SOIL VAPOR INTRUSION WORK PLAN
NYSDEC Site #828159A

Location:

691 Saint Paul Street
Rochester, New York

Prepared for:

Bausch & Lomb
1400 North Goodman Street
Rochester, New York 14609

LaBella Project No. 2170820

March 24, 2017

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5353 I F: (585) 226-8139
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March 30, 2017

Frank Chiappone
Bausch & Lomb
1400 North Goodman Street
Rochester, NY 14609

Dear Mr. Chiappone:

Subject: 690 St. Paul Street Off-Site, Site #C828159A
Soil Vapor Intrusion Work Plan
March 24, 2017
691 Saint Paul Street
City of Rochester, Monroe County

The New York State Departments of Environmental Conservation and Health, collectively referred to as the Departments, have completed their review of the document entitled "*Soil Vapor Intrusion Work Plan"* (the Work Plan) dated March 24, 2017 and the revised figures provided on March 27, 2017 for the 691 Saint Paul Street property located in the City of Rochester. In accordance with 6 NYCRR Part 375-1.6, the Departments have determined that the Work Plan, with modifications and clarifications, substantially addresses the requirements of the Order-on-Consent. The modifications are outlined as follows:

1. Section 1.2: The reference to the NYSDOH guidance document also includes all updates which are available online at: https://www.health.ny.gov/environmental/indoors/vapor_intrusion/update.htm.

2. Section 5: A sub-slab soil vapor sample and co-located indoor air sample will be collected at each of the six sample locations within the building.

3. Section 5: The building's HVAC systems will be operating to maintain normal indoor air temperatures (i.e. 65 – 75 degrees F) for at least 24 hours prior to and during the scheduled sampling time.

4. Section 8: Preliminary laboratory results will be provided to the Departments upon receipt.

5. Section 8: The results will also be compared to the applicable current NYSDOH air guideline values.

With the understanding that the above noted modifications are agreed to, the Work Plan is hereby approved.

The Departments understand that the sampling is scheduled to for Saturday April 1, 2017. Please notify me if there are any changes to the schedule.

Thank you for your continued cooperation in this matter and please contact me at 585-226-5357 if you have questions.

Sincerely,

Frank Sowers, P.E.
Environmental Engineer 2

ec:
Dan Noll
Bridget Boyd
Dennis Harkawick
John Frazer
Bernette Schilling
Jennifer Gillen
Wade Silkworth
Amy Butler

CERTIFICATIONS

"I _Daniel P. Noll _ *certify that I am currently a NYS registered professional engineer and that this Remedial Design Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)."*

NYS Professional Engineer #	Date	Signature
081996	3/26/17	

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Appendices

1.0 INTRODUCTION

LaBella Associates, D.P.C. ("LaBella") is pleased to submit this Soil Vapor Intrusion (SVI) Work Plan on behalf of Bausch & Lomb (B&L) as part of the investigation activities for New State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C828159A located at 691 Saint Paul Street, City of Rochester, Monroe County, New York, herein after referred to as the "Site". A Site Location Map is included as Figure 1.

B&L intends to implement a SVI investigation for the Site building, which is adjacent to the 690 Saint Paul Street NYSDEC BCP Site #C828159. This document presents the Work Plan for the completion of the SVI investigation to determine whether there is a soil vapor intrusion concern at the Site with regard to the chlorinated solvent plumes associated with the 690 Saint Paul Street NYSDEC BCP site. The Work Plan has been prepared in accordance with the NYSDEC DER-10, "Technical Guidance for Site Investigation and Remediation," dated May 3, 2010 and the New York State Department of Health (NYSDOH) Final document "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006.

1.1 Work Plan Organization

The scope of work for the SVI sampling activities in this Work Plan has been organized into the following sections:

- Section 2.0 Site Description and Environmental Summary
- Section 3.0 Objective and Scope
- Section 4.0 Summary of Local Subsurface Geologic Conditions
- Section 5.0 Soil Vapor Intrusion Sampling Work Plan
- Section 6.0 Quality Control Plan
- Section 7.0 Health and Safety Plan
- Section 8.0 Schedule and Reporting

1.2 Standards Criteria and Guidelines

This section identifies the Standards, Criteria, and Guidance (SCGs) for the Site. The SCGs identified are used in order to quantify the extent of contamination at the Site that may require remedial work. The SCGs to be utilized as part of the implementation of the Work Plan are identified below:

- Sub-Slab Soil vapor and Indoor Air SCGs: The NYSDOH Final document "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006.

2.0 SITE DESCRIPTION AND ENVIRONMENTAL SUMMARY

2.1 Site Description

The Site is located directly across the NYSDEC BCP site #C828159 known as 690 Saint Paul Street as shown on Figure 2. The 691 Saint Paul Street property is presently used as commercial office space by Monroe County Social Services Department and is improved with one building as outlined in Table 1.1A below.

TABLE 1.1A
Site Description

Acreage of Site	2.94
Approximate Building Footprint (square feet)	30,630
Foundation Type	Basement (two different levels)
Construction Date	1920
Current Use	Commercial office space

The basement of the Site building is divided into two separate levels or elevations. The eastern half of the basement is approximately 8 to 10 ft higher in elevation than the western half of the Site building.

The exterior of the Site primarily consists of an asphalt paved parking lot located south of the Site building. Neighboring properties that border the Site include:

TABLE 1.1B
Adjacent Properties

Location	Current Use
North	Richardson Gratings (Manufacturing)
South	Smith Street, High Fall Brewery
East	Saint Paul Street, NYSDEC BCP Site# C828159
West	Suntru Street, RG&E Substation #34

2.2 Environmental Summary of NYSDEC 690 Saint Paul Street BCP Site #C828159

The 690 Saint Paul Street BCP site was developed prior to 1875 and was utilized primarily for residential purposes prior to approximately the 1920s. Based on the review of historical mapping and local street directories, the BCP site was primarily utilized for industrial purposes by Bausch & Lomb, Inc., formerly known as Bausch & Lomb Optical Company ("B&L") from sometime around 1920 until it was abandoned by the company in the late 1960s. The property was developed for industrial use by B&L to manufacture lenses and other products. From the early 1970s until 2000, the BCP site was used predominantly for light commercial and storage applications. Occupants and/or owners of the Site have included various individual residences, B&L, Thomas Edison Technical and Industrial High School, Geva Theater storage, and various manufacturing and industrial tenants.

Prior uses of the BCP site that appear to have led to site contamination include underground storage tanks (USTs) that may have leaked. These tanks appear to have contained chlorinated solvents including trichloroethene (TCE) and petroleum products including gasoline and fuel oil. In 2002, a 500-gallon UST was removed from the site and contaminated soil was encountered. In 2008, a Phase II Environmental Site Assessment (ESA) was performed to evaluate subsurface soil and groundwater. The Phase II ESA identified an area of petroleum contaminated soil. The investigation was followed by the excavation of approximately 1,650 cubic yards of petroleum impacted soil and a previously undocumented UST. TCE was identified in confirmation samples in soil and ground and thus the 690 Saint Paul Street site was entered into the BCP. A Remedial Investigation (RI) conducted through the BCP identified eight (8) Areas of Concern that related to elevated concentrations of metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons, petroleum products, and/or chlorinated solvents. The areas of concern related to this Work Plan are two groundwater chlorinated solvent plumes that were identified to have migrated off the BCP site to the west and toward the Site as shown on Figure 2. It should be noted that the 690 Saint Paul Street site is currently undergoing remediation.

Sampling of the soil vapor along the Saint Paul Street right-of-way adjacent to the Site building was conducted on March 3, 2017 at the locations shown on Figure 2. The soil vapor samples were collected at locations in the proximity of two chlorinated solvent groundwater plumes from the 690 Saint Paul Street BCP site to assess the potential for chemicals of concern to indicate a soil vapor intrusion concern at the Site building.

Sample results from locations SV-1 and SV-2 (i.e. adjacent to the northeastern area of the Site building) indicate that the concentrations were below the reported laboratory method detection limit (MDL) for the analytes tested, with the exception of Chloroethane in SV-1. Chloroethane was estimated by the testing laboratory at a value below the MDL. The lack of any detected compounds above the laboratory MDL may indicate a lack of soil vapor impacts from the 690 Saint Paul Street BCP site to this northeast area of the Site. Sample results from locations SV-3 and SV-4 (i.e. adjacent to the southeastern area of the Site building) indicate that concentrations of chlorinated VOCs are present in the soil vapor. A copy of the laboratory analytical report for the soil gas samples is included in Appendix 1. Please note that the laboratory data has not been validated, but will be in the final sampling report.

3.0 OBJECTIVE AND RATIONALE

The objective of the this SVI Work Plan is to determine whether volatile organic compounds (VOCs) from the chlorinated groundwater plumes at the 690 Saint Paul Street property have migrated and affected the indoor air quality inside the Site building. The results of the SVI investigation will be used to assess potential vapor intrusion to indoor.

The indoor air sampling locations are depicted on Figures 2, 3A and 3B. These locations were selected based on the proximity of the chlorinated groundwater plumes located at the 690 Saint Paul Street BCP site to the Site. Groundwater samples collected near the western edge 690 Saint Paul Street site boundary and directly across from the Site are shown on Figure 2. In addition, sample locations were biased to areas of soil vapor samples collected recently within the Saint Paul Street right-of-way that are shown on Figure 2.

4.0 SUMMARY OF LOCAL SUBSURFACE GEOLOGIC CONDITIONS

This section relies upon information obtained from the 690 Saint Paul Street NYSDEC BCP site environmental investigations. The overburden material ranges in depth up to approximately 12 feet (ft) below the ground surface (bgs) and consists primarily of glacial till. Fill material is anticipated to overly the till and may consist of sand, gravel, cinders, and ash.

The Decew Dolomite underlies the overburden material. The Decew Dolomite is the uppermost formation of the Clinton Group and consists of variably bedded, dark-gray to olive-gray, argillaceous to sandy, fine-grained dolomite that contains shaly partings and interbeds, as well as frequent pits and vugs. The thickness of this unit is generally 8 to 12 ft.

The Rochester Shale underlies the Decew Dolomite, and is a relatively uniform dark- to medium-gray, pale- and platy-weathering, highly calcareous to dolomitic mudstone. It contains abundant thin interbeds of medium gray, pale-buff weathering, laminated calcisiltites. Its thickness in Western New York is generally 58 to 65 ft.

The overburden groundwater table at the BCP site ranged from 4 to 9 ft bgs in the southern portion of the site and 8 to 10 ft bgs in the northern portion of the site. The overburden groundwater and flows generally to the west-southwest.

The shallow bedrock water-bearing interval was identified as the uppermost bedrock down to depths of approximately 20 ft bgs. This interval is the uppermost water-bearing unit within the bedrock, and no low permeability horizon separates this zone from the overburden. Groundwater flow direction is generally to the west.

5.0 SOIL VAPOR INTRUSION SAMPLING WORK PLAN

Sampling will be completed in accordance with New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in New York State* (October 2006). A description of the sampling procedures are provided below.

5.1 Sub-Slab Soil Vapor Sampling Point Installation

The following procedures will be conducted to install the soil gas probes:

A. Sub-slab soil vapor points will be installed at a total of six (6) locations. The locations of the samples are shown on Figures 2, 3A, and 3B. Sample locations may be moved due to the presence of underground utilities or other obstructions.

B. Sub-slab soil vapor points will be semi-permanent using a Vapor Pin® to construct the sample point. A Vapor Pin® will be installed by coring an approximate 2 inch diameter hole into the floor at each sub-slab sampling location. Subsequently, a 5/8 inch diameter hole will be drilled through the slab to approximately 1 to 2 inches beneath the floor slab. A vacuum will not be used to remove drilling debris from the sampling port. A 5/8 inch diameter polyethylene tube/gasket and barbed fitting will be inserted into the corehole. The polyethylene tube/gasket will act as seal between the sub floor and interior ambient air space around the annulus of the barbed fitting. Manufacturer information regarding the installation and use Vapor Pins® are included in Appendix B. Sub-slab sampling points will be constructed in the same manner at all locations to minimize possible discrepancies. A protective cap will be installed to complete the installation.

C. Subsequent to installation of the sub-slab sample points, a minimum of one to three probe volumes (i.e., the volume of the sample probe and tube/riser pipe) will be purged in order to ensure that the samples collected are representative of soil gas conditions. The flow rate during purging will not exceed 0.2 liters per minute (L/min) to minimize outdoor air infiltration.

