comparing sub-slab soil vapor and indoor air concentrations have been established for seven volatile organic compounds. According to these criteria, additional action is warranted for one of the seven compounds tetrachloroethene.

Conclusions and Recommendations

Based on the sampling results, it does not appear that the indoor air at the property is being impacted by soil vapor intrusion.

Additional monitoring is recommended to address the detected concentrations of PCE in soil vapor. Should the detected concentrations of PCE at the subject property increase, particularly in indoor air, the re-installation of a sub-slab depressurization system may be warranted. The current sub-slab depressurization system is presently not operational.

1. Introduction

1.1 Property Description

The Cantor Bros. (Cantor) site is located at 50 Engineers Lane, in the Village of Farmingdale, County of Suffolk, New York and is identified as Block 350 and Lot 115 on the Suffolk County Tax Map. The site is approximately 3.2 acres and is bounded on the north by the Hygrade Metal Moulding Manufacturing Corp. (Hygrade) which is listed on the New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Site Registry as Site No. 1-52-147. The Hygrade site is currently undergoing an Interim Remedial Measure (IRM) cleanup under supervision of the NYSDEC. The Cantor site is bounded to the east by the Shorewood Packaging Corp. facility. The site is bounded directly to the south by Engineers Lane and continuation of the Shorewood property further south. Various commercial and small manufacturing properties are located west of the Cantor site.

The site consisted of two-story building comprised of a warehouse area and office area and is currently leased by a furniture distribution company. Operations at the site currently include the loading, unloading, and storage of furniture by tractor trailers and other smaller delivery trucks. The building incorporates approximately 51,500 square ft. The remainder of the site is comprised mainly of asphalt parking areas and a grass area extending between the south side of the building and Engineers Lane. Numerous loading docks are located on the western side of the building and a truck well/loading dock is located on the east side of the building.

1.2 Current and Historical Site Uses

The Cantor site is a former chemical repackaging and paint product manufacturing facility and is located in a heavily industrial and commercial area of western Suffolk County. The site was in operation as a chemical re-packer, manufacturer and distributer of paint products between at least 1975 and 1990. However, in 1964 apparently 15 underground storage tanks (USTs) were installed adjacent to the south side of the warehouse building (Woodward Clyde, 1984; Callender, 1990). The following provides a brief description of the processes which reportedly occurred at the site. This information has been derived from previous reports including the draft Handex Interim Remedial Investigation (1997).

- Primary operations at the Cantor facility consisted of wholesale distribution of paint "sundries," such as turpentine, varnishes and the like.

- Cantor apparently received creosote in 55 gallon drums and #4 petroleum oil in tanker loads. The creosote and #4 oil would be mixed together, inside the building, and repackaged into one gallon and five gallon pails. This material was then distributed to paint stores and lumber yards. This process was reportedly

discontinued when creosote was banned by the United States Environmental Protection Agency (USEPA).

- Cantor was believed to have manufactured calk and putty consisting of a non-hazardous soy bean oil and calcium and carbonate. This process was reportedly discontinued at an unknown date.

- Raw materials including resins, varnishes and pigments were mixed with mineral spirits and packaged for commercial distribution. These raw materials, as well as turpentine, lacquer thinner, kerosene and denatured alcohol, were stored originally in 14 underground storage tanks located in the grass area adjacent to the southern side of the warehouse. These USTs were piped through the southern outer wall of the facility to a manifold area along the wall of a small containment area inside the building. A 15th UST, located west of and adjacent to the other USTs, was reported to contain #2 fuel oil used to fire the boiler at the facility. A remote filling station was apparently located south of the USTs just off the curb on the north edge of Engineers Lane. Cantor vacated the premises in 1993.

1.3 Previous Reports

In April 1983, the Suffolk County Department of Health Services (SCDHS) obtained samples from a storm drain located on the south side of the Cantor building. Results of the analysis indicated that benzene, toluene, and xylenes were above the maximum allowable New York State Water Quality Standards for 1985 (Callender, 1990).

In September of 1983, Woodward-Clyde Consultants, Inc. (WWC) performed a NYSDEC Phase I preliminary investigation of the site. The final Phase I report was issued in September 1984. The Phase I report apparently documented various SCDHS code violations including numerous 55-gallon drums apparently leaking on the outside of the building, and no provisions for spill containment inside the facility. The SCDHS reported that a 6,000-gallon tanker truck containing creosote and oil was apparently leaking where it was located outside the building.

In the summer of 1984, the SCDHS arranged for the installation of five groundwater monitoring wells (construction details unknown) along the southern boundary line of the USTs and just north of Engineers Lane. Results of the sampling of these wells indicated the presence of tetrachloroethene (PCE) at 2,600 parts per billion (ppb), cis-Dichloroethylene at 1,900 ppb and 1,1,2-trichloroethylene at 470 ppb (Callender, 1990).

A UST tightness testing report was issued in November 1984 by Allen and Grant, P.C. This report indicated that only five of 15 USTs tested were tight. The report also indicated that the USTs failing the tightness tests should have been taken out of service (Callender, 1990).

In December 1984, a 450-gallon spill of #2 fuel oil, which reached a nearby storm drain, was reported to the SCDHS. An unknown quantity of contaminated soil was reported to have been excavated from around the storm drain and transported offsite for disposal. No other information regarding this spill is available.

In September 1988, Leroy Callender, under subcontract to Gibbs and Hill, Inc., began a Phase II Investigation on behalf of the NYSDEC (Callender, 1990). As part of the Phase II Investigation, four groundwater monitoring wells were installed, one hydraulically upgradient (MW-1) and three hydraulically downgradient (MW-2 through MW-4) of the Cantor facility. Slug tests were performed on each well at the completion of drilling, and groundwater flow at the site was depicted to flow in a southeasterly direction through relatively permeable sand and gravel (10-2 cm/sec) (Callender, 1990). Soil samples were obtained from the drill cuttings during drilling of the monitoring wells, and sediment samples were obtained from several of the storm sewer leach pools at the site. In addition, groundwater samples were obtained from the four groundwater monitoring wells. Results of the sampling activities confirmed the presence of volatile organic compounds (VOCs) within the groundwater, sediment, and soil samples analyzed. The sampling also confirmed the presence of semi volatile organic compounds (SVOCs) in the sediment and soil samples analyzed.

