

## **Vapor Intrusion Work Plan**

**Superior Health Linens  
5005 South Packard Avenue**

**BRRTS No. 02-41-532649  
FID 241780880**

November 20, 2020  
SMA Project No. 15-15011.00-003

Prepared For:

**D&C Partners, LLP**  
W223 N7658 Cherry Hill Road  
Sussex, WI 53089

Prepared By:

**St. John – Mittelhauser & Associates, Inc.**  
**A Terracon Company**  
1401 Branding Avenue, Suite 315  
Downers Grove, Illinois 60515

## CONTENTS

<u>Section</u>	<u>Page</u>
<b>1.0 INTRODUCTION AND BACKGROUND .....</b>	<b>1</b>
1.1 INTRODUCTION.....	1
1.2 BACKGROUND.....	1
<b>2.0 SITE LAYOUT .....</b>	<b>2</b>
<b>3.0 PROPOSED VAPOR INTRUSION SAMPLING AND ANALYSIS.....</b>	<b>2</b>
3.1 HPV SUB-SLAB SAMPLING .....	2
3.2 INDOOR AIR SAMPLING .....	4
<b>4.0 REPORTING .....</b>	<b>5</b>

### Figures

- 1 Site Location Map
- 2 Site Features Map
- 3 Proposed High Purge Volume Sub-Slab Sample and Indoor Air Sample Locations
- 4 High Purge Volume Sub-Slab Apparatus

### Appendices

- A Building Survey Form

## **1.0 INTRODUCTION AND BACKGROUND**

### **1.1 INTRODUCTION**

St. John – Mittelhauser & Associates, Inc., a Terracon Company (SMA) has prepared this *Vapor Intrusion Work Plan* (Work Plan) on behalf of D&C Partners LTD (D&C Partners) for their facility located at 5005 South Packard Avenue, Cudahy, Wisconsin (Site). The purpose of the Work Plan is to describe the High Purge Volume (HPV) testing to verify the presence or absence of a vapor intrusion issue within the Superior Health Linens building due to a release of chlorinated volatile organic compounds (CVOCs) near the southwest corner of the Site. The location of the Site is shown on Figure 1.

### **1.2 BACKGROUND**

The WDNR's September 9, 2020 correspondence requested additional information related the potential of a vapor intrusion risk within the Superior Health Linens building. In response, D&C Partners proposed the collection of both a single HPV sub-slab sample and completion of an indoor air sampling event in their written correspondence dated October 2, 2020. The goal of the proposed sampling was: 1) allow comparison to the analytical results of the February 2013 sampling event; 2) determine if sub-slab soil gas conditions have changed over time; and 3) allow an assessment of the current vapor intrusion risk within the Superior Health Linens building.

The WDNR responded via email on November 3, 2020 confirmed that the HPV sub-slab testing and sampling outlined in the October 2, 2020 correspondence would be acceptable to assess the current sub-slab soil gas conditions. The WDNR noted that the location of the HPV sub-slab sample location should be close to the location where elevated concentrations of trichloroethene was detected in February 2013 (sample SV2-2). The WDNR further noted that if the analytical results of the HPV sub-slab sample meet the US EPA's Vapor Risk Screen Levels (VRSLs) for Large Commercial Buildings (sub-slab), then no further evaluation of the

vapor intrusion pathway is necessary and continued operation of the SSDS system would not be necessary.

The WDNR also added that the collection of indoor air samples is not required but would be acceptable as part of the site investigation to demonstrate that any risk posed by sub-slab vapor could be mitigated by the continued operation of the SSDS.

## **2.0 SITE LAYOUT**

The Site has been operated as a commercial laundry, including Wolf Cleaners from 1987 through 1993 and Superior Health Linens from 1995 to present. The Site currently consists of a single-story building containing office space and commercial laundry facilities are located on the western half of the Site. A small detached commercial building is located at the southeast corner of the Site, along South Packard Avenue. The location of the former gasoline service station, located at the southwest corner South Packard Avenue and East Holmes Street is covered with grass. The remainder of the property is covered with asphalt and/or concrete parking. The general layout of the Site is shown on Figure 2.