D. During purging of the sample point, a tracer gas evaluation will be conducted to verify the integrity of the sub-slab sampling point seal. Helium will be used as the tracer gas. An enclosure will be constructed around the sampling point (e.g., plastic bag, plastic bucket, etc.) and sealed to the sample point casing or surrounding concrete. Subsequently, the enclosure will be enriched with the tracer gas. The purged soil vapor will then be tested for the tracer gas by an appropriate meter (i.e., a meter capable of measuring the concentration of the tracer gas in at least percentage increments). In the event that the tracer gas is detected at a concentration of 10% or greater, the sample point will be resealed and/or reinstalled and retested prior to sampling.

5.2 Soil Vapor Sampling and Analysis

The following procedures will be conducted to collect samples:

A. Sub-slab vapor, indoor air, and outdoor ambient air samples will be collected utilizing individually certified-clean 1-liter Summa® canisters (or equivalent) equipped with laboratory calibrated flow controllers. The samples will be collected over an approximate eight (8) hour time period. The indoor and outdoor air samples will be collected at a height of approximately 3 to 5 feet above the floor or ground surface to simulate the breathing zone. The outdoor air sample will be collected at an upwind location of the Site building. Immediately after opening each Summa® canister, the initial vacuum (inches of mercury) and time will be noted and recorded on the laboratory chain-of-custody. After approximately eight (8) hours, final vacuum readings (inches of mercury) will be noted and the Summa® canisters will be closed. All samples will be collected over the same general time period and in the same manner at all locations to minimize possible discrepancies.

B. Subsequent to completing soil gas sampling, the samples will be sent under chain of custody control to a NYSDOH Environmental Laboratory Approval Program certified laboratory for testing. The samples will be tested for a specific list of VOCs using United States Environmental Protection Agency Method TO-15. This list is warranted based on the known contaminants of concern emanating from the 690 Saint Paul Street BCP site and the extensive amount of testing documenting the contaminants of concern. Targeted VOCs and their associated laboratory detection limits include:

Targeted VOCs	Laboratory Detection Limit (µg/m^3)
TCE	0.25
cis-1,2-dichloroethene	1.0
trans-1,2-dichloroethene	1.0
vinyl chloride	0.25
1,1-Dichloroethene	1.0
chloroethane	1.0

µg/m^3 denotes micrograms per cubic meter

The detection limits for the compounds above will be the goal for the minimum detection limit by the laboratory for the samples.

5.3 Sampling Notes and Building Survey

The SVI testing will include completing the sampling forms included in Appendix C for each sampling location and a building survey. It should be noted that the building survey may be limited to the basement and accessible tenant spaces only. The forms include the following information which will be recorded during the sampling work and will be utilized with interpreting laboratory results:

Sampling Notes:

- sample identification
- date and time of sample collection
- sampling depth
- identity of sampler(s)
- sampling methods and devices
- purge volumes
- volume of soil vapor extracted
- the vacuum before and after samples are collected
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
- chain of custody protocols used to track samples from sampling point to analysis
- a sketch of the Site and sampling locations relative to area streets, neighboring properties and structures (with estimated distance to the Site), outdoor ambient air sample location(s), if applicable, and orientation (north arrow).
- weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) will be noted during the duration of sampling.
- any pertinent observations will be recorded (e.g., odors).

Building Survey Information

- current storage and uses of volatile chemicals will be identified in the immediate area of sample location, (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance).
- the use of heating or air conditioning systems during sampling will be noted.
- floor plan sketches will be drawn that may include (if accessible) the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation(north), footings that create separate foundation sections, and any other pertinent information will be completed.
- outdoor plot sketches will be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas.

6.0 QUALITY CONTROL PLAN

Activities completed at the Site will be managed under LaBella's Quality Control Program, which is included in Appendix D. Soil gas sampling will include the collection of a sample duplicate and a matrix spike/matrix spike duplicate (MS/MSD) as part of the quality assurance/quality control plan. In addition, a NYSDEC Analytical Services Protocol (ASP) Category B–like data deliverable will be generated by the laboratory and a data usability summary report (DUSR) will be developed. The DUSRs will include the laboratory data summary pages showing corrections made by the data validator and each page will be initialed by the data validator. The laboratory data summary pages will be included even if no changes were made.

7.0 HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan (HASP) has been prepared for the field work described in this Work Plan. This HASP is included in Appendix E. All LaBella personnel will be required to follow the procedures in the HASP. Subcontractors, will have access to a copy of the HASP, however, they are responsible to provide their own safety procedures and monitoring for their own personnel.

8.0 SCHEDULE AND REPORTING

8.1 Schedule

An estimated schedule is provided in Table 8.1 below, and is based on the date the SVI Plan is approved by the NYSDEC.

TABLE 8.1
Anticipated Schedule

Task	Duration
Collect SVI Samples	2 weeks
Analysis of SVI Samples	1 week
ASP Data Package	4 weeks
Data Usability Summary Report	2 weeks
Soil Vapor Intrusion Sampling Report	2 weeks
Estimated Duration:	**11 weeks**

8.2 Reporting

A final report will be prepared presenting the results of the investigation. The report will include field documentation and observations, and summary tables for the analytical data obtained from the samples during the investigation. Supporting documentation will include sampling logs, building survey, laboratory reports and chains of custody, the DUSR, and figure showing sampling locations. In addition, an electronic data deliverable will be provided subsequent to the validation of the data.

The results of the SVI Investigations will be compared to the applicable NYSDOH Guidance decision matrices. For compounds without decision matrices, alternative literature will be used for comparisons. Additional information that will be considered during the data evaluation will include: concentration gradients between sub-slab vapor and indoor air; condition of the concrete slab; the building survey information, and the upwind ambient air background sample.

Based on the investigation findings, recommendations will be made, as appropriate for any additional further assessment of potential SVI issues, if any.

I:\Bausch & Lomb\2170820 - 691 St Paul St SVIA BCP Site\Reports\SVIA Work Plan\RPT.2017-03-24.691 St Paul SVIA Work Plan.docx

FIGURES

LABELLA Associates, D.P.C.

SITE LOCATION MAP

SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM SITE #C828159A

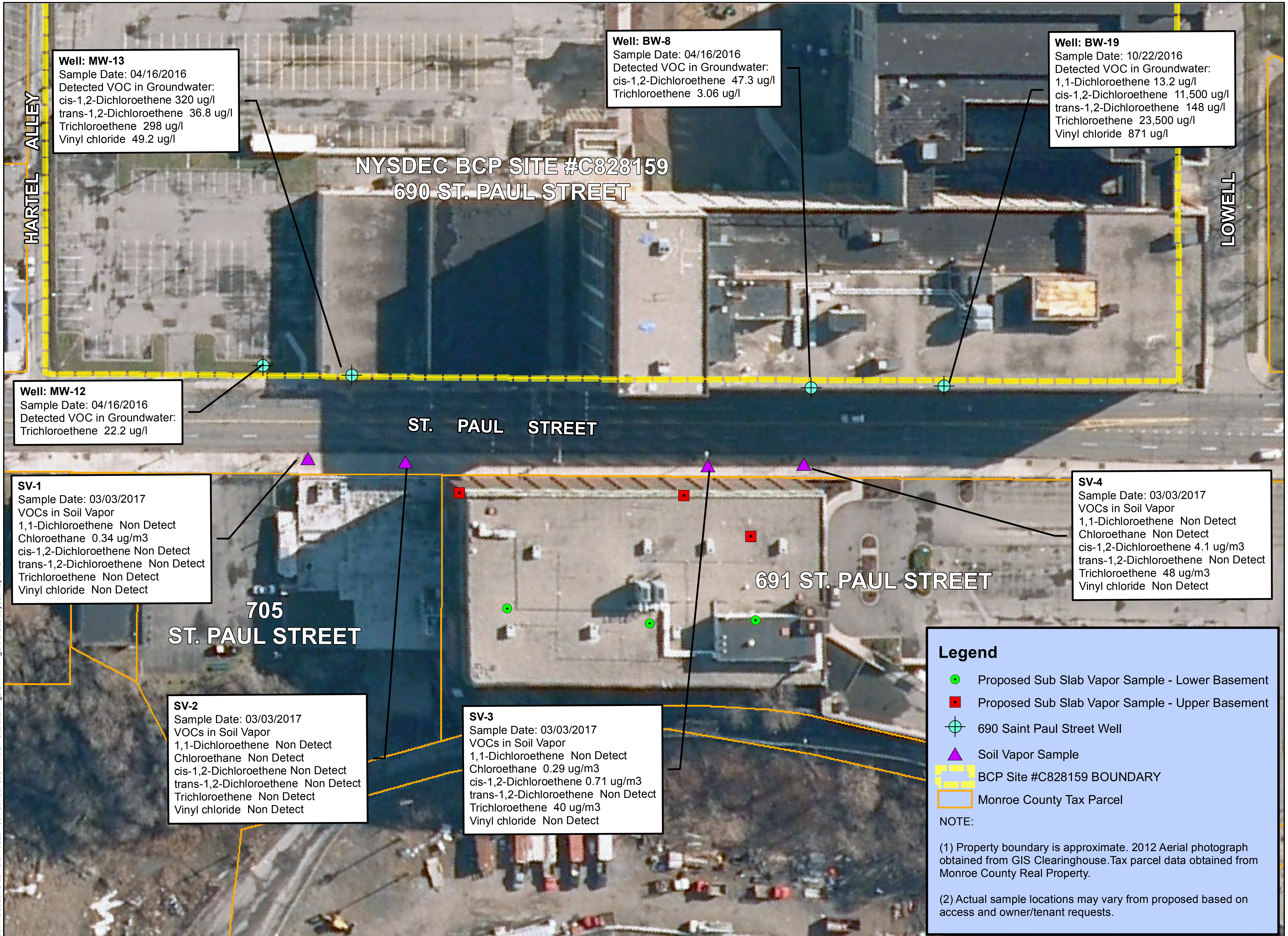
691 SAINT PAUL ST
ROCHESTER, NEW YORK

CLIENT:
BAUSCH & LOMB

2170820

FIGURE 1

I:\Barzotti Woodworking, Inc\213211 - 1445 Jefferson Rd, Phase II, ESA\Drawings\Figure2.mxd



Path: I:\Bausch & Lomb\2170820 - 691 St Paul St SVIA BCP Site\Drawings\SVI WP\Figure 2 Site Layout Map.mxd

LABELLA Associates, D.P.C.