Handex was retained by Cantor to decommission the USTs in July 1991. Cantor had reportedly taken the USTs out of service in 1990; however, the details of this activity are unknown. All of the USTs, except tanks 13 and 14, were removed from one large excavation. Tanks 13 and 14 were removed separately. Upon removal, the tanks were inspected and were reported to be in good condition with no holes or pitting. A representative from the SCDHS was present during the tank removals. The soil surrounding tank #2 was the only area that exhibited visual signs of contamination. A soil sample was obtained beneath tank #2 by the SCDHS for select VOCs and SVOCs analysis. Results of the analysis indicated only acetone (1.72 parts per million [ppm]), total xylenes (0.30 ppm) and p-isopropyl toluene (0.63 ppm) were detected in the sample. Approximately three cubic yards of soil was removed from beneath tank #2 for disposal (Handex, 1993).

Advanced Cleanup Technologies, Inc. (ACT) was retained by Apple Bank for Savings in late 1993 to perform an Environmental Assessment (ACT, 1993) of the facility due to a possible foreclosure on the property by the bank. The purpose of the Environmental Assessment was reported to determine the scope and cost of environmental remediation at the property. The report submitted by ACT provided the following:

- Summary of the historical handling practices and regulatory involvement at the facility,
- Summary of the subsurface investigation performed by ACT at the site,
- Inventory of onsite chemicals and wastes at the time ACT performed the site assessment, and
- Listing of estimated costs for various proposed remedial strategies.

As part of the assessment, ACT obtained sediment samples from ten dry wells (storm water leach pools) and soil samples from 16 soil borings advanced at various locations throughout the Cantor property. The sediment and soil samples were analyzed for VOCs in the field with a portable gas chromatograph (GC), and only a few soil samples were submitted to an independent laboratory for analysis of total petroleum hydrocarbons (TPH) and priority pollutant metals. Since most of the samples were analyzed only by field GC methods, the results could not be confirmed.

EEA, Inc. Remedial Action

EEA operated and maintained an Soil Vapor Extraction (SVE) system for 19 months from November 1998 through May 2000, in which a Consent Decree between the Cantor Estate and NYSDEC required soil samples to be collected within the areas of the extraction wells, prior to the termination of the SVE. Contamination was discovered at the location of the former underground solvent tanks at a depth of 40-42 feet below grade surface (bgs). Additionally, impacted material was found in the vicinity of the SVE Well No. 3, at a depth of 0-4 feet bgs. Based on these findings, EEA recommended excavating the soils around the solvent UST area and modifying the existing SVE system to mitigate the impacted zone of 40-42 feet bgs.

EEA, Inc. performed a subsurface closure investigation during June 2000 and submitted a report dated September 2000. The results indicated that contamination previously identified in the areas of the existing SVE wells had been remediated. Additional contamination was discovered in areas of the facility which had not been previously investigated.

2. Scope of Work

The following scope of work was implemented to determine the subsurface soil vapor conditions. All sampling was performed in accordance with GEI's standard operating procedures (SOPs) and New York State Department of Health (NYSDOH).Guidance for Evaluating Soil Vapor Intrusion (October 2006).

The indoor and outdoor air samples were collected to evaluate ambient air quality at the Site, and to provide a basis of comparison between these media and sub-slab soil vapor quality to determine if soil vapor intrusion is occurring. Sampling locations are shown in **Figure 2**.

2.1 Soil Vapor Intrusion Investigation Procedures

Sub-Slab Soil Vapor Point Installation and Sampling

This SVI investigation included the collection of a total of three sub-slab soil vapor samples, three indoor air samples, and one outdoor air sample (**Figure 2**). Three sub-slab soil vapor samples (SV-1, SV-2, and SV-3) were collected from soil or aggregate immediately below the slab of the building. To evaluate indoor air quality, three indoor air samples, and one duplicate sample (IA-1, IA-2, IA-3, and IA-DupX) were collected. The indoor air samples were co-located with each of the three sub-slab soil vapor samples. The outdoor air sample (OA-1) was collected in the grass area along Engineers Lane.

The sub-slab soil vapor points (SV-1, SV-2, and SV-3) were installed using a hand-held drill. Once driven to depth, 3/8-inch diameter low-density polyethylene (LDPE) plastic riser tubing was inserted into the hole and a surface seal was placed around the tubing using impermeable clay. In order to measure the integrity of the surface seal, a plastic housing (an inverted 5-gallon bucket) was used to cover the sub-slab vapor points prior to sampling. Once in place, the housings were sealed to the floor using impermeable clay. The sampling tube was then brought through a hole in the top surface of the plastic housing and sealed. Helium tracer gas was introduced into the plastic housing to enrich the atmosphere. A helium meter was then used to measure the percentage of helium within the housing to confirm that the atmosphere was enriched. Finally, the meter was connected to the sampling tube. Helium was detected below the 10% limit in each of the sub-slab points, as specified in the NYSDOH Guidance document; therefore, verifying the integrity of the seals.

The samples were collected within 6-liter batch certified SUMMA canisters collected for an 8-hour time period set at a flow rate of 0.0125 liters per minute and were analyzed for VOCs using USEPA TO-15 method. In addition, the laboratory tested for the presence of helium in the sub-grade soil vapor samples.

Photos of the sampling activities are included as **Appendix A**. A chemical inventory (**Appendix B**) and property owner questionnaire (**Appendix C**) were completed to determine if any chemicals used or stored at the facility, or if any activities recently conducted at the property may impact the sampling results. Any potential areas or issues of concern, including any odors or potential sources were noted.