## **3.0 PROPOSED VAPOR INTRUSION SAMPLING AND ANALYSIS**

The following sections describe the sampling methodology to complete the HPV sub-slab and indoor air sampling activities. Indoor air sampling (Section 3.2) will only be completed if the HPV sub-slab sample data identifies one or more constituents of concern above their respective US EPA's VRSLs.

### **3.1 HPV SUB-SLAB SAMPLING**

SMA will collect one (1) HPV sub-slab sample to assess the vapor intrusion issue due to presence of chlorinated volatile organic compounds (CVOCs) along the southwest property line. The HPV sub-slab sample will be collected by coring a 3-inch diameter hole. The

underlying fill material will be removed via a small diameter hand auger to create a small sump to increase air flow. A 2-inch diameter PVC pipe will be placed into the hole and serve as the sampling test point. To ensure a proper seal, the space between the PVC pipe and the concrete floor will be grouted in place using quick setting hydraulic cement. The cement seal will be allowed to cure a minimum of 30 minutes before sampling. The location of the proposed HPV sub-slab test point is shown on Figure 3.

A sampling manifold will be connected to the HPV sub-slab test point using a Fernco flexible coupler. A vacuum gauge and sampling port installed on the sampling manifold will be used to monitor the overall vacuum applied to the subsurface, the monitoring of the soil gas via a photoionization detector (PID), and the collection of the soil gas sample.

Vacuum will be applied to the sampling manifold via a four to five-foot section of 2-inch diameter PVC pipe. The length of the PVC pipe will provide near linear air flow to facilitate velocity measurements of the soil gas. A sample port within the PVC pipe will allow for the collection of velocity measurements with a digital anemometer (e.g. Dwyer 471). Finally, a vacuum (e.g. Shop Vac) will be connected to the manifold to pull soil gas from the subsurface. The soil gas will be piped to and discharged outside of the building. The general sampling manifold, including the vacuum, sampling ports, and vacuum gauges is shown on Figure 4.

To monitor the radius of influence, three (3) vacuum test points (Vapor Pins) will be installed through the concrete floor at distances between 20 and 25 feet from the sampling point. Vacuum readings will be collected every 15-minutes during the HPV sub-slab sampling event to monitor the performance of the HPV sampling equipment and verify the radius of influence.

The HPV sub-slab sampling event will consist of removing soil gas from the sub-slab at a rate of 25 to 100 ft<sup>3</sup> per minute for a period of 2 hours. After a period of 2 hours, a 6-liter summa canister fitted with a 1-hour flow controller will be collected to the sampling port. With the system drawing soil gas from beneath the sub-slab, the flow controller on the summa canister will be opened to allow the collection of a representative soil gas sample.

The respective soil gas sample will be submitted to a NELAP-certified laboratory for analysis along with proper chain-of-custody documentation and analyzed for VOCs using Modified EPA Method TO-15 SIM for the following compounds:

- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Cis-1,2-Dichloroethene
- Trans-1,2-Dichloroethene
- Tetrachloroethene
- Trichloroethene
- Vinyl Chloride

Upon completion of the sampling activities, the HPV sub-slab sample point and vacuum test points will be backfilled with annular material and patched with concrete to match the existing concrete floor.

### **3.2 INDOOR AIR SAMPLING**

Indoor air sampling will only be completed if the HPV sub-slab sampling data identifies one or more constituents of concern above their respective US EPA's VRSLs.

Prior to the collection of the indoor air samples, SMA will conduct an indoor air building survey and complete an Indoor Air Building Survey and Sampling Form. Information recorded on the form included the building occupants, building characteristics, potential inside and outside contaminant sources, various miscellaneous items, sampling information, meteorological conditions, and any general observations. A copy of the Indoor Air Building Survey Form is provided in Appendix A.

A total of three (3) will be collected in evacuated 6-liter Summa canisters fitted with a regulator and flow controller calibrated for the collection of an air sample over a 24-hour period.