TITLE
PROPOSED SUB-SLAB SAMPLE LOCATIONS

PROJECT
SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM #C828159A

691 SAINT PAUL ST
ROCHESTER, NEW YORK

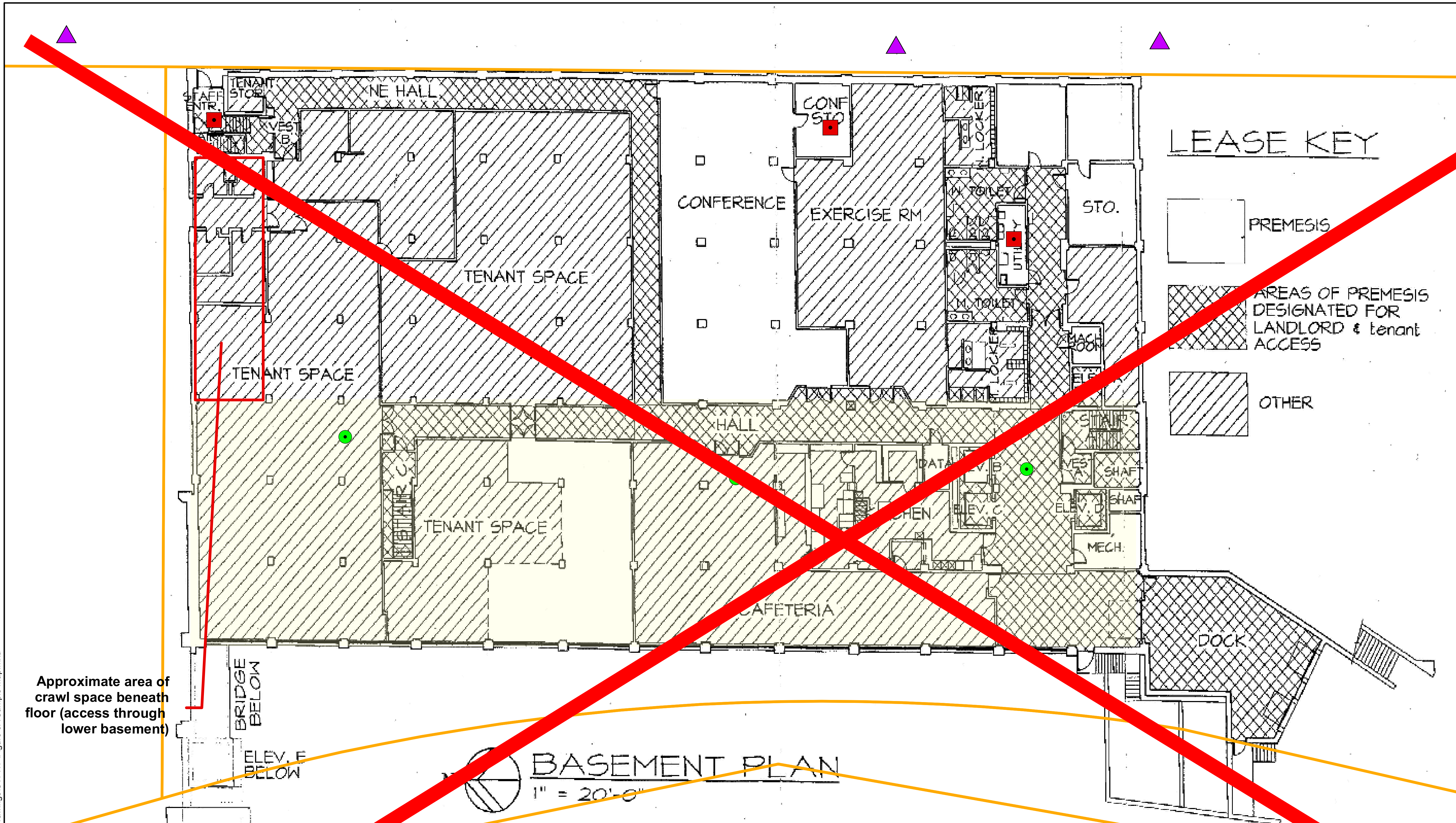
CLIENT
BAUSCH AND LOMB

N E S W

0 15 30 60 Feet
1 inch = 60 feet

2170820

FIGURE 2



Legend

- Proposed Sub Slab Vapor Sample - Lower Basement
- Proposed Sub Slab Vapor Sample - Upper Basement
- Soil Vapor Sample
- Monroe County Tax Parcel
- Approximate Area of Lower Basement

NOTE:

(1) Property boundary is approximate. Tax parcel data obtained from Monroe County Real Property.

(2) Building plan referenced from Bero Architecture dated 07/01/03.

(3) Actual basement plan may differ.

(4) Actual sample locations may vary from proposed based on access and owner/tenant requests.

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TITLE
PROPOSED SUB-SLAB SAMPLE LOCATIONS AT UPPER BASEMENT

PROJECT
SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM #C828159A

691 SAINT PAUL ST
ROCHESTER, NEW YORK

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FIGURE 3A

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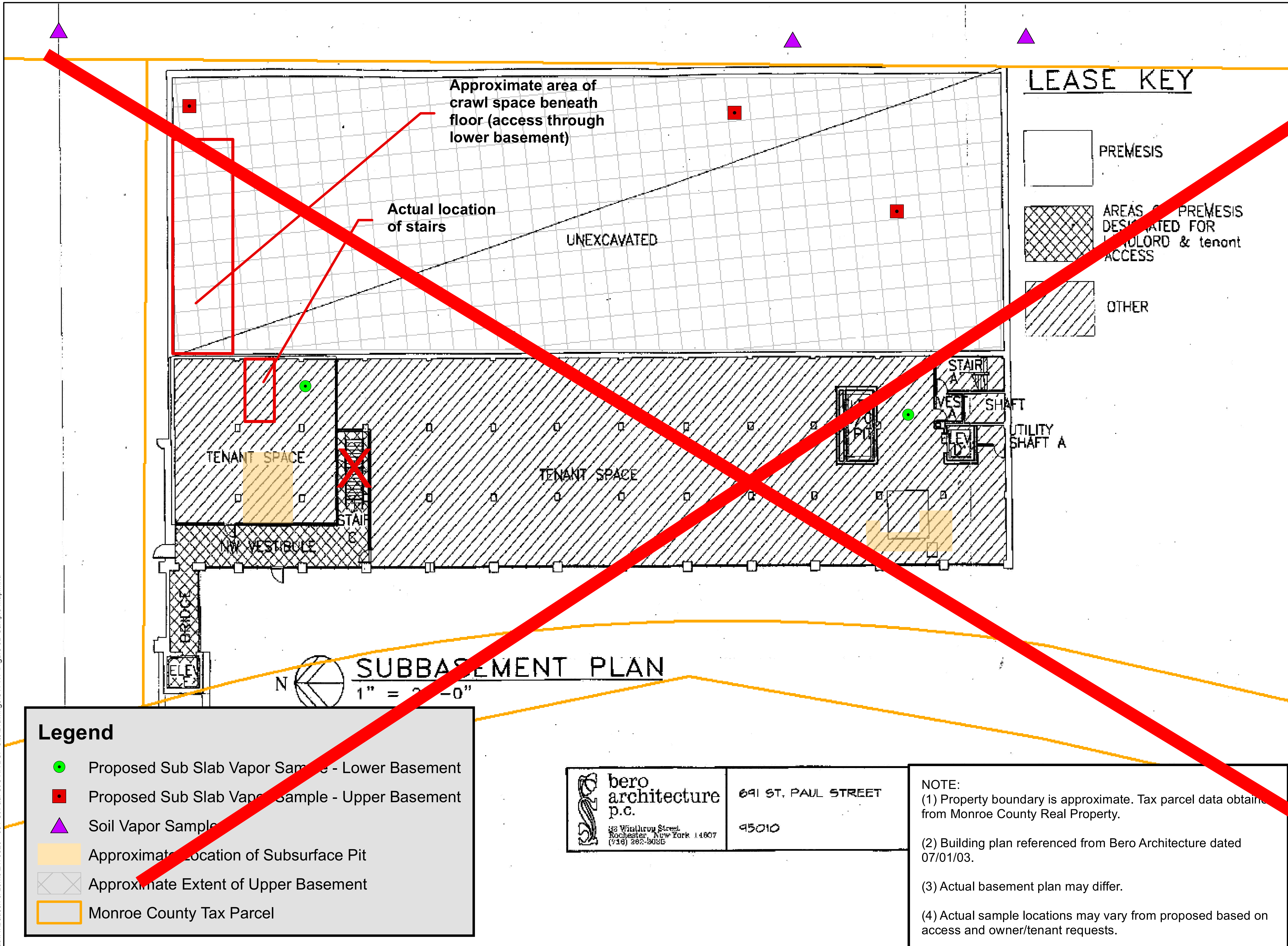

LABELLA Associates, D.P.C.

TITLE
PROPOSED SUB-SLAB SAMPLE LOCATIONS AT LOWER BASEMENT

PROJECT
SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM #C828159A

691 SAINT PAUL ST
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FIGURE 3B

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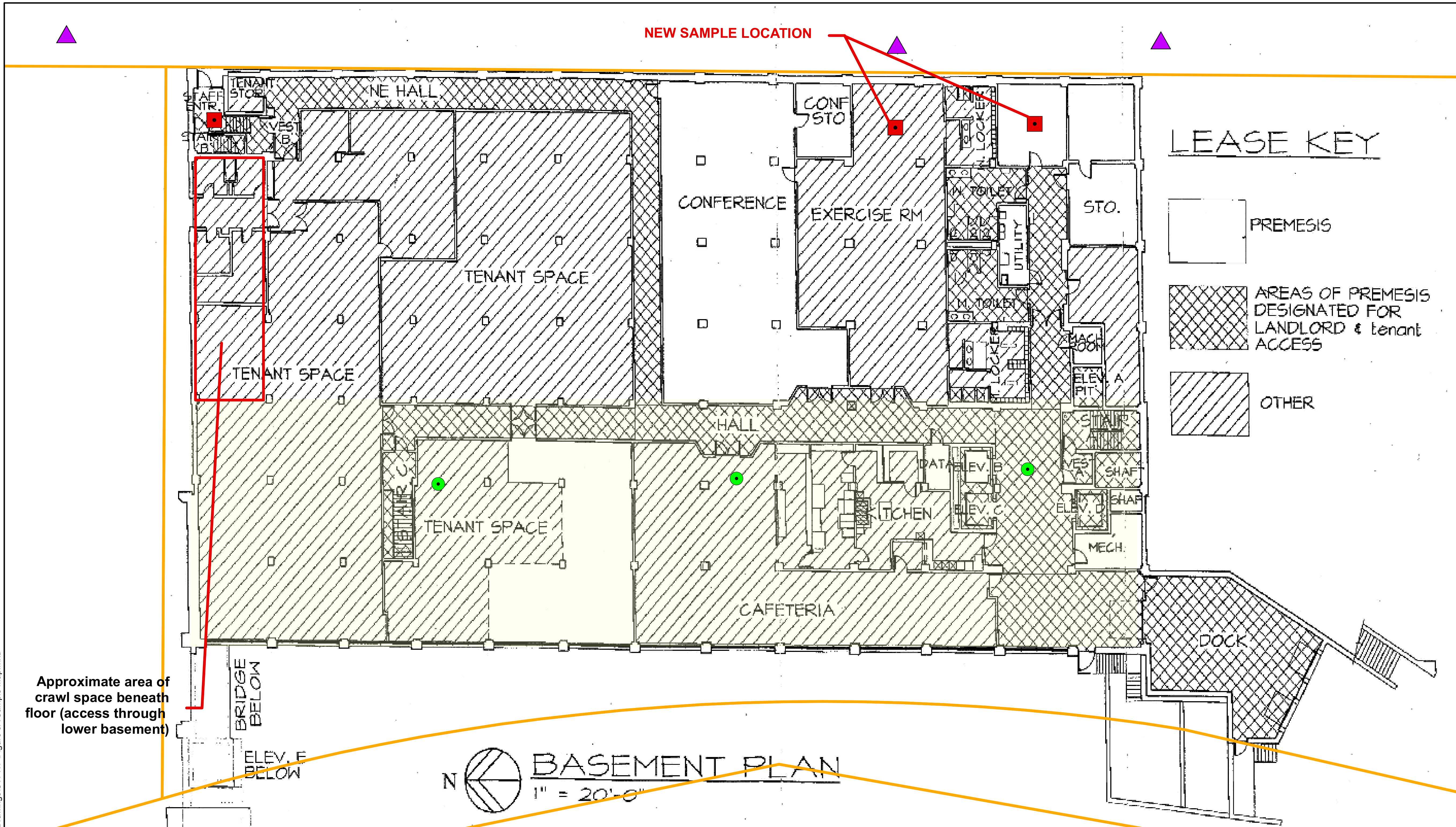

Legend

- Proposed Sub Slab Vapor Sample - Lower Basement
- Proposed Sub Slab Vapor Sample - Upper Basement
- Soil Vapor Sample
- Monroe County Tax Parcel
- Approximate Area of Lower Basement

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TITLE
PROPOSED SUB-SLAB SAMPLE LOCATIONS AT UPPER BASEMENT

PROJECT
SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM #C828159A

691 SAINT PAUL ST
ROCHESTER, NEW YORK

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0 12.5 25 Feet
1 inch = 25 feet