2.2 Field and Sampling Protocols

All efforts were made to eliminate possible sample contamination and maximize the reliability of the analytical results. These efforts included the use of dedicated sampling equipment to eliminate sample contamination; the use of standardized sampling procedures, and use of chain-of-custody procedures to track the samples from source to analysis and minimize the opportunity for cross contamination or tampering.

2.3 Laboratory Analysis

York Analytical (National Environmental Laboratory Accreditation Program [NELAP] Approved New York License #11627), a NYSDOH approved laboratory, was used for all analysis. The laboratory operates a Quality Assurance and Quality Control Plan (QA/QC) program that consists of proper laboratory practices (including the required chain-of-custody), an internal quality control program, and external quality control audits by New York State.

Laboratory QA/QC procedures include:

- Verification and/or validation of equipment according to National Institute of Standards and Technology (NIST).
- Regular calibrations and use of reference standards on instruments used for sample analysis.
- Adherence to sample acceptance policy; meaning, samples will not be analyzed if any of the following are encountered: damaged or leaking samples or samples improperly preserved (i.e., no preservative in sample if necessary and/or samples not kept at proper temperature if analysis requires it).
- Prior to analysis, samples are to be stored according to standard SOPs.

Analysis of Quality Control Samples including: laboratory control blanks, matrix spikes, method blanks and laboratory duplicate samples.

In addition, the samples were analyzed by methods that achieve minimum reporting limits of 0.25 micrograms/cubic meter (ug/m^3) that allowed a comparison with background levels and with the levels specified in the NYSDOH Guidance Matrix tables.

All laboratory data was validated by a third party under EPA Level IV guidelines. The data usability summary report (DUSR) is included in **Appendix D**. All results were usable as reported or usable with minor qualification due to sample matrix or laboratory quality control outliers.

3. Findings

Laboratory analytical results for the sub-slab soil vapor and indoor air samples are presented in **Table 1**. The chain-of-custody records, as well as the analytical laboratory data sheets, are presented in **Appendix D** to this report.

The only established regulatory criteria for soil vapor intrusion assessment are provided in the NYSDOH final document titled, "*Guidance for Evaluating Soil Vapor Intrusion in the State of New York*" (NYSDOH Guidance), dated October 2006. Guideline values have been developed for several compounds for indoor and outdoor air. Compounds relevant to this investigation for which guidelines have been derived include methylene chloride, PCE, and trichloroethylene (TCE). No concentrations of the indoor and outdoor air sampled as part of this investigation were above these guidelines.

Additionally, criteria as listed in the Volatile Chemical Matrix Tables within the DOH Guidance compare sub-slab vapor concentrations to indoor air concentrations for carbon tetrachloride, PCE, 1,1,1-trichloroethane (1,1,1-TCA), and TCE. According to the criteria set in these tables, additional action would be warranted for one of the four compounds (PCE). The table below lists the recommended actions for each compound for the subject property.

Sample Name		IA-1	SV-1	IA-2	SV-2	IA-3	SV-3
Sample Date		1/28/14	1/28/14	1/28/14	1/28/14	1/28/14	1/28/14
Analyte	**Units**						
Carbon tetrachloride	ug/m^3	0.32 U	6.7 U	0.32 U	7.7 U	0.32 U	6.4 U
Tetrachloroethene (PCE)	ug/m^3	**0.83**	**650**	**1.4**	**250**	**0.69 J**	**600**
1,1,1-Trichloroethane	ug/m^3	0.55 U	12 U	0.55 U	**15**	0.55 U	11 U
Trichloroethene (TCE)	ug/m^3	0.27 U	5.7 U	0.27 U	6.6 U	0.27 U	**22**

Notes:
No Further Action
Monitor

The detected concentrations of PCE in each of the sub-slab soil vapor samples warrant additional monitoring in accordance with the NYSDOH Guidance. Monitoring is considered an interim measure required to evaluate exposures related to sub-slab soil vapor intrusion until contaminated media are remediated. The concentrations of PCE in the adjacent indoor samples were significantly below the corresponding sub-slab soil vapor concentrations and were below the recommended action level of 3 $\mu g/m^3$.

Several other VOCs were detected at concentrations above laboratory method detection limits in sub-slab soil vapor and indoor air. Similar to the PCE concentrations discussed above, the concentrations of these compounds in indoor air were generally significantly

reduced in comparison to the sub-slab soil vapor concentration. The indoor air concentrations for the compounds with detections in sub-slab and indoor air samples were also compared to the USEPA Building Assessment and Survey Evaluation (BASE) background values for indoor air (90^{th} percentile). No exceedances of the USEPA BASE background values for indoor air (90^{th} percentile) were identified. The USEPA BASE background values for indoor air are recommended for use at commercial properties by NYSDOH. The USEPA BASE survey was a cross-sectional study of indoor air for public and commercial office buildings across the country.

As expected, other VOC's were identified in the indoor and outdoor air samples, but not in the sub-slab soil vapor samples suggesting that the sub-slab soil is not the source for these compounds. Some of these compounds were hydrocarbons, which are typically found in ambient air in urban environments. The detections were relatively low (generally below 3 $\mu g/m^3$) and within the USEPA BASE background values for indoor air (90^{th} percentile).

4. Conclusions and Recommendations

4.1 Conclusions

Tetrachlorethene (PCE) was detected in all three soil vapor samples performed. The laboratory results found PCE in the following concentrations: SV-1 (650ug/m3), SV-2 (250ug/m3), and SV-3 (600ug/m3).

Based on the sampling results, it does not appear that the indoor air at the property is being impacted by soil vapor intrusion.

No concentrations of indoor and outdoor air sampled were above established NYSDOH guidance values.

4.2 Recommendations

Regarding compounds included in the Volatile Chemical Matrix Tables within the NYSDOH Guidance, which compare sub-slab soil vapor to indoor air concentrations, additional monitoring of PCE in soil vapor at the subject property is recommended. Should the detected concentrations of PCE at the subject property increase, particularly in indoor air, the re-installation of a sub-slab depressurization system (SSDS) may be warranted.