To ensure the air samples were collected from the breathing zone, each Summa canister was placed on a small table and fitted with laboratory supplied tubing supported by a wooden dowel.

To verify that a detected contaminant of concern is associated with the Superior Health Linens building and not associated with offsite ambient air contaminants, SMA will collect one (1) outdoor air sample at a location on the upwind side of the building on the day of sampling. The outdoor air sample will be collected in an evacuated 6-liter Summa canister and fitted with a regulator and flow controller calibrated for the collection of an air sample over an 8-hour period. The Summa canister will be placed in a locked animal crate, fitted with laboratory supplied tubing and secured to a fixed location on the upwind side of the Site on the day of sampling. The sample tubing will be terminated in a downward direction to form a rain cap.

The soil gas samples will be submitted to a NELAP-certified laboratory for analysis along with proper chain-of-custody documentation and analyzed for VOCs using Modified EPA Method TO-15 SIM for the following compounds:

- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Cis-1,2-Dichloroethene
- Trans-1,2-Dichloroethene
- Tetrachloroethene
- Trichloroethene
- Vinyl Chloride

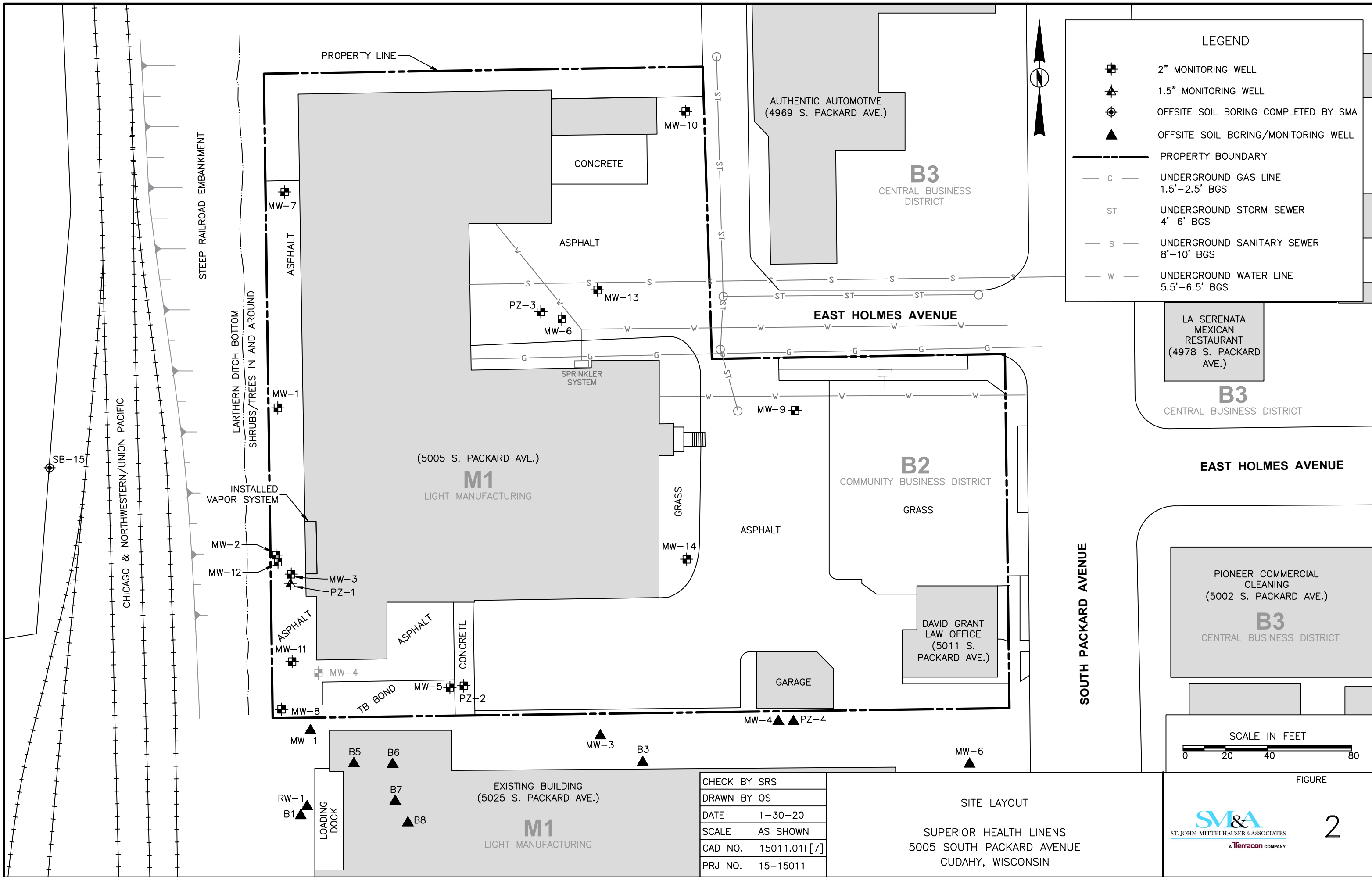
#### **4.0 REPORTING**

The analytical results of the scope of work outlined this work plan, including analytical tables, figures, field data, laboratory reports, and photo documentation will be submitted to the WDNR as part of the Addendum to the SI/ROADR.

## FIGURES







**LEGEND**

- 2" MONITORING WELL
- 1.5" MONITORING WELL
- OFFSITE SOIL BORING COMPLETED BY SMA
- OFFSITE SOIL BORING/MONITORING WELL
- PROPERTY BOUNDARY
- UNDERGROUND GAS LINE  
1.5'-2.5' BGS
- UNDERGROUND STORM SEWER  
4'-6' BGS
- UNDERGROUND SANITARY SEWER  
8'-10' BGS
- UNDERGROUND WATER LINE  
5.5'-6.5' BGS

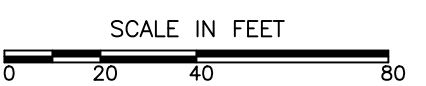
LA SERENATA  
MEXICAN  
RESTAURANT  
(4978 S. PACKARD  
AVE.)

**B3**  
CENTRAL BUSINESS DISTRICT

**EAST HOLMES AVENUE**

PIONEER COMMERCIAL  
CLEANING  
(5002 S. PACKARD AVE.)