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FIGURE 3A

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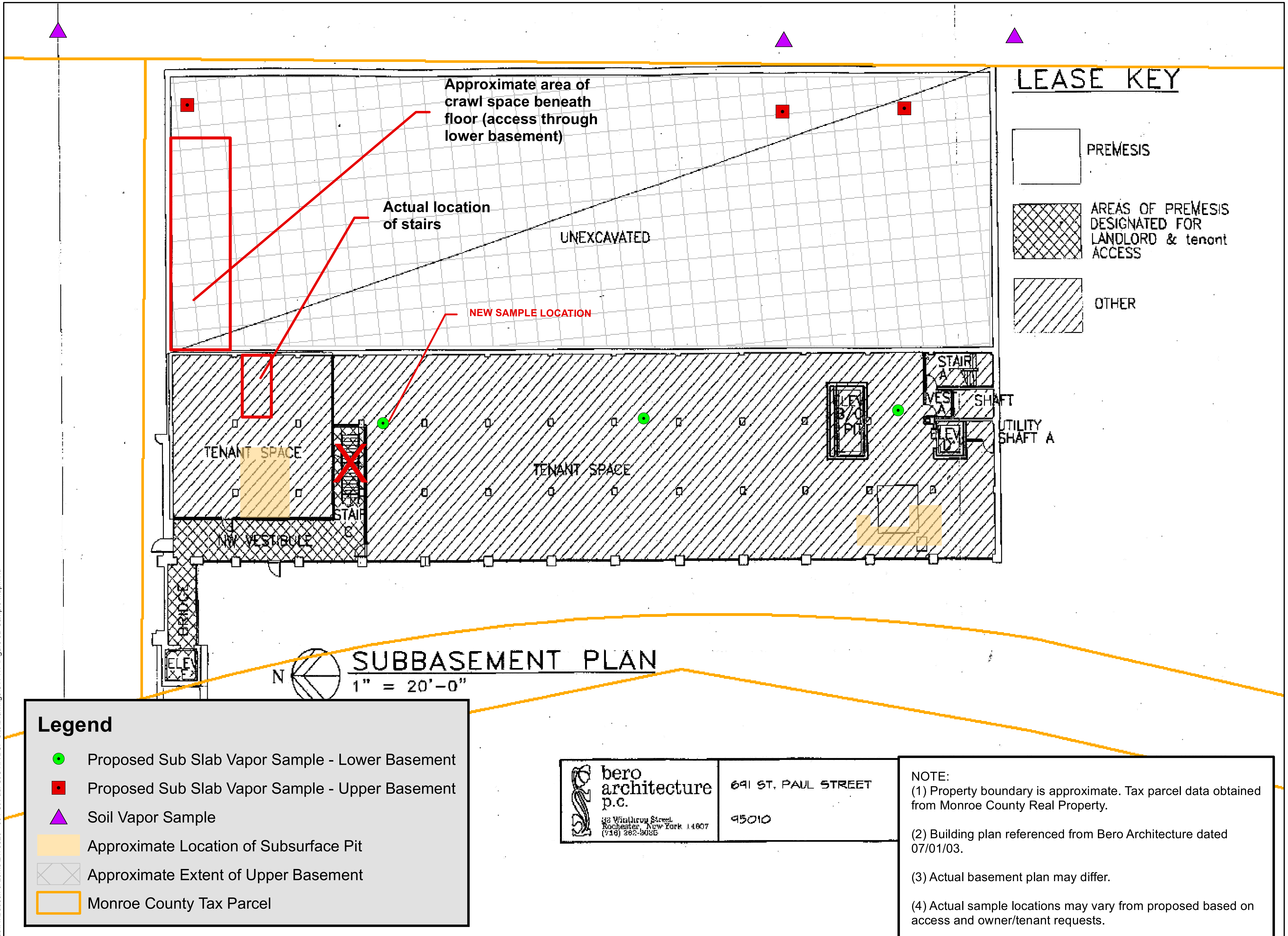

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TITLE
PROPOSED SUB-SLAB SAMPLE LOCATIONS AT LOWER BASEMENT

PROJECT
SOIL VAPOR INTRUSION WORK PLAN

BROWNFIELD CLEANUP PROGRAM #C828159A

691 SAINT PAUL ST
ROCHESTER, NEW YORK

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N E S W

0 12.5 25 Feet
1 inch = 25 feet

2170820

FIGURE 3B

Path: I:\Bausch & Lomb\2170820 - 691 St Paul St SVIA BCP Site\Drawings\SVI WP\Figure 3B Sample Map.mxd

LABELLA Associates, D.P.C. Engineering Architecture Environmental Planning

APPENDIX A

SOIL VAPOR SAMPLES LABORATORY ANALYTICAL REPORT

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	SV-1
Lab Order:	C1703015	**Tag Number:**	542.256
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-001A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 BY METHOD TO15		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 1:28:00 PM
Chloroethane	0.34	0.40	J	ug/m3	1	3/8/2017 1:28:00 PM
cis-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 1:28:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 1:28:00 PM
Trichloroethene	< 0.81	0.81		ug/m3	1	3/8/2017 1:28:00 PM
Vinyl chloride	< 0.38	0.38		ug/m3	1	3/8/2017 1:28:00 PM

NOTES:

Surrogate did not meet criteria due to severe matrix interference.

Qualifiers:

**	Quantitation Limit	.	Results reported are not blank corrected
B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	SV-2
Lab Order:	C1703015	**Tag Number:**	237.402
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-002A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 BY METHOD TO15		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 2:09:00 PM
Chloroethane	< 0.40	0.40		ug/m3	1	3/8/2017 2:09:00 PM
cis-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 2:09:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 2:09:00 PM
Trichloroethene	< 0.81	0.81		ug/m3	1	3/8/2017 2:09:00 PM
Vinyl chloride	< 0.38	0.38		ug/m3	1	3/8/2017 2:09:00 PM

NOTES:

Surrogate did not meet criteria due to severe matrix interference.

Qualifiers:

**	Quantitation Limit	.	Results reported are not blank corrected
B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	SV-3
Lab Order:	C1703015	**Tag Number:**	1206.249
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-003A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 BY METHOD TO15		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 2:48:00 PM
Chloroethane	0.29	0.40	J	ug/m3	1	3/8/2017 2:48:00 PM
cis-1,2-Dichloroethene	0.71	0.59		ug/m3	1	3/8/2017 2:48:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 2:48:00 PM
Trichloroethene	40	8.1		ug/m3	10	3/8/2017 11:34:00 PM
Vinyl chloride	< 0.38	0.38		ug/m3	1	3/8/2017 2:48:00 PM

NOTES:

Surrogate did not meet criteria due to severe matrix interference.

Qualifiers:			
**	Quantitation Limit	.	Results reported are not blank corrected
B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	SV-4
Lab Order:	C1703015	**Tag Number:**	290.299
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-004A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 BY METHOD TO15		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 4:59:00 PM
Chloroethane	< 0.40	0.40		ug/m3	1	3/8/2017 4:59:00 PM
cis-1,2-Dichloroethene	4.1	0.59		ug/m3	1	3/8/2017 4:59:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 4:59:00 PM
Trichloroethene	48	8.1		ug/m3	10	3/9/2017 12:47:00 AM
Vinyl chloride	< 0.38	0.38		ug/m3	1	3/8/2017 4:59:00 PM

NOTES:
Surrogate did not meet criteria due to severe matrix interference.

Qualifiers:

**	Quantitation Limit	.	Results reported are not blank corrected
B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	Duplicate
Lab Order:	C1703015	**Tag Number:**	1184.299
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-005A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 BY METHOD TO15		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 5:39:00 PM
Chloroethane	< 0.40	0.40		ug/m3	1	3/8/2017 5:39:00 PM
cis-1,2-Dichloroethene	3.9	0.59		ug/m3	1	3/8/2017 5:39:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 5:39:00 PM
Trichloroethene	47	8.1		ug/m3	10	3/9/2017 2:01:00 AM
Vinyl chloride	< 0.38	0.38		ug/m3	1	3/8/2017 5:39:00 PM

NOTES:

Surrogate did not meet criteria due to severe matrix interference.

Qualifiers:

**	Quantitation Limit	.	Results reported are not blank corrected
B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
S	Spike Recovery outside accepted recovery limits		

Centek Laboratories, LLC

Date: *10-Mar-17*

CLIENT:	LaBella Associates, P.C.	**Client Sample ID:**	Ambient Air
Lab Order:	C1703015	**Tag Number:**	556.267
Project:	691 and 705 St Paul St	**Collection Date:**	3/3/2017
Lab ID:	C1703015-006A	**Matrix:**	AIR

Analyses	Result	**Limit	Qual	Units	DF	Date Analyzed
1UG/M3 W/ 0.25UG/M3 CT-TCE-VC		**TO-15**				Analyst: **RJP**
1,1-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 12:48:00 PM
Chloroethane	< 0.40	0.40		ug/m3	1	3/8/2017 12:48:00 PM
cis-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 12:48:00 PM
trans-1,2-Dichloroethene	< 0.59	0.59		ug/m3	1	3/8/2017 12:48:00 PM
Trichloroethene	< 0.21	0.21		ug/m3	1	3/8/2017 12:48:00 PM
Vinyl chloride	< 0.10	0.10		ug/m3	1	3/8/2017 12:48:00 PM

Qualifiers:				
	**	Quantitation Limit	.	Results reported are not blank corrected
	B	Analyte detected in the associated Method Blank	E	Estimated Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit
	JN	Non-routine analyte. Quantitation estimated.	ND	Not Detected at the Limit of Detection
	S	Spike Recovery outside accepted recovery limits		

LABELLA Associates, D.P.C. | Engineering Architecture Environmental Planning

APPENDIX B

VAPOR PIN® INFORMATION

Standard Operating Procedure Installation and Extraction of the Vapor Pin®

Updated September 9, 2016

Scope:

This standard operating procedure describes the installation and extraction of the VAPOR PIN® for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the VAPOR PIN® for the collection of sub-slab soil-gas samples or pressure readings.

Equipment Needed:

- Assembled VAPOR PIN® [VAPOR PIN® and silicone sleeve(Figure 1)]; Because of sharp edges, gloves are recommended for sleeve installation;
- Hammer drill;
- 5/8-inch (16mm) diameter hammer bit (hole **must** be 5/8-inch (16mm) diameter to ensure seal. It is recommended that you use the drill guide). (Hilti™ TE-YX 5/8" x 22" (400 mm) #00206514 or equivalent);
- 1½-inch (38mm) diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch (19mm) diameter bottle brush;
- Wet/Dry vacuum with HEPA filter (optional);
- VAPOR PIN® installation/extraction tool;
- Dead blow hammer;
- VAPOR PIN® flush mount cover, if desired;
- VAPOR PIN® drilling guide, if desired;
- VAPOR PIN® protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel for repairing the hole following the extraction of the VAPOR PIN®.

Figure 1. Assembled VAPOR PIN®

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. Use of a VAPOR PIN® drilling guide is recommended.

4) Drill a 5/8-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. Hole **must** be 5/8-inch (16mm) in diameter to ensure seal. It is recommended that you use the drill guide.

5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of VAPOR PIN® assembly into the drilled hole. Place the small hole located in the handle of the installation/extraction tool over the vapor pin to protect the barb fitting, and tap the vapor pin into place using a dead blow hammer (Figure 2). Make sure the installation/extraction tool is aligned parallel to the vapor pin to avoid damaging the barb fitting.

Figure 2. Installing the VAPOR PIN®

During installation, the silicone sleeve will form a slight bulge between the slab and the VAPOR PIN® shoulder. Place the protective cap on VAPOR PIN® to prevent vapor loss prior to sampling (Figure 3).

Figure 3. Installed VAPOR PIN®

7) For flush mount installations, cover the vapor pin with a flush mount cover, using either the plastic cover or the optional stainless-steel Secure Cover (Figure 4).

Figure 4. Secure Cover Installed

8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

9) Remove protective cap and connect sample tubing to the barb fitting of the VAPOR PIN®. This connection can be made using a short piece of Tygon™ tubing to join the VAPOR PIN® with the Nylaflow tubing (Figure 5). Put the

Nylaflow tubing as close to the VAPOR PIN® as possible to minimize contact between soil gas and Tygon™ tubing.

Figure 5. VAPOR PIN® sample connection

10) Conduct leak tests in accordance with applicable guidance. If the method of leak testing is not specified, an alternative can be the use of a water dam and vacuum pump, as described in SOP Leak Testing the VAPOR PIN® via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1 1/2 inch (38mm) hole.

Figure 6. Water dam used for leak detection

11) Collect sub-slab soil gas sample or pressure reading. When finished, replace the protective cap and flush mount cover until the next event. If the sampling is complete, extract the VAPOR PIN®.

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the VAPOR PIN® (Figure 7). Turn the tool clockwise continuously, don't stop turning, the VAPOR PIN® will feed into the bottom of the installation/extraction tool and will extract from the hole like a wine cork, DO NOT PULL.