Recommendations to address some of the other VOCs detected in indoor air include reducing exposures by keeping containers tightly capped or by storing VOC-containing products in low occupancy areas.

Table

Table 1 Soil Vapor Analysis Results
Soil Vapor Investigation
50 Engineers Lane
Farmingdale, New York

Sample ID	NYSDOH Background Standards - Indoor Air Air	NYSDOH Background Standards - Outdoor Air Air	NYSDOH Background Standards - Indoor Air - Upper Air	IA-1		SV-1		IA-2		SV-2	
Sampling Date				1/28/2014		1/28/2014		1/28/2014		1/28/2014	
Client Matrix				Indoor Ambient Air		Soil Vapor		Indoor Ambient Air		Soil Vapor	
Report Units	ug/m3	ug/m3	ug/m3	ug/m³		ug/m³		ug/m³		ug/m³	
Compound				Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m³	ug/m³	ug/m³	ug/m³		ug/m³		ug/m³		ug/m³	
1,1,1-Trichloroethane	0.25	0.25	2.5	0.55	U	12	U	0.55	U	15	D
1,1,2,2-Tetrachloroethane	0.25	0.25	0.4	0.70	U	15	U	0.84		17	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.25	0.25	2.5	0.78	U	16	U	0.78	U	19	U
1,1,2-Trichloroethane	0.25	0.25	0.4	0.55	U	12	U	0.55	U	13	U
1,1-Dichloroethane	0.25	0.25	0.4	0.41	U	8.6	U	0.41	U	9.9	U
1,1-Dichloroethylene	0.25	0.25	0.4	0.40	U	8.5	U	0.40	U	9.7	U
1,2,4-Trichlorobenzene	0.25	0.25	0.5	0.75	U	16	U	0.75	U	18	U
1,2,4-Trimethylbenzene	0.7	0.25	9.8	2.3		630	D	3.5		930	D
1,2-Dibromoethane	0.25	0.25	0.4	0.78	U	16	U	0.78	U	19	U
1,2-Dichlorobenzene	0.25	0.25	0.5	0.61	U	13	U	0.61	U	15	U
1,2-Dichloroethane	0.25	0.25	0.4	0.41	U	8.6	U	0.41	U	9.9	U
1,2-Dichloropropane	0.25	0.25	0.4	0.47	U	9.9	U	0.47	U	11	U
1,2-Dichlorotetrafluoroethane	0.25	0.25	0.4	0.71	U	15	U	0.71	U	17	U
1,3,5-Trimethylbenzene	0.25	0.25	3.9	1.1		590	D	1.4		390	D
1,3-Butadiene	~	~	~	0.44	U	9.3	U	0.44	U	11	U
1,3-Dichlorobenzene	0.25	0.25	0.5	0.61	U	13	U	0.61	U	15	U
1,4-Dichlorobenzene	0.25	0.25	1.2	0.61	U	13	U	0.61	U	15	U
1,4-Dioxane	~	~	~	0.37	U	7.7	U	0.37	U	8.8	U
2-Butanone	0.25	0.25	16	10		6.3	U	10		44	D
2-Hexanone	~	~	~	0.83	U	17	U	0.83	U	20	U
4-Methyl-2-pentanone	0.25	0.25	1.9	1.7		80	D	1.5		450	D
Acetone	9.9	3.40	115	16		37	D	14		1200	D
Benzene	1.1	0.6	13	0.84		6.8	U	0.88		7.8	U
Benzyl chloride	~	~	~	0.53	U	11	U	0.53	U	13	U
Bromodichloromethane	~	~	~	0.63	U	13	U	0.63	U	15	U
Bromoform	~	~	~	1.1	U	22	U	1.1	U	25	U
Bromomethane	0.25	0.25	0.5	0.39	U	8.3	U	0.39	U	9.5	U
Carbon disulfide	~	~	~	0.32	U	6.7	U	0.32	U	7.6	U
Carbon tetrachloride	0.25	0.25	1.3	0.32	U	6.7	U	0.32	U	7.7	U
Chlorobenzene	0.25	0.25	0.4	0.47	U	9.8	U	0.47	U	11	U
Chloroethane	0.25	0.25	0.4	0.27	U	5.6	U	0.27	U	6.4	U
Chloroform	0.25	0.25	1.2	0.50	U	21	D	0.50	U	12	U
Chloromethane	0.25	0.25	4.2	1.3		4.4	U	1.3		5.0	U
cis-1,2-Dichloroethylene	0.25	0.25	0.4	0.40	U	8.5	U	0.40	U	9.7	U
cis-1,3-Dichloropropylene	0.25	0.25	0.4	0.46	U	9.7	U	0.46	U	11	U
Cyclohexane	0.25	0.25	6.3	0.35	U	7.4	U	0.35	U	8.4	U
Dibromochloromethane	~	~	~	0.82	U	17	U	0.82	U	20	U
Dichlorodifluoromethane	0.25	0.25	10	2.6		20	D	2.6		12	U
Ethyl acetate	~	~	~	3.0		7.7	U	2.8		8.8	U
Ethyl Benzene	0.40	0.25	6.4	0.97		79	D	1.0		330	D
Hexachlorobutadiene	0.25	0.25	0.5	1.1	U	23	U	1.1	U	26	U
Isopropanol	~	~	~	14		10	U	25		1100	D

Table 1 Soil Vapor Analysis Results
Soil Vapor Investigation
50 Engineers Lane
Farmingdale, New York

