148 NAGLE SITE
148 NAGLE AVENUE
NEW YORK, NY

OFF SITE SOIL VAPOR INTRUSION WORK PLAN

March 2021

Prepared for:
Dyckman Crestview Realty, LLC
279 West 231st Street
Bronx, New York, 10463

Prepared By:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

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CERTIFICATION

I, A.Czemerinski, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Off Site Soil Vapor Intrusion 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).

Date 3/25/2021

1.0 INTRODUCTION

This Off Site Soil Vapor Intrusion Work Plan (SVIWP) was prepared on behalf of Dyckman Crestview Realty, LLC of a property located at 148 Nagle Avenue, New York, New York which is known as the 148 Nagle Site.

The purpose of this soil vapor intrusion work plan will be to evaluate if indoor air exposures are occurring or have the potential to occur, via the soil vapor intrusion pathway in off-site buildings. The study will include the sampling and analysis of subslab, indoor and outdoor air samples at four properties identified as follows:

6-Story Residential Building: 9 Thayer Street New York, New York 10040
6-Story Residential Building: 151 Nagle Avenue New York, New York 10040
2-Story Commercial Building: 156 Nagle Avenue New York, New York 10040
5-Story Residential: 140 Nagle Avenue New York, New York 10040

1.1 Site Location and Description

The Site is located at 148 Nagle Avenue, New York, New York (**Figure 1**) and is comprised of a single tax lot (Block 2174, Lot 70) totaling 10,000 square feet (0.175 acres). The Site is located in the City of New York and Borough of New York (Manhattan). The Site is square shaped with 100 feet of street frontage along Nagle Avenue and 100 feet of street frontage along Thayer Street (**Figure 2**). The Site is currently improved with a 1- story 2,000 square foot commercial building occupied by a laundromat. Previously, a one-story 6,000 square foot retail building which housed a dry cleaner was also present on the property. The 6,000 sf building was destroyed in a fire. The cellar level of the 6,000 sf building was filled in following the fire and subsequent building demolition. The concrete cellar slab remains at a depth of approximately 10 feet below grade.

The area immediately surrounding the Site is a densely developed urban area, consisting primarily of residential and mixed-use (commercial/retail and residential) properties. A muli-family residential building (9 Thayer Street) border the site to the north. Nagle Avenue is to the south beyond which is multi family residential building (151 Nagle Avenue). Thayer Street borders the site to the west beyond which is developed with a is multi family residential building (140 Nagle Avenue). Commercial buildings (156 Nagle Avenue) border the site to the east.

During the RIR investigation, Air samples were collected from six soil gas implants (SG1 – SG6), three sub-slab soil vapor points (SS1-SS3), four indoor air samples (IA4) and one outdoor air sample (OA1).

Total petroleum-related VOCs were detected in all on-site soil gas and subslab soil vapor samples at generally low concentrations. With the exception of a low detection of toluene in one sample, petroleum VOCs were not reported in the indoor or outdoor air samples.

One or more CVOCs were also detected in all of the soil gas, subslab and indoor / outdoor air samples collected. PCE was reported in all five soil gas samples collected and ranged from 269 $\mu g/m^3$ at SG6 located in the north–central area of the Site to 58,600 $\mu g/m^3$ in SG2 located within

the source area. TCE was also reported in all five soil gas samples and ranged from 5.69 µg/m^3 in SG5 to 3,820 µg/m^3 in SG2. Cis-DCE was reported in all five samples ranging from 8.64 µg /m^3 in SG5 to 7,850 µg/m^3 in SG2. Trans-DCE was reported in three of the five samples and ranged from 8.08 µg /m^3 in SG4 to 109 µg/m^3 in SG2. Vinyl chloride was reported in all five sample ranging from 0.58 µg /m^3 in SG6 to 149 µg/m^3 in SG1.

CVOCs in subslab / indoor air pairings were reported for PCE in SS1/IA1 as 16.8 / 0.86 µg/m^3, in SS2/IA2 as 11 / 1.08 µg/m^3, and in SS3/IA3 as 13.6 / 1.76 µg/m^3. TCE was reported in the pairings as 0.7 µg/m^3/ND for SS1/IA1, 1.48 µg/m^3/ND for SS2/IA2 and 1.3 /0.33 µg/m^3 for SS3/IA3. Cis-DCE was reported in the pairings as 0.64µg/m^3/ND for SS1/IA1, 5.75 /0.31 µg/$m^3$for SS2/IA2 and ND /0.35 µg/m^3 for SS3/IA3. Vinyl chloride was not reported in any of the pairings. IA4 which was not associated with a corresponding subslab sample had concentrations of PCE 0.86 µg/m^3, TCE ND, cis-DCE 0.26 µg/m^3 and ND for vinyl chloride. The outdoor air sample reported PCE at 0.43 µg/m^3. TCE, cis-DCE and vinyl chloride were all ND.