2) Fill the void with hydraulic cement and smooth with a trowel or putty knife.

Figure 7. Removing the VAPOR PIN®

- Prior to reuse, remove the silicone sleeve and protective cap and discard. Decontaminate the VAPOR PIN® in a hot water and Alconox® wash, then heat in an oven to a temperature of 265° F (130° C) for 15 to 30 minutes. For both steps, **STAINLESS – ½ hour, BRASS 8 minutes**

3) Replacement parts and supplies are available online.

Innovative Sampling Methods for Focusing the Sub-Slab Soil-Gas Investigation

Martin (Mort) Schmidt
Cox-Colvin & Associates, Inc.
August 3, 2012

Introduction

Sub-slab soil-gas is critical to vapor intrusion investigations, but spatial heterogeneity in soil-gas can be extremely high. McHugh's investigation[1] on spatial and temporal variability showed that the variability in sub-slab soil gas was equal to that in deeper soil gas and far higher than the variability in indoor air. However, due in part to the difficulty of installing sub-slab sampling points via conventional methods, many investigations probably lack representative soil-gas data. California's vapor intrusion guidance indicates that, "*Collecting as many as eight subsurface samples for a single building, even a large commercial building, both spatially and temporally, is rarely done*".[2]

More extensive sub-slab soil gas sampling is hampered by two factors – the effort and cost required to install sampling points, and the costs of collecting and analyzing soil-gas samples. A typical sub-slab sampling point is described in US EPA's Raymark investigation.[3] Points consisted of either stainless-steel Swagelok® or commonly-available brass plumbing parts. The report recommends using quick-drying cement and, even then, allowing it to cure for a minimum of 24 hours before sampling. DiGiulio, et al. indicated that using this procedure, probes could be installed in as little as 40 minutes. The report goes on to explain that one of the points could not be sampled when it broke loose while making connections. Similarly, Ohio EPA's Vapor Intrusion Guidance[4] provides a Standard Operating Procedure (SOP) for installing sub-slab sampling points using Swagelok® fittings, and includes advice on repairing the assembly if it breaks loose while removing or installing the end plug. The sub-slab points were well designed, given the available hardware, but the time and difficulty of installing them properly is a major limitation.

Simplified means of collecting sub-slab soil gas include the use of "rubber" stoppers with holes pre-drilled for tubing, as described in the Massachusetts vapor intrusion guidance,[5] or jamming modeling clay and tubing into holes in the floor. These alternatives can be useful, but the data they provide may be questionable, and the sample points are generally not useable for repeat sampling. Moreover, short-term cost savings might come at a high cost in data quality, without lowering long-term economic costs.

Cox-Colvin conducts sub-slab soil-gas sampling using rapidly-installed sampling points (Vapor Pins™). The device can be installed with hand-held tools in under ten minutes and requires no cement. Vapor Pins™ can be installed above grade for one time sampling, or below grade for repeat sampling. This presentation highlights an investigation in which we installed and sampled 145 sample points in five days to locate a source of tetrachloroethene (PCE) at a manufacturing facility.

Costs were further reduced by collecting samples into 22-ml glass vials for laboratory analysis by gas chromatography (GC), for approximately a third the cost of TO-15 analysis of samples from canisters. The streamlined procedures and reduced costs enabled the collection of an extensive array of soil-gas samples, allowing us to focus subsequent investigative and remediation efforts.
Vapor Pins™ might not comply with some regulatory requirements for vapor intrusion sampling, particularly if barbed fittings are not allowed for tubing connections. Additionally, reporting levels for the glass vials were higher than for evacuated canisters – 10 ppb for PCE – potentially limiting the use of vials to data screening, depending upon data quality objectives.

Background

The investigation was conducted at a manufacturing facility in western Ohio which historically used PCE for cleaning and degreasing. The facility has operated since 1933, but the current owner purchased the property in the 1990s and has a limited understanding of earlier solvent use. PCE had been observed in groundwater at the facility at concentrations as high as 440 ug/L, but declined dramatically following remediation at an area that once held PCE degreasing equipment. A smaller, nearby source of PCE contamination was remediated concurrently using the same techniques, with a similar drop in groundwater PCE.

PCE in groundwater remained elevated in the eastern part of the facility, averaging 18 ug/L in one monitor well. This area contained an aboveground storage tank (AST) that was overtopped with PCE in the 1980s. But because the area was remediated immediately after the release, the spill area was not directly in line with the plume, and groundwater at the spill location was consistently free of PCE, we assumed that the source of PCE was most likely a different AST or former degreaser. The client had us investigate soil and groundwater beneath the eastern building via Geoprobe® direct-push drilling. But soil samples next to the former degreasers and ASTs lacked major contamination, and because the client was pressed to make financial decisions on long-term environmental costs, we were tasked with locating all remaining source areas in a single deployment, and at a limited cost.

Experimental Methods

Having previously located unsuspected sources of VOCs at another Ohio site by prospecting with soil gas, we decided to collect soil gas beneath the building in a grid pattern with 20 ft spacing. In the earlier investigation, soil gas was collected via Geoprobe® from a depth of 5 ft, injected into evacuated 22-ml glass vials, and analyzed by GC in a mobile laboratory by Microseeps of Pittsburgh, PA. The more recent investigation was streamlined by collecting soil gas directly through the floor with methods we had since developed for vapor intrusion assessments. Recognizing the limitations of conventional sub-slab soil-gas sampling points, we developed the Vapor Pin™, constructed from a single piece of brass or stainless steel that forms a seal against concrete with a silicone sleeve (Figure 1).

The Vapor Pins™ were installed by drilling 5/8-inch holes through the floor with a hand-held hammer drill. After dusting the holes with a bottle brush, the Vapor Pins™ were hammered into place, capped, and allowed to equilibrate for approximately one hour. At several locations, a second, larger hole was countersunk around the 5/8-inch holes so that the Vapor Pins™ could be installed in a flush-mount configuration and left in place for long-term monitoring (Figure 2).

Figure 1. Vapor Pin™ Sub-Slab Samplers.

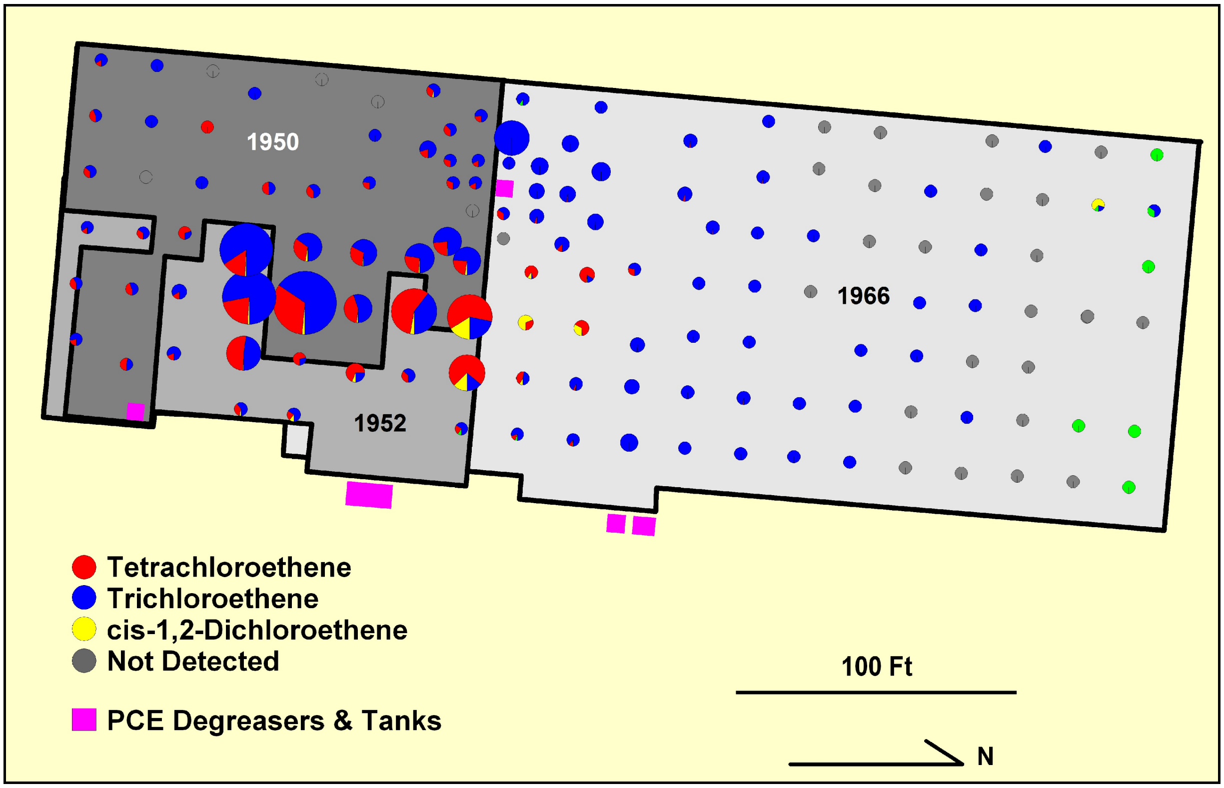
Following equilibration, soil gas was purged from the sampling points at a rate of 200 ml/minute with a multi-meter equipped with a photo-ionization detector (PID) and oxygen (O_2) sensor. Purging ended after PID and O_2 levels stabilized – approximately 20 seconds. Soil gas was collected from the sample points by puncturing the sample tubing with a disposable syringe and withdrawing the plunger. Soil gas was injected through the septum of evacuated glass vials and sent to Microseeps for analysis.

At the end of each shift, the Vapor Pins™ were removed and the holes were plugged with hydraulic cement, allowing daytime plant operations to go uninterrupted. Following each use, the silicone sleeves were stripped from the Vapor Pins™ and discarded, and the pins were decontaminated for reuse.

Figure 2. Flush-Mount Installation Process.

Results

Total VOCs in soil gas, as indicated by the field PID, ranged from non-detect to 100,000 ppb (up to 58,000 ppb, corrected for PCE). Total chlorinated solvents in laboratory samples closely resembled PID data, with concentrations ranging from non-detect to 57,000 ppb. VOCs in soil gas did not correspond to expected sources of PCE, i.e., the location of former ASTs or degreasers (Figure 3). Additionally, laboratory results showed a strong correlation with the field-PID data, suggesting that future costs could be further reduced by limiting laboratory analysis to samples with high PID concentrations.



Soil samples were subsequently collected via Geoprobe® from areas of highly contaminated soil-gas to verify the presence of VOC sources and to provide data on soil properties for the subsequent remediation. Soil samples were sent to a commercial laboratory for analysis for VOCs via gas chromatography/mass spectrometry (GC/MS).

Laboratory results showed high levels of PCE in soil at a depth of approximately 15 ft in the areas of high VOCs in soil gas. Soil data also indicated an area of what appears to be primary contamination by trichloroethene (TCE), which had previously been considered a PCE-degradation product. The soil investigation was followed by the installation of a soil-vapor extraction (SVE) remediation system – approximately nine months after collecting the first soil-gas sample.

Discussion

As we had seen in previous investigations, most of the contamination was *not* near former degreasing equipment or ASTs. By overlaying the map of soil-gas contamination with historic building outlines, taken from fire insurance maps and aerial photographs, we found that the distribution of PCE and TCE matched the building configuration of 1950 – a time when wastes were routinely dumped or spilled at back doors and loading docks. By 1952, the building completely surrounded the area of PCE contamination.

There are important implications for vapor intrusion. With the cost and effort required to construct sub-slab sample points made of lab-grade stainless hardware, set into concrete mixed with distilled water, and leak testing with ultra-pure helium, one risks collecting a few high-quality samples in the wrong place. The situation is analogous to the argument over Geoprobe® drilling for soil or groundwater in the 1980s. At the time, many argued that direct-push drilling could not provide adequate sample quality for environmental assessment. Experience has proven that while direct-push drilling is not the answer to all sampling needs, the ability to collect more samples in a timely, cost-effective way, enables one to focus efforts on where contamination levels are highest. Likewise, the use of streamlined sampling techniques, including Vapor Pins™, PIDs, and glass vials, allows collecting significantly more data within time and budgetary constraints, potentially reducing problems caused by sample heterogeneity.