Sample ID	NYSDOH Background Standards - Indoor Air Air	NYSDOH Background Standards - Outdoor Air Air	NYSDOH Background Standards - Indoor Air - Upper Air Air	IA-1		SV-1		IA-2		SV-2	
Sampling Date				1/28/2014		1/28/2014		1/28/2014		1/28/2014	
Client Matrix				Indoor Ambient Air		Soil Vapor		Indoor Ambient Air		Soil Vapor	
Report Units	ug/m3	ug/m3	ug/m3	ug/m³		ug/m³		ug/m³		ug/m³	
Compound				Result	Q	Result	Q	Result	Q	Result	Q
Methyl Methacrylate	0.25	0.25	0.4	0.42	U	8.7	U	0.42	U	10	U
Methyl tert-butyl ether (MTBE)	0.25	0.25	14	0.37	U	7.7	U	0.37	U	8.8	U
Methylene chloride	0.30	0.25	16	1.5	B	8.2	B,D	1.1	B	8.5	U
n-Heptane	1	0.25	18	0.46		8.8	U	0.50		14	D
n-Hexane	0.60	0.25	14	1.9		7.5	U	2.0		8.6	U
o-Xylene	0.40	0.25	7.1	1.2		200	D	1.5		330	D
p- & m- Xylenes	0.5	0.25	11	3.0		290	D	3.4		1000	D
p-Ethyltoluene	~	~	~	1.9		500	D	2.4		650	D
Propylene	~	~	~	0.18	U	5.9	D	0.18	U	4.2	U
Styrene	0.25	0.25	1.4	1.0		9.1	U	1.6		10	U
Tetrachloroethylene	0.25	0.25	2.5	0.83		650	D	1.4		250	D
Tetrahydrofuran	0.25	0.25	0.8	0.30	U	6.3	U	0.30	U	7.2	U
Toluene	3.5	0.60	57	1.5		19	D	1.5		200	D
trans-1,2-Dichloroethylene	~	~	~	0.40	U	8.5	U	0.40	U	9.7	U
trans-1,3-Dichloropropylene	0.25	0.25	~	0.46	U	9.7	U	0.46	U	11	U
Trichloroethylene	0.25	0.25	0.5	0.27	U	5.7	U	0.27	U	6.6	U
Trichlorofluoromethane (Freon 11)	1.1	0.25	12	1.4		12	U	1.4		14	U
Vinyl acetate	~	~	~	0.36	U	7.5	U	0.36	U	8.6	U
Vinyl Chloride	0.25	0.25	0.4	0.26	U	5.5	U	0.26	U	6.2	U
Helium	%	%	%	%		%		%		%	
Helium	~	~	~	NT		1.0	U	NT		1.2	U

Table 1 Soil Vapor Analysis Results
Soil Vapor Investigation
50 Engineers Lane
Farmingdale, New York

Sample ID	NYSDOH Background Standards - Indoor Air Air ug/m3	NYSDOH Background Standards - Outdoor Air Air ug/m3	NYSDOH Background Standards - Indoor Air - Upper Air ug/m3	IA-3		IA-X DUP		SV-3		OA-1	
Sampling Date				1/28/2014		1/28/2014		1/28/2014		1/28/2014	
Client Matrix				Indoor Ambient Air		Indoor Ambient Air		Soil Vapor		Outdoor Ambient Air	
Report Units				ug/m³		ug/m³		ug/m³		ug/m³	
Compound				Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m³	ug/m³	ug/m³	ug/m³		ug/m³		ug/m³		ug/m³	
1,1,1-Trichloroethane	0.25	0.25	2.5	0.55	U	0.55	U	11	U	0.55	U
1,1,2,2-Tetrachloroethane	0.25	0.25	0.4	0.70	U	0.70	U	14	U	0.70	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.25	0.25	2.5	0.78	U	0.78	U	16	U	0.78	U
1,1,2-Trichloroethane	0.25	0.25	0.4	0.55	U	0.55	U	11	U	0.55	U
1,1-Dichloroethane	0.25	0.25	0.4	0.41	U	0.41	U	8.3	U	0.41	U
1,1-Dichloroethylene	0.25	0.25	0.4	0.40	U	0.40	U	8.1	U	0.40	U
1,2,4-Trichlorobenzene	0.25	0.25	0.5	0.75	U	0.75	U	15	U	0.75	U
1,2,4-Trimethylbenzene	0.7	0.25	9.8	1.7		2.2		15	D	0.50	U
1,2-Dibromoethane	0.25	0.25	0.4	0.78	U	0.78	U	16	U	0.78	U
1,2-Dichlorobenzene	0.25	0.25	0.5	0.61	U	0.61	U	12	U	0.61	U
1,2-Dichloroethane	0.25	0.25	0.4	0.41	U	0.41	U	8.3	U	0.41	U
1,2-Dichloropropane	0.25	0.25	0.4	0.47	U	0.47	U	9.5	U	0.47	U
1,2-Dichlorotetrafluoroethane	0.25	0.25	0.4	0.71	U	0.71	U	14	U	0.71	U
1,3,5-Trimethylbenzene	0.25	0.25	3.9	0.85		1.0		10	U	0.50	U
1,3-Butadiene	~	~	~	0.44	U	0.44	U	8.9	U	0.44	U
1,3-Dichlorobenzene	0.25	0.25	0.5	0.61	U	0.61	U	12	U	0.61	U
1,4-Dichlorobenzene	0.25	0.25	1.2	0.61	U	0.61	U	12	U	0.61	U
1,4-Dioxane	~	~	~	0.37	U	0.37	U	7.4	U	0.37	U
2-Butanone	0.25	0.25	16	8.2		11		9.1	D	1.2	
2-Hexanone	~	~	~	0.83	U	0.83	U	17	U	0.83	U
4-Methyl-2-pentanone	0.25	0.25	1.9	1.1		1.4		8.4	U	0.42	U
Acetone	9.9	3.40	115	15		18		63	D	6.4	
Benzene	1.1	0.6	13	0.81		0.88		6.6	U	0.62	
Benzyl chloride	~	~	~	0.53	U	0.53	U	11	U	0.53	U
Bromodichloromethane	~	~	~	0.63	U	0.63	U	13	U	0.63	U
Bromoform	~	~	~	1.1	U	1.1	U	21	U	1.1	U
Bromomethane	0.25	0.25	0.5	0.39	U	0.39	U	8.0	U	0.39	U
Carbon disulfide	~	~	~	0.32	U	0.32	U	8.9	D	0.32	U
Carbon tetrachloride	0.25	0.25	1.3	0.32	U	0.32	U	6.4	U	0.32	U
Chlorobenzene	0.25	0.25	0.4	0.47	U	0.47	U	9.4	U	0.47	U
Chloroethane	0.25	0.25	0.4	0.27	U	0.27	U	5.4	U	0.27	U
Chloroform	0.25	0.25	1.2	0.50	U	0.50	U	10	U	0.50	U
Chloromethane	0.25	0.25	4.2	0.21	U	1.4		4.2	U	1.4	
cis-1,2-Dichloroethylene	0.25	0.25	0.4	0.40	U	0.40	U	8.1	U	0.40	U
cis-1,3-Dichloropropylene	0.25	0.25	0.4	0.46	U	0.46	U	9.3	U	0.46	U
Cyclohexane	0.25	0.25	6.3	0.35	U	0.35	U	13	D	0.35	U
Dibromochloromethane	~	~	~	0.82	U	0.82	U	16	U	0.82	U
Dichlorodifluoromethane	0.25	0.25	10	2.6		2.7		10	U	2.9	
Ethyl acetate	~	~	~	2.4		2.5		7.4	U	0.37	U
Ethyl Benzene	0.40	0.25	6.4	0.97		1.0		8.9	U	0.44	U
Hexachlorobutadiene	0.25	0.25	0.5	1.1	U	1.1	U	22	U	1.1	U
Isopropanol	~	~	~	5.4		12		10	U	10	