**B3**  
CENTRAL BUSINESS DISTRICT



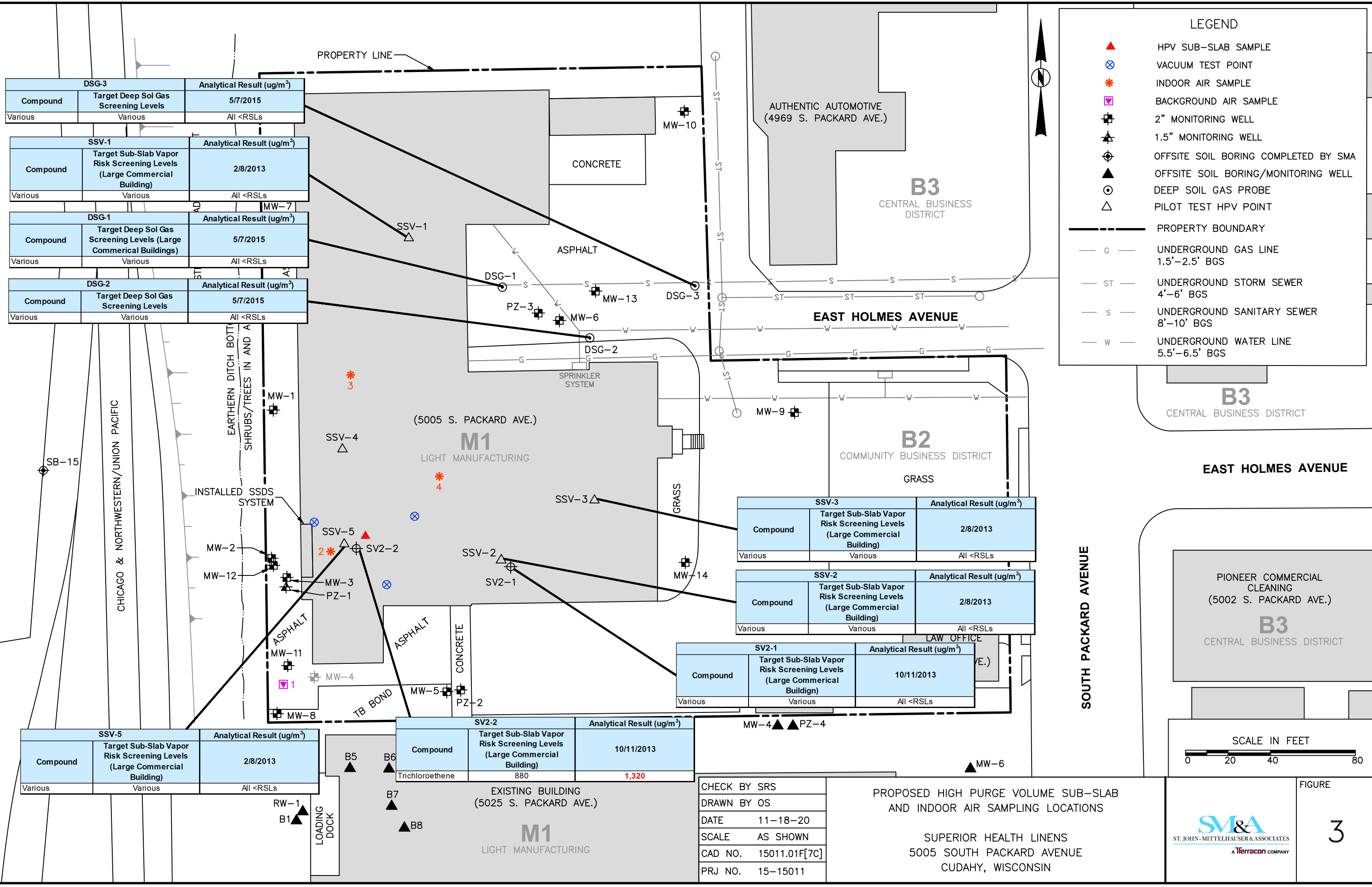
CHECK BY	SRS
DRAWN BY	OS
DATE	1-30-20
SCALE	AS SHOWN
CAD NO.	15011.01F[7]
PRJ NO.	15-15011

**SITE LAYOUT**

SUPERIOR HEALTH LINENS  
5005 SOUTH PACKARD AVENUE  
CUDAHY, WISCONSIN

**FIGURE**

**2**



DSG-3		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Deep Sol Gas Screening Levels	5/7/2015
Various	Various	All <RSLs

SSV-1		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	2/8/2013
Various	Various	All <RSLs

DSG-1		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Deep Sol Gas Screening Levels (Large Commercial Buildings)	5/7/2015
Various	Various	All <RSLs

DSG-2		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Deep Sol Gas Screening Levels	5/7/2015
Various	Various	All <RSLs

SSV-3		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	2/8/2013
Various	Various	All <RSLs

SSV-2		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	2/8/2013
Various	Various	All <RSLs

SV2-1		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	10/11/2013
Various	Various	All <RSLs

SSV-5		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	2/8/2013
Various	Various	All <RSLs

SV2-2		Analytical Result (ug/m <sup>3</sup> )
Compound	Target Sub-Slab Vapor Risk Screening Levels (Large Commercial Building)	10/11/2013
Trichloroethene	880	1,320