Based on the results of the Remedial Investigation Report (RIR) performed at the Site, petroleum-related VOCs were identified at low levels in soil vapor samples. One or more CVOCs were also detected in all of the soil gas, subslab and indoor / outdoor air samples collected. As expected, CVOCs were highest in the source area, diminishing with distance towards the rear of the property. The highest concentration of tetrachloroethene (PCE) in soil vapor was 58,600 micrograms per cubic meter (µ/m3) at SG2.

When compared to the NYSDOH decision matrices, subslab / indoor air sample pairings indicated no further action. In addition, neither PCE nor TCE were reported in the indoor laundromat building air samples above their ambient air guidelines. Soil vapor intrusion data pertaining to the current on site laundromat, indicated that no further actions are required at this time. The highly elevated levels of CVOCs were detected in the source area. Further information regarding the remediation of the Site can be found in the Remedial Investigation Report (RIR) prepared by EBC and dated February 2021.

2.0 SAMPLING AND ANALYIS PLAN

The purpose of this soil vapor intrusion work plan will be to evaluate if indoor air exposures are occurring or have the potential to occur, via the soil vapor intrusion pathway in off-site buildings.

The investigation will be performed in accordance with the procedures detailed in NYSDEC DER 10 (May 2010) and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

The SVI sampling event will include the following Samples:

- Collect three to five sub-slab vapor samples from within the cellar level of each building;
- Collect three to five indoor ambient air samples from the breathing zone of the cellar level in each building; and,
- Collect one ambient outdoor air sample at each building.

See **Figure 2** for the location of subslab, indoor air and outdoor air sampling locations.

2.1 Building Conditions

9 Thayer Street New York, New York 10040: The property is improved with six-story residential building constructed in at least 1927. According to a certificate of occupancy (CO) dated 1927, the building has a cellar level and all uppper floors are used as residentail spaces. The site has eighty nine residentail units.

151 Nagle Avenue New York, New York 10040: The property is improved with a six-story mixed use residential and commerical building constructed in at least 1924. The first floor appears to be dweveloped with retail stores and upper floors appear to be residential. No Cos were avaible on NYCDOBs website for review.

156 Nagle Avenue New York, New York 10040: The property is improved with a two-story commercial building. According to the CO dated 2004, the building has a cellar level which is used for storage. The first floor is commercial –which is occupied by stores and medical offices. The site has thirty one residentail units.

140 Nagle Avenue New York, New York 10040: The property is improved with a five-story residential building constructed in 1924. According to the CO dated 1924, the building has a cellar level which is used for tenant homes. The first to 5th floors are residential spaces. The site has fourty seven residential units.

The type of HVAC / heating system in each building is unknown though it is highly likely that the heating systems are operating at the present time. Prior to collecting the samples, a pre-sampling inspection will be performed to gather information regarding the building's characteristics such as air flow patterns; heating, venting and air conditioning (HVAC); utilities; chemical and maintenance product inventory; and any other factors that may affect indoor air quality in the areas to be sampled.

A NYSDOH Indoor Air Quality Questionnaire and Building Inventory form will be used to document the building conditions and any chemicals that may be present. A photoionization detector will be used during the survey to screen for VOCs near windows and air supply vents. A floor plan sketch was drawn for the indoor air sampling locations. A copy of the NYSDOH Indoor Air Quality Questionnaire and Building Inventory form is provided in **Appendix A**.

2.2 Subslab Vapor Sampling Procedure

The sub-slab soil vapor implants (SS1-SS16) will be installed by drilling a ½-inch hole through the concrete slab with a handheld drill and inserting ¼-inch polyethylene tubing to no more than 3 inches below the base of the slab. The tubing will then be sealed at the surface with hydrated granular bentonite and a 6" x 6" (approximate) plastic sheet.

After installation, one to three volumes (i.e., the volume of the sample tube) will be purged prior to collecting the samples to ensure samples collected are representative. Flow rates for both purging and collecting will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. Samples will be collected in Summa® canisters which have been certified clean by the laboratory and analyzed by using USEPA Method TO-15. All samples will be collected over a 24-hour period of time and submitted to a NYSDOH certified laboratory.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serves as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a box will serve to keep it in contact with the probe during the testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration.

Prior to beginning sample collection, the canister identification number, flow regulator identification number and sample ID will be recorded on the sample tag attached to each canister. Sampling will then be initiated by fully opening the flow control valve on each canister in turn. Immediately after opening the flow control valve on a canister, the initial vacuum (inches of mercury) will be recorded on the sample tag and in a bound field notebook. When the vacuum level in the canister is between 5 and 8 inches of mercury (approx. 24 hours), the flow controller valve will be closed, and the final vacuum recorded on the sample tag.