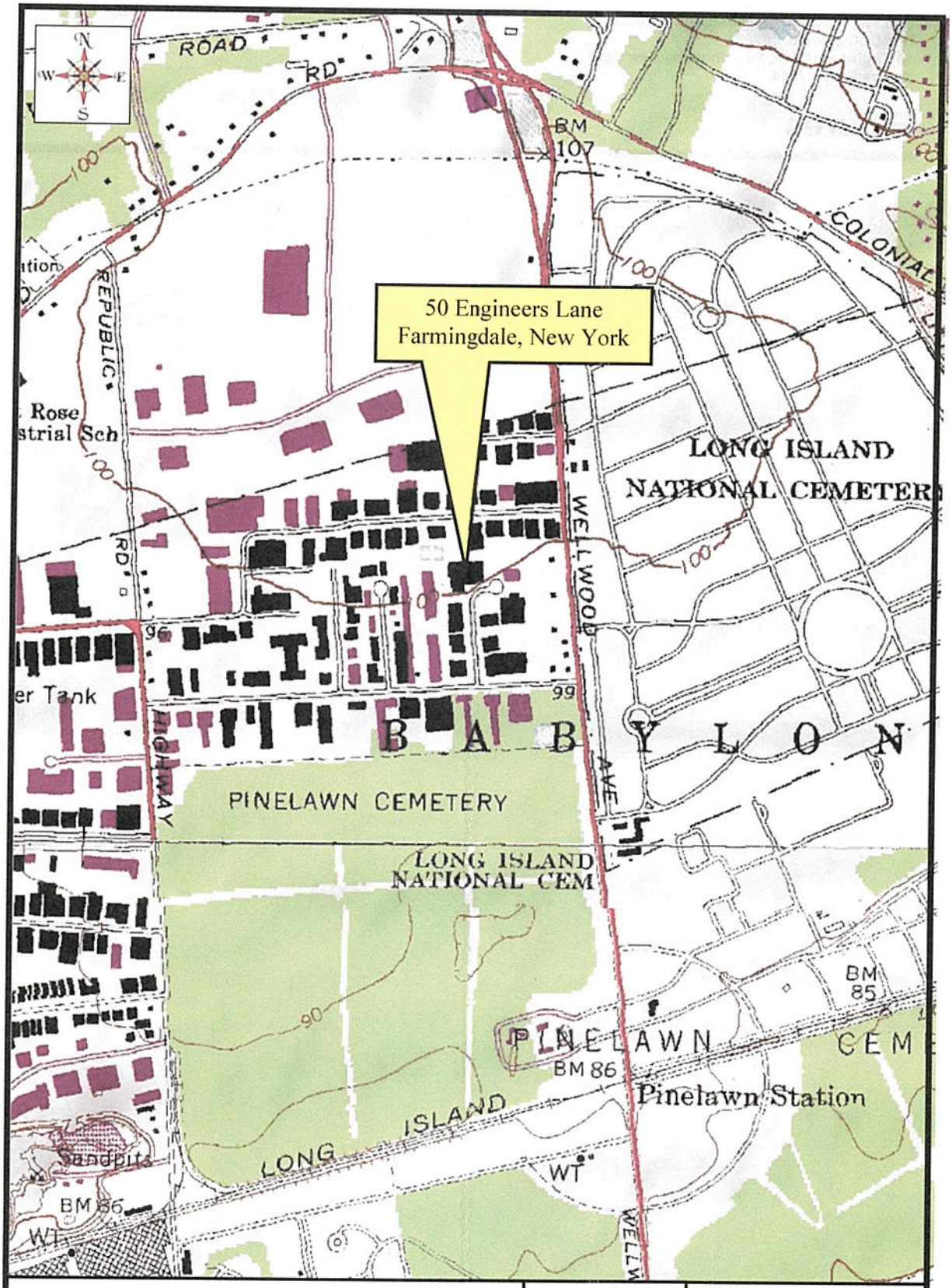
Table 1 Soil Vapor Analysis Results
Soil Vapor Investigation
50 Engineers Lane
Farmingdale, New York