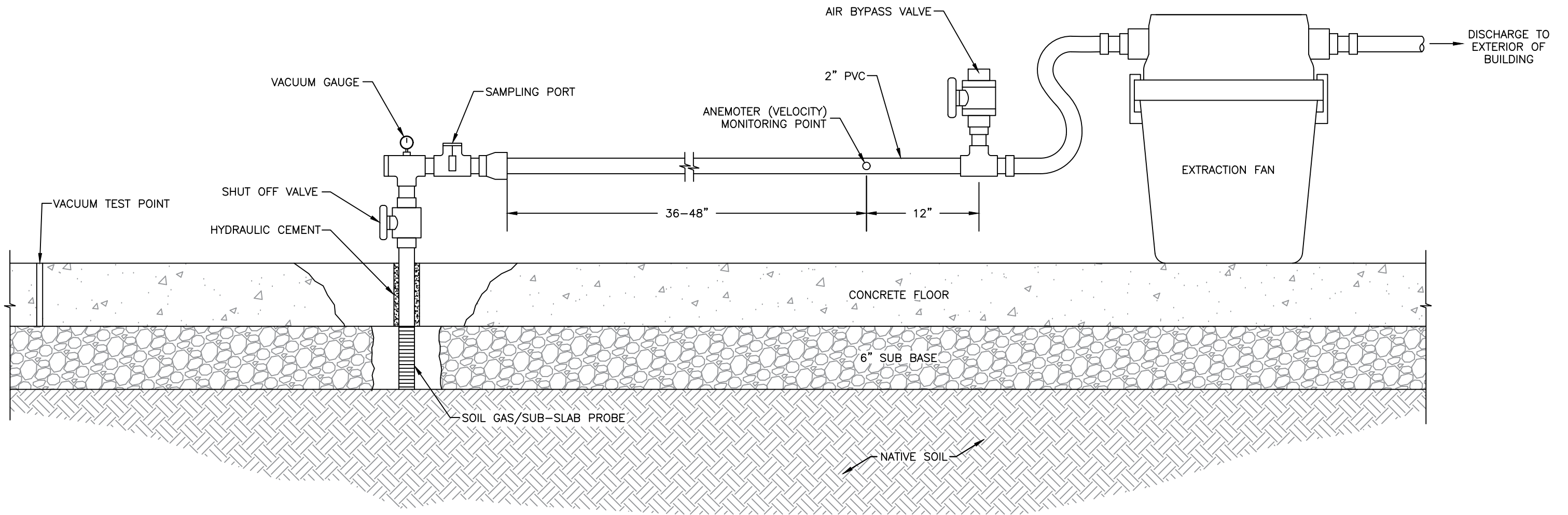
CHECK BY SRS	
DRAWN BY OS	
DATE	11-18-20
SCALE	AS SHOWN
CAD NO.	15011.01F[7C]
PRJ NO.	15-15011

PROPOSED HIGH PURGE VOLUME SUB-SLAB AND INDOOR AIR SAMPLING LOCATIONS

SUPERIOR HEALTH LINENS  
5005 SOUTH PACKARD AVENUE  
CUDAHY, WISCONSIN







CHECK BY	SRS
DRAWN BY	OS
DATE	11-18-20
SCALE	N.T.S.
CAD NO.	15011.01G
PRJ NO.	15-15011

HIGH PURGE VOLUME SUB-SLAB APPARATUS

SUPERIOR HEALTH LINENS  
5005 SOUTH PACKARD AVENUE  
CUDAHY, WISCONSIN



FIGURE

4

## APPENDIX A

# INDOOR AIR BUILDING SURVEY AND SAMPLING FORM

Preparer's name: \_\_\_\_\_ Date: \_\_\_\_\_

Preparer's affiliation: \_\_\_\_\_ Phone #: \_\_\_\_\_

Site Name: \_\_\_\_\_ Project #: \_\_\_\_\_

## Part I - Occupants

Building Address: \_\_\_\_\_

Property Contact: \_\_\_\_\_ Owner / Renter / other: \_\_\_\_\_

Contact's Phone: home ( ) \_\_\_\_\_ work ( ) \_\_\_\_\_ cell \_\_\_\_\_

# of Building occupants: Children under age 13 \_\_\_\_\_ Children age 13-18 \_\_\_\_\_ Adults \_\_\_\_\_

## Part II – Building Characteristics

Building type: residential / multi-family residential / office / strip mall / commercial / industrial

Describe building: \_\_\_\_\_ Year constructed: \_\_\_\_\_

Sensitive population: day care / nursing home / hospital / school / other (specify): \_\_\_\_\_