References

1. McHugh, T.E. 2007. Evaluation of Spatial and Temporal Variability in VOC Concentrations at Vapor Intrusion Investigation Sites, A&WMA Vapor Intrusion Conference, Providence, RI, September 2007.

2. California Department of Toxic Substances Control & California Environmental Protection Agency, 2011. Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance), October, 2011.

3. DiGiulio, D.C.; Paul, C.J; Cody, R; Willey, R; Clifford, S; Kahn, P; Mosley, R; Lee, A.; Christensen, K., 2006. Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples. March 2006, EPA/600/R-05/147.

4. Ohio Environmental Protection Agency, 2010. Sample Collection and Evaluation of Vapor Intrusion to Indoor Air for Remedial Response and Voluntary Action Programs. May 2010.

5. Massachusetts Department of Environmental Protection, 2011. Interim Final Vapor Intrusion Guidance, December 2011, WSC#-11-435.

Key Words

Vapor Intrusion, Vapor Pin™, Subslab, Sub-Slab, Soil Gas, Volatile Organic Compound, VOC, Tetrachloroethene, Spatial Heterogeneity.

APPENDIX C

SAMPLING AND BUILDING SURVEY FORMS

LABELLA Associates, D.P.C.

AIR SAMPLING FIELD REPORT

AIR SAMPLING POINT

Project: ____________________ LaBella Project No.: ____________________
Site Location: ____________________ LaBella Representative: ____________________
Client: ____________________ Weather: ____________________

General Information

Sample Canister Location: ____________________

Sample Source: ______ Indoor Air ______ Sub-Slab ______ Interior Ambient Air ______ Exterior Ambient Air

______ Exterior Soil Gas ______ Other

Shipping Date: ____________________ Laboratory: ____________________

Canister Type: ______ 1.0 L Summa Canister ______ 6.0 L Summa Canister Other (specify): ____________________

Canister Serial No.: ____________________ Flow Controller Serial No.: ____________________

Purge Information

Leak Detection Test Date: ____________________ Leak Detection: ______ Pass ______ Fail

Purging Method: ____________________

PID Reading Start: ____________ ppm PID Reading End: ____________ ppm

Volume of Gas Extracted: ____________________

Sampling Information

Sample Date: ____________________ Sampler: ____________________

Sample Depth: ____________________

Moisture Content of Sampling Zone: ____ Dry ____ Moist ____ Saturated ____ Not Applicable (i.e. ambient air)

	Start	Stop
Canister Pressure Gauge Reading:		
Sample Time:		

Comments:
____
____
____
____
____
____
____

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name ______________________ Date/Time Prepared __________

Preparer's Affiliation ______________________ Phone No. ____________

Purpose of Investigation ____

1. OCCUPANT:

Interviewed: Y / N

Last Name: ________________ First Name: ________________

Address: ____

County: __________

Home Phone: ____________ Office Phone: ____________

Number of Occupants/persons at this location ____ Age of Occupants ____________

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: ________________ First Name: ________________

Address: ____

County: __________

Home Phone: ____________ Office Phone: ____________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: __________

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) ______________________________________

Does it include residences (i.e., multi-use)? Y / N If yes, how many? ______

Other characteristics:

Number of floors______ Building age______

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

____

____

____

Airflow near source

____

____

____

Outdoor air infiltration

____

____

____

Infiltration into air ducts

____

____

____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other ________
c. Basement floor:	concrete	dirt	stone	other ________
d. Basement floor:	uncovered	covered	covered with _______________	
e. Concrete floor:	unsealed	sealed	sealed with ________________	
f. Foundation walls:	poured	block	stone	other ________
g. Foundation walls:	unsealed	sealed	sealed with ________________	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: ________(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

____

____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other __________

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: ___________________________

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other__________
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

____

____

____

____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	______________________________
1st Floor	______________________________
2nd Floor	______________________________
3rd Floor	______________________________
4th Floor	______________________________

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify____________

d. Has the building ever had a fire? Y / N When?____________

e. Is a kerosene or unvented gas space heater present? Y / N Where? ____________

f. Is there a workshop or hobby/craft area? Y / N Where & Type? ____________

g. Is there smoking in the building? Y / N How frequently? ____________

h. Have cleaning products been used recently? Y / N When & Type? ____________

i. Have cosmetic products been used recently? Y / N When & Type? ____________

j. Has painting/staining been done in the last 6 months? Y / N Where & When? ______________

k. Is there new carpet, drapes or other textiles? Y / N Where & When? ______________

l. Have air fresheners been used recently? Y / N When & Type? ______________

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?___________

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?___________

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?______________

Are there odors in the building? Y / N
If yes, please describe: ____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ______________________________________

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
Yes, work at a dry-cleaning service
No
Unknown

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: ___________
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _______
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _______

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: ______________________________

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ________________________________

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

LABELLA Associates, D.P.C. | Engineering Architecture Environmental Planning

APPENDIX D

QUALITY CONTROL PLAN

LaBella Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Quality Control Plan (QCP)
NYSDEC Site #828159A

Location:

691 Saint Paul Street
Rochester, New York

Prepared for:

Bausch & Lomb
1400 North Goodman Street
Rochester, New York 14609

LaBella Project No. 2170820

March 22, 2017

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1.0 INTRODUCTION

LaBella's Quality Control (QC) Program is an integral part of its approach to environmental investigations. By maintaining a rigorous QC program, our firm is able to provide accurate and reliable data. QC also provides safe working conditions for all on-site workers.

The Quality Control program contains procedures, which provide for collected data to be properly evaluated, and which document that quality control procedures have been followed in the collection of samples. The quality control program represents the methodology and measurement procedures used in collecting quality field data. This methodology includes the proper use of equipment, documentation of sample collection, and sample handling practices.

Procedures used in the firm's Quality Control program are compatible with federal, state, and local regulations, as well as, appropriate professional and technical standards.

This QC program has been organized into the following areas:

- QC Objectives and Checks
- Field Equipment, Handling, and Calibration
- Sampling Techniques
- Sample Handling and Packaging

It should be noted that the Soil Gas Sampling Work Plan (SGS) Work Plan may have project specific details that will differ from the procedures in this QC program. In such cases, the SGS Work Plan should be followed (subsequent to regulatory approval).

2.0 QUALITY CONTROL OBJECTIVES

The United States Environmental Protection Agency (EPA) has identified five general levels of analytical data quality as being potentially applicable to site investigations conducted under CERCLA. These levels are summarized below:

- **Level I -** Field screening. This level is characterized by the use of portable instruments, which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sampling locations.
- **Level II -** Field analysis. This level is characterized by the use of portable analytical instruments, which can be used on site or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.
-

- **Level III** - Laboratory analysis using methods other than the Contract Laboratory Program (CLP) Routine Analytical Services (RAS). This level is used primarily in support of engineering studies using standard EPA-approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP requirements for documentation.

- **Level IV** - CLP Routine Analytical Services. This level is characterized by rigorous QC protocols and documentation and provides qualitative and quantitative analytical data. Some regions have obtained similar support via their own regional laboratories, university laboratories, or other commercial laboratories.

- **Level V** - Non-standard methods. Analyses, which may require method modification and/or development. CLP Special Analytical Services (SAS) are considered Level V.

Unless stated otherwise, all data will be generated in accordance with Level IV. When CLP methodology is not available, federal and state approved methods will be utilized. Level III will be utilized, as necessary, for non-CLP RAS work which may include ignitability, corrosivity, reactivity, EP toxicity, and other state approved parameters for characterization. Level I will be used throughout the SGS for health and safety monitoring activities.

All measurements will be made to provide that analytical results are representative of the media and conditions measured. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations reporting similar data to allow comparability of data bases among organizations. Data will be reported in µg/L and mg/L for aqueous samples, and µg/kg and mg/kg (dry weight) for soils, or otherwise as applicable.

The characteristics of major importance for the assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. Application of these characteristics to specific projects is addressed later in this document. The characteristics are defined below.

2.1 Accuracy

Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

2.2 Precision

Precision is the degree of mutual agreement among individual measurements of a given parameter.

2.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

2.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

Careful choice and use of appropriate methods in the field will ensure that samples are representative. This is relatively easy with water or air samples since these components are homogeneously dispersed. In soil and sediment, contaminants are unlikely to be evenly distributed, and thus it is important for the sampler and analyst to exercise good judgment when removing a sample.

2.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data sets may be inter- or intra- laboratory.

3.0 MEASUREMENT OF DATA QUALITY

3.1. Accuracy

Accuracy of a particular analysis is measured by assessing its performance with "known" samples. These "knowns" take the form of EPA standard reference materials, or laboratory prepared solutions of target analytes spiked into a pure water or sample matrix. In the case of GC or GC/MS analyses, solutions of surrogate compounds, which can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination, are used.

In each case the recovery of the analyte is measured as a percentage, correcting for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA supplied known solutions, this recovery is compared to the published data that accompany the solution.

For the firm's prepared solutions, the recovery is compared to EPA-developed data or the firm's historical data as available. For surrogate compounds, recoveries are compared to EPA CLP acceptable recovery tables.

If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate. The analyst or his supervisor must initiate an investigation of the cause of the problem and take corrective action. This can include recalibration of the instrument, reanalysis of the QC sample, reanalysis of the samples in the batch, or flagging the data as suspect if the problems cannot be resolved. For highly contaminated samples, recovery of the matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

3.2. *Precision*

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field and transported to the laboratory as distinct samples. Their identity as duplicates is sometimes not known to ASC and usually not known to bench analysts, so their usefulness for monitoring analytical precision at bench level is limited. For most purposes, precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample). Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantitation of precision is impossible.

For EPA CLP analyses, replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD).

- Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix spike duplicate analyses.
- RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non homogeneity, analysis of check samples, etc. Follow-up action may include sample reanalysis or flagging of the data as suspect if problems cannot be resolved.
- During the data review and validation process (see Section 9), field duplicate RPDs are assessed as a measure of the total variability of both field sampling and laboratory analysis.

3.3. *Completeness*

Completeness for each parameter is calculated as follows:

- The firm's target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the site managers. In planning the field sample collection, the site manager will plan to collect field duplicates from identified critical areas. This procedure should assure 100% completeness for these areas.

3.4. *Representativeness*

The characteristic of representativeness is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representativeness of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representative of the site and the specific area. Within the laboratory, precautions are taken to extract from the sample bottle an aliquot representative of the whole sample. This includes premixing the sample and discarding pebbles from soil samples.

4.0 QC TARGETS

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and RPD of duplicates/replicates are included in the QCP, Analytical Procedures. Note that tabulated values are not always attainable. Instances may arise where high sample concentrations, non homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the firm will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

5.0 INSTALLATION PROCEDURES

5.1 Sub-Slab Soil Vapor Points

Sub-slab soil vapor points will be semi-permanent using a Vapor Pin® to construct the sample point. A Vapor Pin® will be installed by coring an approximate 2 inch diameter hole into the floor at each sub-slab sampling location. Subsequently, a 5/8 inch diameter hole will be drilled through the slab to approximately 1 to 2 inches beneath the floor slab. A vacuum will not be used to remove drilling debris from the sampling port. A 5/8 inch diameter polyethylene tube/gasket and barbed fitting will be inserted into the corehole. The polyethylene tube/gasket will act as seal between the sub floor and interior ambient air space around the annulus of the barbed fitting. Sub-slab sampling points will be constructed in the same manner at all locations to minimize possible discrepancies. A protective cap will be installed to complete the installation.

6.0 SAMPLING PROCEDURES

6.1 Soil Vapor Sampling

This section describes the sampling procedures to be utilized for each environmental medium that will be collected and analyzed in accordance with appropriate state and federal requirements. All procedures described are consistent with EPA sampling procedures as described in SW-846, Update V, dated August 2015 and New York State Department of Health's *Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006*.

One to three probe volumes (i.e., the volume of the sample probe and tube/riser pipe) will then be purged in order to ensure that the samples collected are representative of soil gas conditions. The flow rate during purging will not exceed 0.2 liters per minute (L/min) to minimize outdoor air infiltration.