Sample ID	NYSDOH Background Standards - Indoor Air Air	NYSDOH Background Standards - Outdoor Air Air	NYSDOH Background Standards - Indoor Air - Upper Air Air	IA-3		IA-X DUP		SV-3		OA-1	
Sampling Date				1/28/2014		1/28/2014		1/28/2014		1/28/2014	
Client Matrix				Indoor Ambient Air		Indoor Ambient Air		Soil Vapor		Outdoor Ambient Air	
Report Units	ug/m3	ug/m3	ug/m3	ug/m³		ug/m³		ug/m³		ug/m³	
Compound				Result	Q	Result	Q	Result	Q	Result	Q
Methyl Methacrylate	0.25	0.25	0.4	0.42	U	0.42	U	8.4	U	0.42	U
Methyl tert-butyl ether (MTBE)	0.25	0.25	14	0.37	U	0.37	U	7.4	U	0.37	U
Methylene chloride	0.30	0.25	16	10	B	1.2	B	7.1	U	2.2	B
n-Heptane	1	0.25	18	0.42	U	0.79		8.4	U	0.42	U
n-Hexane	0.60	0.25	14	5.5		2.4		21	D	0.39	
o-Xylene	0.40	0.25	7.1	1.2		1.4		8.9	U	0.44	U
p- & m- Xylenes	0.5	0.25	11	2.9		3.3		18	U	0.88	U
p-Ethyltoluene	~	~	~	1.6		1.9		10	U	0.50	U
Propylene	~	~	~	0.18	U	0.18	U	3.5	U	0.18	U
Styrene	0.25	0.25	1.4	1.0		1.2		8.7	U	0.43	U
Tetrachloroethylene	0.25	0.25	2.5	0.69		1.4		600	D	0.69	U
Tetrahydrofuran	0.25	0.25	0.8	0.30	U	1.9		6.0	U	0.30	U
Toluene	3.5	0.60	57	1.3		1.5		29	D	0.84	
trans-1,2-Dichloroethylene	~	~	~	0.40	U	0.40	U	8.1	U	0.40	U
trans-1,3-Dichloropropylene	0.25	0.25	~	0.46	U	0.46	U	9.3	U	0.46	U
Trichloroethylene	0.25	0.25	0.5	0.27	U	0.27	U	22	D	0.27	U
Trichlorofluoromethane (Freon 11)	1.1	0.25	12	1.8		1.7		12	U	1.5	
Vinyl acetate	~	~	~	0.36	U	0.36	U	7.2	U	0.36	U
Vinyl Chloride	0.25	0.25	0.4	0.26	U	0.26	U	5.2	U	0.26	U
Helium	%	%	%	%		%		%		%	
Helium	~	~	~	NT		NT		1.0	U	NT	

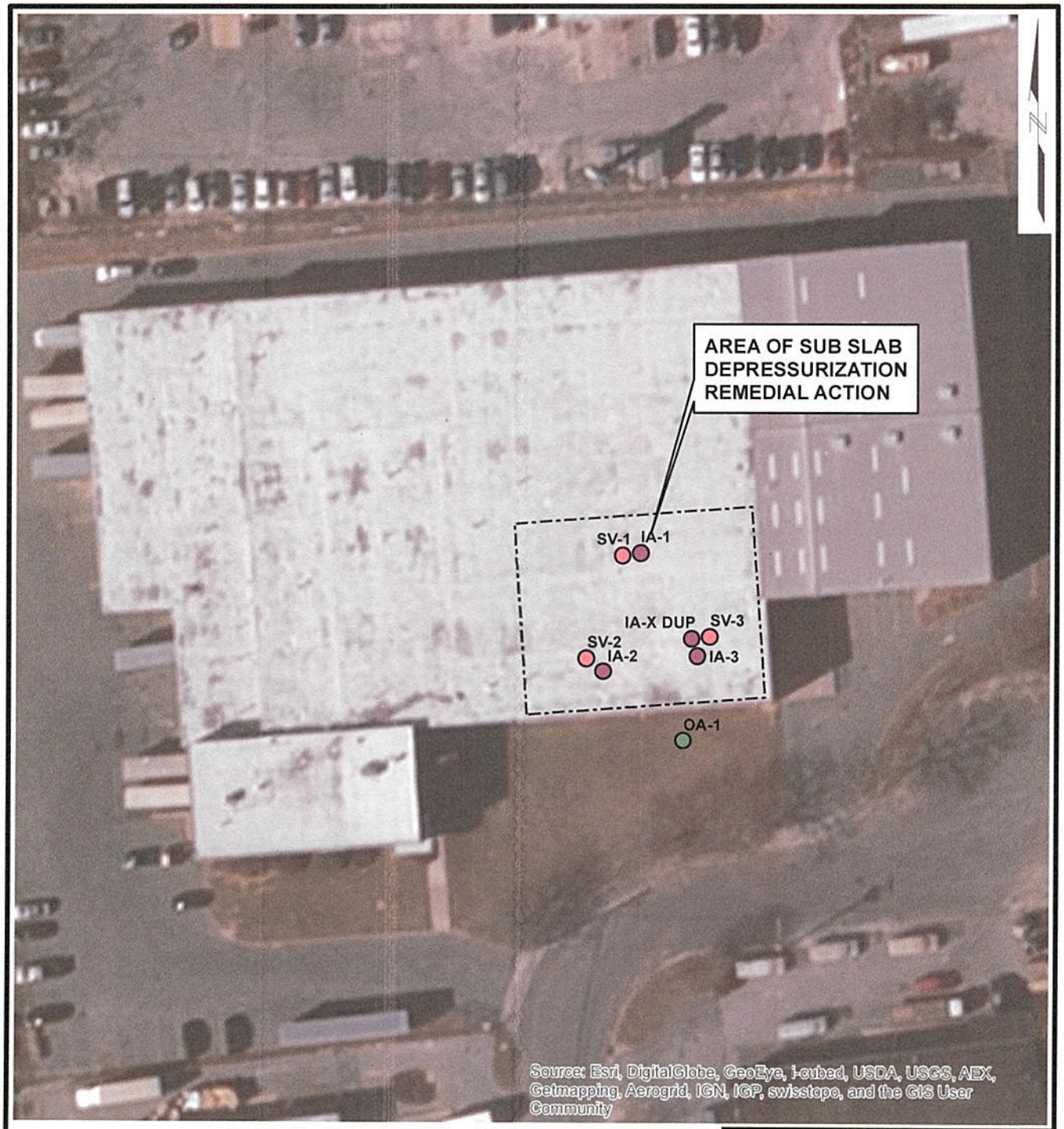
NOTES:
ug/m3 = micrograms per cubic meter
Any Regulatory Exceedences are color coded by Regulation