Number of floors below grade: \_\_\_\_\_ (full basement / crawl space / slab on grade)

Number of floors at or above grade: \_\_\_\_\_

Depth of basement below grade surface: \_\_ ft. Basement size: \_\_\_\_\_ ft<sup>2</sup>

Basement floor construction: concrete / dirt / floating / stone / other (specify): \_\_--\_\_\_\_\_

Foundation walls: poured concrete / cinder blocks / stone / other (specify) \_\_\_\_\_

Basement sump present? *Yes / No* Sump pump? *Yes / No* Water in sump? *Yes / No*

Type of heating system (circle all that apply):

hot air circulation	hot air radiation	wood	steam radiation
heat pump	hot water radiation	kerosene heater	electric baseboard
other (specify): _____			

Type of ventilation system (circle all that apply):

central air conditioning	mechanical fans	bathroom ventilation fans	individual air
window air conditioning units	kitchen range hood fan	outside air intake	
other (specify): _____			

Type of fuel utilized (circle all that apply):

Natural gas / electric / fuel oil / wood / coal / solar / kerosene

Are the basement walls or floor sealed with waterproof paint or epoxy coatings? *Yes / No*

Is there a whole house fan? *Yes / No*

Septic system? *Yes / Yes (but not used) / No*

Irrigation/private well? *Yes / Yes (but not used) / No*

Type of ground cover outside of building: grass / concrete / asphalt / other (specify) \_\_\_\_\_

Existing subsurface depressurization (radon) system in place? *Yes / No* *active / passive*

Sub-slab vapor/moisture barrier in place? *Yes / No*  
 Type of barrier: \_\_\_\_\_

**Part III - Outside Contaminant Sources**

Other stationary sources nearby (gas stations, emission stacks, etc.): \_\_\_\_\_

Heavy vehicular traffic nearby (or other mobile sources): \_\_\_\_\_

**Part IV – Indoor Contaminant Sources**

Identify all potential indoor sources found in the building (including attached garages), the location of the source (floor and room), and whether the item was removed from the building 48 hours prior to indoor air sampling event. Any ventilation implemented after removal of the items should be completed at least 24 hours prior to the commencement of the indoor air sampling event.

<b>Potential Sources</b>	<b>Location(s)</b>	<b>Removed (Yes / No / NA)</b>
Gasoline storage cans		
Gas-powered equipment		
Kerosene storage cans		
Paints / thinners / strippers		
Cleaning solvents		
Oven cleaners		
Carpet / upholstery cleaners		
Other house cleaning products		
Moth balls		
Polishes / waxes		
Insecticides		
Furniture / floor polish		
Nail polish / polish remover		
Hairspray		
Cologne / perfume		
Air fresheners		
Fuel tank (inside building)		
Wood stove or fireplace		
New furniture / upholstery		
New carpeting / flooring		
Hobbies - glues, paints, etc.		

Part V – Miscellaneous Items

Do any occupants of the building smoke?      *Yes / No*      How often? \_\_\_\_\_

    Last time someone smoked in the building?      \_\_\_\_\_ hours / days ago

Does the building have an attached garage directly connected to living space?      *Yes / No*

    If so, is a car usually parked in the garage?      *Yes / No*

    Are gas-powered equipment or cans of gasoline/fuels stored in the garage?      *Yes / No*

Do the occupants of the building have their clothes dry cleaned?      *Yes / No*

    If yes, how often?      weekly / monthly / 3-4 times a year

Do any of the occupants use solvents in work?      *Yes / No*

    If yes, what types of solvents are used? \_\_\_\_\_

    If yes, are their clothes washed at work?      *Yes / No*

Have any pesticides/herbicides been applied around the building or in the yard?      *Yes / No*

    If so, when and which chemicals? \_\_\_\_\_

Has there ever been a fire in the building?      *Yes / No*      If yes, when? \_\_\_\_\_

Has painting or staining been done in the building in the last 6 months?      *Yes / No*