During purging of the sample point, a tracer gas evaluation will be conducted to verify the integrity of the soil gas probe seal. Helium will be used as the tracer gas. An enclosure will be constructed around the soil gas sampling point (e.g., plastic bag, plastic bucket, etc.) and sealed to the sample point casing or surrounding concrete. Subsequently, the enclosure will be enriched with the tracer gas. The purged soil gas will then be tested for the tracer gas by an appropriate meter (i.e., a meter capable of measuring the concentration of the tracer gas in at least percentage increments). In the event that the tracer gas is detected at a concentration of 10% or greater, the sample point will be resealed and retested prior to sampling.

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

- The protective brass plug from each canister will be removed and the pre-calibrated flow controller will be connected to the canister. The canister will be connected to the soil gas sampling probe via inert tubing (e.g., polyethylene, stainless steel, or Teflon®).
- The identification numbers for the canisters and flow controllers will be recorded along with the. initial canister pressures on the vacuum gauge. Canisters with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling.
- The flow controller valve will be completely opened and the time that the valve was opened (beginning of sampling) will be recorded.
- Sample collection will be stopped after the scheduled duration of sample collection (approximately 8 hours) and care will be taken to make sure that the canister still has a minimum amount of vacuum remaining. If there is no vacuum remaining, the sample will be rejected and should be collected again in a new canister.
- The final vacuum pressure will be recorded and the flow controller valve will be closed completely. The date and time sample collection was stopped will be recorded.
- The flow controller from the canister will be removed and the protective brass plugs will be replaced.
- Labels/tags (sample name, time/date of sampling, etc.) will be attached to the canisters as directed by the laboratory and placed in the packaging provided by the laboratory.
- The information required for each sample will be entered on the chain of custody form. Copies of the chain-of-custody form will be included in the shipping packaging, as directed by the laboratory. The field manager will retain a copy of the chain of custody for the project file.
- The samples will be shipped to the laboratory within one business day of sample collection via overnight delivery.
- In addition to the soil gas samples, one exterior ambient air sample will also be collected from the apparent upwind location. The ambient air sample will be collected from about 3 to 4 ft above the ground using a Summa Canister over the same approximate sampling period.

In some cases, weather conditions may present certain limitations on soil vapor sampling. When soil vapor samples are collected, the following actions will be taken to document local conditions during sampling that may influence interpretation of the results:

- Weather conditions (e.g., precipitation and outdoor temperature) should be noted for the past 24 to 48 hours; and

- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

7.0 SURVEYING

Coordinates and elevations will be established for each soil gas sampling point. Elevations to the closest 0.01 foot shall be used for the survey. These elevations shall be referenced to a regional, local, or project-specific datum. USGS benchmarks will be used whenever available. The location, identification, coordinates, and elevations of the wells will be plotted on maps with a scale large enough to show their location with reference to other structures at each site. Interior locations will be located via tape measure and elevations based on tape measure from exterior grade, to the extent practicable.

8.0 GEOLOGIC LOGGING AND SAMPLING

At each investigative location, the boring will be advanced through overburden using either a drill rig and hollow-stem auger or direct push technology; soils will be visually inspected for stains and monitored with a PID to help determine potential for vertical migration of contaminants. Soil samples will be collected continuously. The sampling device will be decontaminated according to procedures outlined in the Decontamination section of this document. Recovered soil will be screened in the field for volatile organic vapors using a PID, classified in accordance with Unified Soil Classification System (USCS) specifications, and logged.

All samples will be screened with a PID during collection. The headspace of all samples taken in the field will be screened using USEPA method 3810.

9.0 MANAGEMENT OF INVESTIGATIVE DERIVED WASTE

Purpose:

The purposes of these guidelines are to ensure the proper holding, storage, transportation, and disposal of materials that may contain hazardous wastes. Investigation-derived waste (IDW) included the following:

- Drill cuttings, discarded soil samples, drilling mud solids, and used sample containers;
- Soiled disposable personal protective equipment (PPE);
- Used disposable sampling equipment;
- Used plastic sheeting and aluminum foil;

- Other equipment or materials that either contain or have been in contact with potentially-impacted environmental media.
- Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated id characterization analytical results indicate the absence of these constituents.

<u>Procedure:</u>

1. Contain all investigation-derived wastes in Department of Transpiration (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.
2. Contain wastes from separate borings or wells in separate containers (i.e. do not combine wastes from several borings/wells in a single container, unless it is a container used specifically for transfer purposes, or unless specific permission to do so has been provided by the LaBella Project Manager. Unused samples from surface sample locations within a given area may be combined.
3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Pending transfer, all containers will be covered and secured when not immediately attended,
6. Label all containers with regard to contents, origin, and date of generation. Use indelible ink for all labeling.
7. Collect samples for waste characterization purposes, use boring/well sample analytical data for characterization.
8. For wastes determined to be hazardous in character, be aware on accumulation time limitations. Coordinate the disposal of these wastes with the Owner and NYSDEC.
9. Dispose of investigation-derived wastes as follows;
    - Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels consistent with background, may be spread on-site or otherwise treated as a non0-waste material.
    - Soils, water, and other environmental media in which organic compounds are detected or metals are present above background will be disposed as industrial waste. Alternate disposition must be consistent with applicable State and Federal laws.
    - Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate disposal as industrial wastes

10.0 DECONTAMINATION

Sampling methods and equipment have been chosen to minimize decontamination requirements and to prevent the possibility of cross-contamination. Decontamination of equipment will be performed between discrete sampling locations. Equipment used to collect samples between composite sample locations will not require decontamination between collection of samples. All drilling equipment will be decontaminated prior to drilling, after drilling each monitoring well, and after the completion of all drilling. Special attention will be given to the drilling assembly, augers, and PVC casing and screens.

Drilling decontamination will consist of:

- Steam cleaning;
- Scrubbing with brushes, if soil remains on equipment; and
- Steam rinse.

Split spoons and other non-disposable equipment will be decontaminated between each sampling event. The sampler will be cleaned prior to each use, by one of the following procedures:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner;

OR

- Initially cleaned of all foreign matter;
- Scrubbed with brushes in trisodium phosphate or alconox solution;
- Rinsed with deionized water;
- Rinsed with pesticide grade methanol;
- Triple rinsed with deionized water; and
- Allowed to air dry.

11.0 SAMPLE CONTAINERS

The volumes and containers required for the sampling activities are included in pre-washed sample containers will be ordered directly from a firm, which prepares the containers in accordance with EPA bottle washing procedures.

TABLE 1
Soil Gas Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics via USEPA Method TO-15	Summa Canister, 6 Liter	One (1), fill as regulator allows	Keep away from sunlight	30 days

* Holding time is based on the times from verified time of sample receipt at the laboratory.

12.0 SAMPLE CUSTODY

This section describes standard operating procedures for sample identification and chain-of-custody to be utilized for all Phase II field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during their collection, transportation, and storage through analysis. All chain-of-custody requirements comply with standard operating procedures indicated in EPA sample handling protocol.

Sample identification documents must be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks,
- Sample label,
- Custody seals, and
- Chain-of-custody records.

13.0 CHAIN OF CUSTODY

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

13.1 Field Custody Procedures

- As few persons as possible should handle samples.
- Sample bottles will be obtained precleaned from a source such as I-Chem. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.
- The sample collector will record sample data in the notebook.
- The site manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

13.2 Sample Tags

Sample tags attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample tags are to be placed on the bottles so as not to obscure any QC lot numbers on the bottles; sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the logbook. For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as "real" samples.

13.3 Transfer of Custody and Shipment

- The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain-of-custody record. This record documents sample custody transfer
- Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the chain-of-custody record and traffic reports.
- All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment. The other copies are distributed appropriately to the site manage.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bill of lading are retained as part of the permanent documentation.

13.4 Chain-of-Custody Record

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the "Remarks" section of the record.

13.5 Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identification number matches that on the chain-of-custody record and traffic reports, if required. Pertinent information as to shipment, pickup, and courier is entered in the "Remarks" section.

13.6 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. On receipt at the laboratory, the custodian must check (and certify, by completing the package receipt log and LABMIS entries) that seals on boxes and bottles are intact. Strapping tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

14.0 DOCUMENTATION

14.1 Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container (labels are to be covered with Mylar tape):

XX-YY-O/D

- XX This set of initials indicates the specific Phase II sampling project
- YY These initials identify the sample location. Actual sample locations will be recorded in the task log.
- O/D An "O" designates an original sample; "D" identifies it as a duplicate.

Each sample will be labeled, chemically preserved, if required and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers and protected with Mylar tape. The sample label will give the following information:

- Name of sampler,
- Date and time of collection,
- Sample number,
- Analysis required,
- pH, and
- Preservation.

14.2 Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct event that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. All daily logs will be kept in a bound waterproof notebook containing numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason. Corrections will be made according to the procedures given at the end of this section. The daily logs will include a site log and task log.

The site log is the responsibility of the site manager and will include a complete summary of the day's activity at the site.

The **Task Log** will include:

- Name of person making entry (signature).
- Names of team members on-site.
- Levels of personnel protection:
    - Level of protection originally used;
    - Changes in protection, if required; and
    - Reasons for changes.
- Time spent collecting samples.
- Documentation on samples taken, including:
    - Sampling location and depth station numbers;
    - Sampling date and time, sampling personnel;
    - Type of sample (grab, composite, etc.); and
    - Sample matrix.
- On-site measurement data.
- Field observations and remarks.
- Weather conditions, wind direction, etc.
- Unusual circumstances or difficulties.
- Initials of person recording the information.

15.0 CORRECTIONS TO DOCUMENTATION

15.1 Notebook

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

15.2 Sampling Forms

As previously stated, all sample identification tags, chain-of-custody records, and other forms must be written in waterproof ink. None of these documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the corrected information. The incorrect information should not be obliterated. Any subsequent error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

15.3 Photographs

Photographs will be taken as directed by the site manager. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be noted in the task log concerning photographs:

- Date, time, location photograph was taken;
- Photographer (signature);
- Weather conditions;
- Description of photograph taken;
- Reasons why photograph was taken;
- Sequential number of the photograph and the film roll number; and
- Camera lens system used.

After the photographs have been developed, the information recorded in the field notebook should be transferred to the back of the photographs

16.0 SAMPLE HANDLING, PACKAGING, AND SHIPPING

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulation, 49 CFR 171 through 177. All samples will be delivered to the laboratory with 24 to 48 hours from the day of collection.

All chain-of-custody requirements must comply with standard operating procedures in the EPA sample handling protocol. All sample control and chain-of-custody procedures applicable to the Consultant are presented in the Field Personnel Chain-of-Custody Documentation and Quality Control Procedures Manual, January 1992.

16.1 Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample volume level can be marked by placing the top of the label at the appropriate sample height, or with a grease pencil. This procedure will help the laboratory to determine if any leakage occurred during shipment. The label should not cover any bottle preparation QC lot numbers.
- All sample bottles are placed in a plastic bag to minimize the potential for vermiculite contamination.
- Shipping coolers must be partially filled with packing materials and ice when required, to prevent the bottles from moving during shipment.
- The sample bottles must be placed in the cooler in such a way as to ensure that they do not touch one another.
- The environmental samples are to be cooled. The use of "blue ice" or some other artificial icing material is preferred. If necessary, ice may be used, provided that it is placed in plastic bags. Ice is not to be used as a substitute for packing materials.
- Any remaining space in the cooler should be filled with inert packing material. Under no circumstances should material such as sawdust, sand, etc., be used.
- A duplicate custody record and traffic reports, if required must be placed in a plastic bag and taped to the bottom of the cooler lid. Custody seals are affixed to the sample cooler.

16.2 Shipping Containers

Shipping containers are to be custody-sealed for shipment as appropriate. The container custody seal will consist of filament tape wrapped around the package at least twice and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking a seal.

Field personnel will make arrangements for transportation of samples to the lab. When custody is relinquished to a shipper, field personnel will telephone the lab custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis. The lab must be notified as early in the week as possible, and in no case later than 3 p.m. (EST) on Thursday, regarding samples intended for Saturday delivery.

16.3 Marking and Labeling

- Use abbreviations only where specified.
- The words "This End Up" or "This Side Up" must be clearly printed on the top of the outer package. Upward pointing arrows should be placed on the sides of the package. The words "Laboratory Samples" should also be printed on the top of the package.

- After a sample container has been sealed, two chain-of-custody seals are placed on the container, one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over then.
- If samples are designated as medium or high hazard, they must be sealed in metal paint cans, placed in the cooler with vermiculite and labeled and placarded in accordance with DOT regulations.
- In addition, the coolers must also be labeled and placarded in accordance with DOT regulations if shipping medium and high hazard samples.