Q is the Qualifier Column with definitions as follows:
B=analyte found in the analysis batch blank
D=result is from an analysis that required a dilution
U=analyte not detected at or above the level indicated
NT=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte

Figures



50 ENGINEERS LANE, FARMINGDALE, NEW YORK	GEI Consultants	**SITE LOCATION MAP**
LJM ASSOCIATES EAST ROCKAWAY, NEW YORK	Project 123150	April 2014 Figure 1



LEGEND

Samples

- INDOOR AIR SAMPLE
- OUTDOOR AIR SAMPLE
- SUB-SLAB SOIL VAPOR SAMPLE

SOURCE:
1. 2011 ESRI WORLD IMAGERY

0 60 120
SCALE: 1" = 60'

50 Engineers Lane
Farmingdale, New York

LJM Associates
East Rockaway, New York

GEI Consultants

Project 123150

SOIL VAPOR AND AMBIENT AIR LOCATIONS

April 2014 Fig. 2

J:\Projects\LJM Associates\50 Engineers Ln\SV and AA Locations.mxd

Appendix A

Photographs



PHOTO 1: View of overall site operations



PHOTO 2: View of outside of building



PHOTO 3: View of SV-1 and dup samples



PHOTO 4: Vie of sealed soil vapor bucket



PHOTO 5: view of storage area and overhead fans

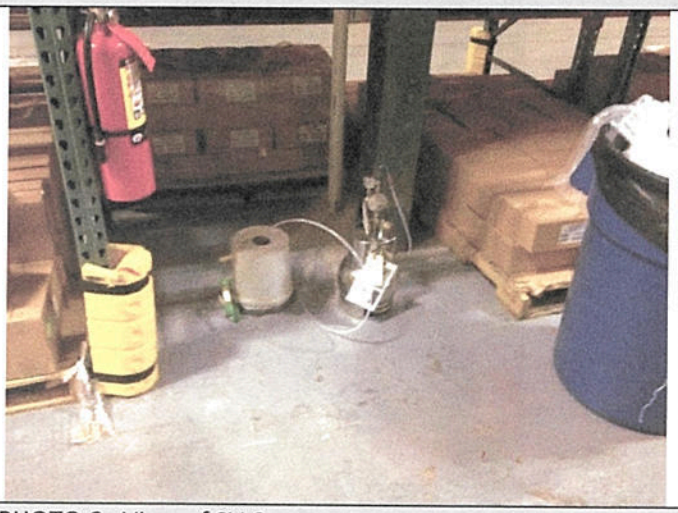


PHOTO 6: View of SV-2



PHOTO 7: Pledge Wipes



PHOTO 8: Lysol Spray

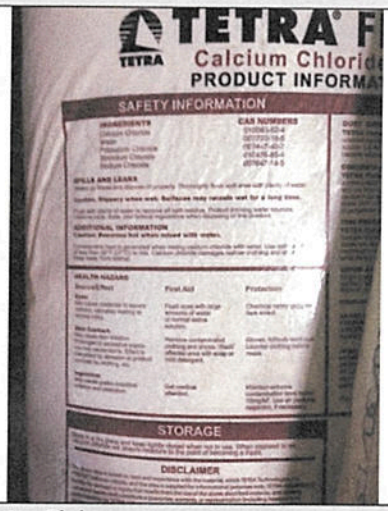


PHOTO 9: Tetra Flakes

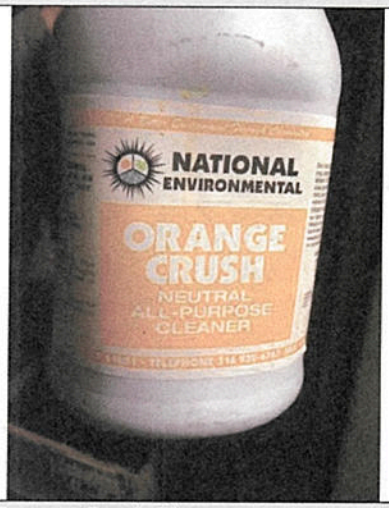


PHOTO 10: Orange Crush Cleaner

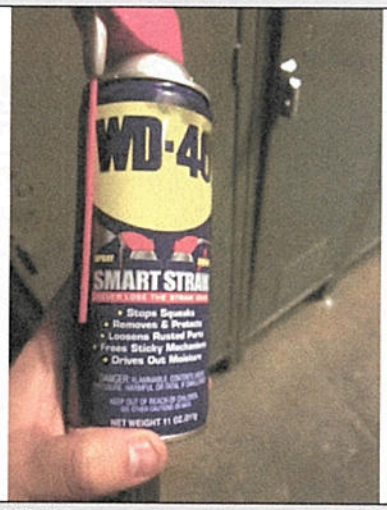


PHOTO 11: WD-40

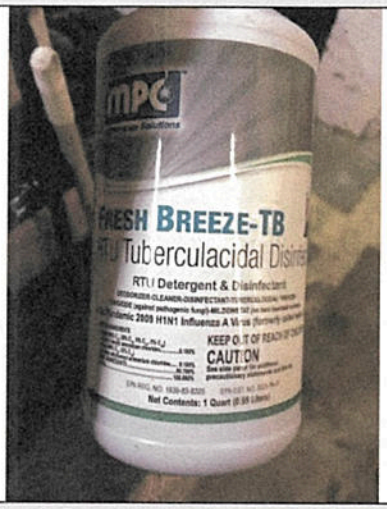


PHOTO 12: Fresh Breeze