    If yes, when \_\_\_\_\_ and where? \_\_\_\_\_

Part VI – Sampling Information

Sample Technician: \_\_\_\_\_ Phone number: \_\_\_\_\_

Sample Source: Indoor Air / Sub-Slab / Near Slab Soil Gas / Exterior Soil Gas

Sampler Type: Tedlar bag / Sorbent / \_\_\_\_\_ / Other (specify): \_\_\_\_\_

Analytical Method: TO-15 / TO-17 / \_\_\_\_\_ Cert. Laboratory: \_\_\_\_\_

Sample locations (floor, room):

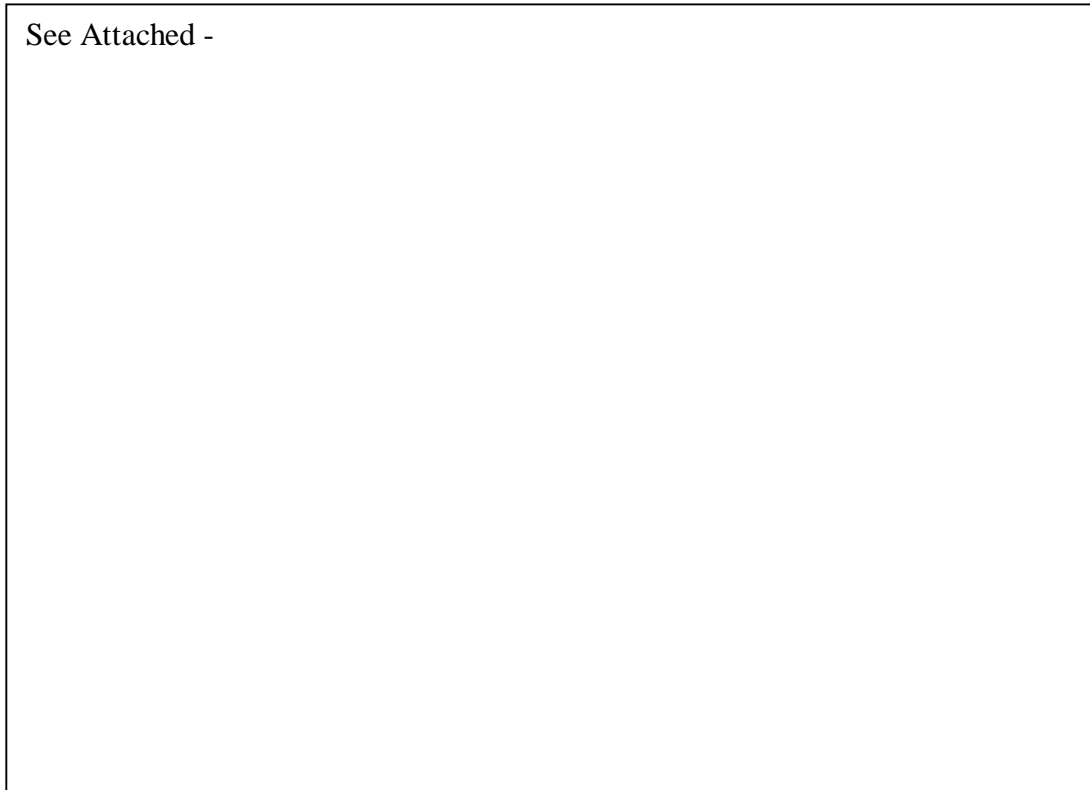
Field ID # \_\_\_\_\_ Field ID # \_\_\_\_\_

Field ID # \_\_\_\_\_ Field ID # \_\_\_\_\_



*Provide Drawing of Sample Location(s) in Building*

See Attached -



Part VII - Meteorological Conditions

Was there significant precipitation within 12 hours prior to (or during) the sampling event?    *Yes / No*

Describe the general weather conditions: \_\_\_\_\_

Part VIII – General Observations

Provide any information that may be pertinent to the sampling event and may assist in the data interpretation process.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(NJDEP 1997; NHDES 1998; VDOH 1993; MassDEP 2002; NYSDOH 2005; CalEPA 2005)