17.0 CALIBRATION PROCEDURES AND FREQUENCY

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Documentation of all routine and special maintenance and calibration information will be maintained in an appropriate logbook or reference file, and will be available on request. Table 7-1 lists the major instruments to be used for sampling and analysis. Brief descriptions of calibration procedures for major field and laboratory instruments follow.

18.0 FIELD INSTRUMENTATION

18.1 Photovac/MiniRae Photoionization Detector (PID)

Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

18.2 Internal Quality Control Checks

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of field equipment. Field-based QC will comprise at least 10% of each data set generated and will consist of standards, replicates, spikes, and blanks. Field duplicates and field blanks will be analyzed by the laboratory as samples and will not necessarily be identified to the laboratory as duplicates or blanks. For each matrix, field duplicates will be provided at a rate of one per 10 samples collected or one per shipment, whichever is greater. Field blanks which consist of trip, routine field, and rinsate blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater.

Calculations will be performed for recoveries and standard deviations along with review of retention times, response factors, chromatograms, calibration, tuning, and all other QC information generated. All QC data, including split samples, will be documented in the site logbook. QC records will be retained and results reported with sample data.

18.3 Blank Samples

Blank samples are analyzed in order to assess possible contamination from the field and/or laboratory so that corrective measures may be taken, if necessary. Field samples are discussed in the following subsection:

18.4 Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. The following types of blanks may be used: the trip blank, the routine field blank, and the field equipment blank. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination. Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

- Routine Field Blanks or bottle blanks are blank samples prepared in the field to access ambient field conditions. They will be prepared by filling empty sample containers with deionized water and any necessary preservatives. They will be handled like a sample and shipped to the laboratory for analysis.
- Trip Blanks are similar to routine field blanks with the exception that they are <u>not</u> exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. For the SGS, one trip blank will be collected with every batch of water samples for volatile organic analysis. Each trip blank will be prepared by filling a 40-ml vial with deionized water prior to the sampling trip, transported to the site, handled like a sample, and returned to the laboratory for analysis without being opened in the field.
- Field Equipment Blanks are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

18.5 Field Duplicates

Field duplicate samples consist of a set of two samples collected independently at a sampling location during a single sampling event. In some instances the field duplicate can be a blind duplicate, i.e., indistinguishable from other analytical samples so that personnel performing the analyses are not able to determine which samples are field duplicates. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

18.6 Quality Control Check Samples

Inorganic and organic control check samples are available from EPA free of charge and are used as a means of evaluating analytical techniques of the analyst. Control check samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized.

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APPENDIX E

HEALTH AND SAFETY PLAN

Site Health and Safety Plan

Location:

691 Saint Paul Street
Rochester, New York 14605

Prepared For:

Bausch & Lomb
1400 N. Goodman Street
Rochester, New York 14609

LaBella Project No. 2170436

January 2017

Site Health and Safety Plan

Location:

691 Saint Paul Street
Rochester, New York 14605

Prepared For:

Bausch & Lomb
1400 N. Goodman Street
Rochester, New York 14609

LaBella Project No. 2170820

March 2017

LaBella Associates, D.P.C.
300 State Street
Rochester, New York 14614

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SITE HEALTH AND SAFETY PLAN

Project Title:	691 Saint Paul Street Soil Vapor Intrusion Sampling
Project Number:	2170436
Project Location (Site):	
Environmental Director:	Gregory Senecal, CHMM
Project Manager:	Dan Noll, P.E.
Plan Review Date:	______________________________
Plan Approval Date:	______________________________
Plan Approved By:	______________________________ Mr. Richard Rote, CIH
Site Safety Supervisor:	Ben Stracuzzi
Site Contact:	To Be Determined
Safety Director:	Rick Rote, CIH
Proposed Date(s) of Field Activities:	To Be Determined
Site Conditions:	Slightly sloping, encompassing approximately 3.74 acres
Site Environmental Information Provided By:	Interim SMP for 690 St. Paul (NYSDEC Site Code #: C828159) prepared by LaBella Associates, D.P.C., dated March 2013
Air Monitoring Provided By:	LaBella Associates, D.P.C.
Site Control Provided By:	Contractor(s)

EMERGENCY CONTACTS

	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Rochester General Hospital	585-922-4000
Poison Control Center:	Finger Lakes Poison Control	585-273-4621
Police (local, state):	Monroe County Sheriff	911
Fire Department:	Rochester Fire Department	911
Site Contact:	Frank Chiappone	
Agency Contact:	NYSDEC – Frank Sowers, P.E. NYSDOH – Justin Deming Finger Lakes Poison Control MCDOH – Jeff Kosmala	585-226-5357 518-402-7860 1-800-222-1222 585-753-5904
Environmental Director:	Greg Senecal, CHMM	Direct: 585-295-6243 Cell: 585-752-6480 Home: 585-323-2142
Project Manager:	Dan Noll, P.E.	Direct: 585-295-6611 Cell: 585-301-8458
Site Safety Supervisor:	Ben Stracuzzi	Direct: 585-295-6694 Cell: 607-240-9699
Safety Director	Rick Rote, CIH	Direct: 704-941-2123

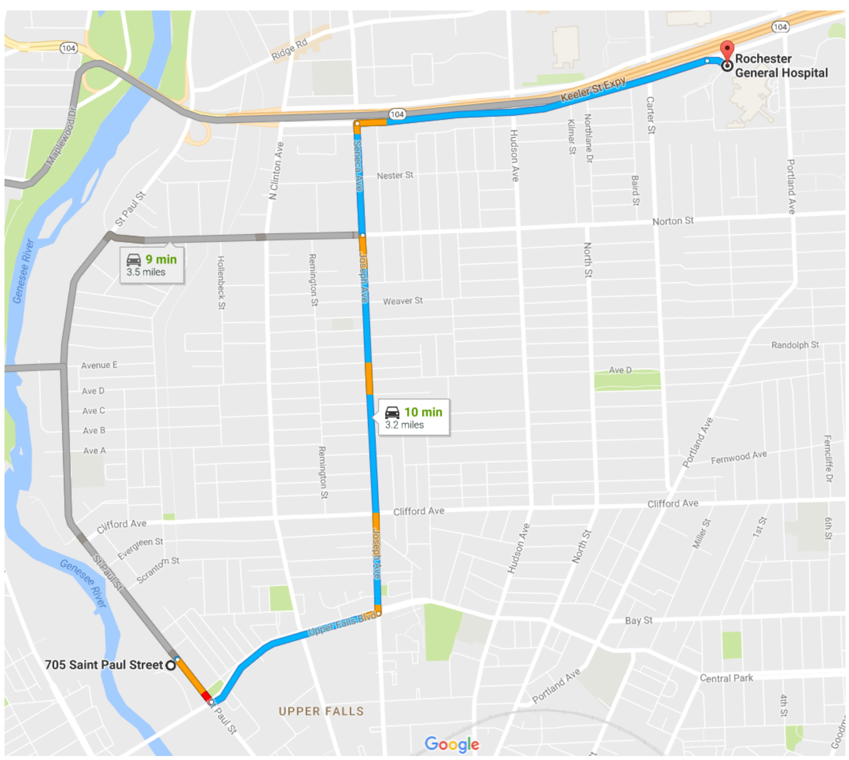
MAP AND DIRECTIONS TO THE MEDICAL FACILITY - ROCHESTER GENERAL HOSPITAL

Total Time: 10 minutes
Total Distance: 3.20 miles

Start: 691 Saint Paul St, Rochester, NY 14605-1742

START	1: Start out going SOUTHEAST on ST PAUL ST toward LOWELL ST.	0.1 mi
	2: Turn LEFT onto UPPER FALLS BLVD.	0.6 mi
	3: Turn LEFT onto JOSEPH AVE.	1.1 mi
	4: JOSEPH AVE becomes SENECA AVE.	0.3 mi
	5: Turn RIGHT onto RT-104.	1.2 mi
	6: Turn RIGHT onto PORTLAND AVE/CR-114.	0.2 mi
END	7: End at 1425 Portland Ave Rochester, NY 14621-3001	

End: 1425 Portland Ave, Rochester, NY 14621-3001



1.0 Introduction

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the Soil Vapor Intrusion sampling activities at the Site located at 691 Saint Paul Street in the City of Rochester, Monroe County, New York. This HASP only reflects the policies of LaBella Associates D.P.C. The requirements of this HASP are applicable to all approved LaBella personnel at the work site. This document's project specifications and the Community Air Monitoring Plan (CAMP) are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel and their authorized visitors. The Project Manager shall implement the provisions of this HASP for the duration of the project. It is the responsibility of LaBella employees to follow the requirements of this HASP, and all applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following:

- ❑ Management of environmental investigation and remediation activities
- ❑ Environmental Monitoring
- ❑ Collection of samples

4.0 Work Area Access and Site Control

The contractor(s) will have primary responsibility for work area access and site control. However, a minimum requirement for work area designation and control will consist of:

- Drilling (hammer drill) – Orange cones to establish at least a 5-foot by 5-foot work area

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed.

5.1 Hazards Due to Heavy Machinery

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, etc will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses and steel toe shoes are required.

5.2 Excavation Hazards

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Excavations that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0).

Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. All excavations will be backfilled by the end of each day. Additionally, no test pit will be left unattended during the day.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.3 Cuts, Punctures and Other Injuries

Potential Hazard:
In any excavation or construction, work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer

5.4 Injury Due to Exposure of Chemical Hazards

Potential Hazards:
Volatile organic vapors from petroleum products, chlorinated solvents or other chemicals may be encountered during excavation activities at the project work site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Protective Action:
The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of organic vapors are present. Air monitoring (refer to Section 9.0 and to the Modified CAMP in Appendix 7) of the work area will be performed at least every 60 minutes or more often using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained total volatile organic compound (VOC) readings of 25 ppm is encountered personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0).

5.5 Injuries Due to Extreme Hot or Cold Weather Conditions

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

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Protective Action:
The presence of asbestos can be identified through visual observation of a white magnesium silicate material. If encountered, work should be halted and a sample of the suspected asbestos should be collected and placed in a plastic sealable bag. This sample should be sent to the asbestos laboratory at LaBella Associates for analysis.

6.0 Work Zones

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 Personal Protective Equipment

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

9.0 Air Monitoring

No air monitoring is required. If indications during the installation of the sub-slab sampling points indicates potential concerns, such as chemical odors, air monitoring will be performed. According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring identified in this HASP is only intended to monitor air for workers involved with the sampling.

If sustained PID readings of greater than 10 ppm are recorded in the breathing zone, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8-hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 10 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 Employee Training

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the remedial investigation must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential	^{232}Thorium Action Level
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69	NA
Anthracene	0.2	0.2	NA	NA	NA	NA	Faint aromatic	NA	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24	NA
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88	NA
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	0.096	10.07	NA
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07	NA
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65	NA
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07	NA
Ethylbenzene	100	100	NA	1	6.7	2,000	Ether	2.3	8.76	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35	NA
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12	NA
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82	NA
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45	NA
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56	NA
Metals										
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond	NA	NA	NA
Cadmium	0.2	0.5	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	1	0.5	NA	NA	NA	NA	NA	NA	NA	NA
Lead	0.05	0.15	NA	NA	NA	700	NA	NA	NA	NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless	NA	NA	NA
Selenium	0.2	0.02	NA	NA	NA	Unknown	NA	NA	NA	NA
Other										
Asbestos	0.1 (f/cc)	NA	1.0 (f/cc)	NA	NA	NA	NA	NA	NA	NA
^{232}Thorium	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,400 µrem/hour or 5,000 mrem/year

(a) Skin = Skin Absorption
(b) OSHA-PEL Permissible Exposure Limit (flame weighted average, 8-hour): NIOSH Guide, June 1990
(c) ACGIH – 8 hour time weighted average from Threshold Limit Values and Biological Exposure Indices for 2003.
(d) Metal compounds in mg/m3
(e) Lower Exposure Limit (%)
(f) Upper Exposure Limit (%)
(g) Immediately Dangerous to Life or Health Level: NIOSH Guide, June 1990.

Notes:
1. All values are given in parts per million (PPM) unless otherwise indicated.
2. Ca = Possible Human Carcinogen, no IDLH information.

LABELLA