Each of the summa-canisters will be submitted to Phoenix Environmental Laboratories of Manchester Connecticut (NYSDOH Lab I.D. No. 11301) for laboratory analysis of VOCs by EPA method TO15.

2.3 Indoor / Outdoor Air Sampling Procedure

One indoor air sample (IA1-IA16) placed approximately 3 ft above the ground will be collected concurrent with and co-located with each of the subslab soil vapor samples. One outdoor air sample (OA1-OA4) placed approximately 3 ft above the ground and in the upwind direction will also be collected at each building. Samples will be collected over a 24hr period in Summa® canisters which have been certified clean by the laboratory.

Prior to beginning sample collection, the canister identification number, flow regulator identification number and sample ID will be recorded on the sample tag attached to each canister. Sampling will then be initiated by fully opening the flow control valve on each canister in turn. Immediately after opening the flow control valve on a canister, the initial vacuum (inches of mercury) will be recorded on the sample tag and in a bound field notebook. When the vacuum level in the canister is between 5 and 8 inches of mercury (approx. 24 hours), the flow controller valve will be closed, and the final vacuum recorded on the sample tag.

Each of the summa-canisters will be submitted to Phoenix Environmental Laboratories of Manchester Connecticut (NYSDOH Lab I.D. No. 11301) for laboratory analysis of VOCs by EPA method TO15.

In accordance with the NYSDOH-Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Oct. 2006, and revised versions), indoor and ambient air sample laboratory detection limits for five compounds, namely trichloroethene; cis 1,2-dichloroethene; 1,1-dichloroethene; carbon tetrachloride and vinyl chloride, will be 0.20 micrograms per cubic meter (µg/m3) or less. These detection limits can be achieved by using EPA Method TO-15, Select Ion Monitoring.

2.4 Laboratory Analysis

Samples will be submitted to the laboratory for a standard turnaround time, which is estimated to be one to two weeks. The proposed sampling program is summarized in **Table 1**.

Analytical procedures and corresponding reporting limits will be identified when reporting the sampling results. Samples will be analyzed for volatile organic compounds (VOCs) by USEPA Method TO-15. All samples will be analyzed by a New York State ELAP-certified environmental laboratory.

In accordance with the NYSDOH-Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Oct. 2006, and revised versions), indoor and ambient air sample laboratory detection limits for five compounds, namely trichloroethene; cis 1,2-dichloroethene; 1,1-dichloroethene; carbon tetrachloride and vinyl chloride, will be 0.20 micrograms per cubic meter (µg/m3) or less. These detection limits can be achieved by using EPA Method TO-15, Select Ion Monitoring.

2.5 Management of Investigation Derived Wastes

Investigation derived waste includes disposable sampling equipment generated during the remedial investigation.

Disposable sampling equipment (gloves, tubing, acetate liners, etc.) will be placed in heavy-duty plastic bags and disposed of properly.

3.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged and transported via laboratory dispatched courier to the analytical laboratory.

Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability report (DUSR). The DUSR will be applicable to all samples collected during the RI. The QAPP prepared for the Site is provided in **Appendix B**.

3.1 Subslab Vapor and Indoor / outdoor Air Samples

Extreme care will be taken during all aspects of sample collection to ensure that sampling error is minimized and high quality data are obtained. The sampling team members will avoid actions (e.g., using permanent marker pens and wearing freshly dry-cleaned clothes or personal fragrances) which can cause sample interference in the field. A tracer gas, helium, will be used in accordance with NYSDOH sampling protocols to serve as a QA/QC device to verify the integrity of the soil vapor probe seals. QA/QC protocols will be followed for sample collection and laboratory analysis, such as use of certified clean sample devices, meeting sample holding times and temperatures, sample accession, and chain of custody.

Samples will be delivered to the analytical laboratory as soon as possible after collection. The laboratory analyzes QC samples with each analytical batch, including a Method Blank (MB), Laboratory Control Sample (LCS), and a Laboratory Control Sample Duplicate (LCSD). Internal standards are added to all calibration standards, samples, and blanks to verify that the analytical system is in control.

3.2 Reporting of Results

Draft soil vapor intrusion data, sampling location figures and completed Building Questionnaires and Product Inventories (for each sampled building) will be provided to the NYSDEC and the NYSDOH Project Managers as soon as the draft data is available.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format (EQuIS).

3.3 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the

site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RIWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this SVI will be included in the SVI Report prior to its formal approval.

3.4 OFF SITE ACCESS

EBC will distribute a request for access to each of the owners listed on the deeds for the properties notes above. A copy of these SVI access letters will be submitted to DEC for approval and once approved the letter will be mailed via certified mail. The certified mail receipts will be provided to DEC. Draft SVI Access letter are included in Appendix C.

4.0 SOIL VAPOR INTRUSION REPORT

Following completion of the investigation and receipt of the analytical data, EBC will prepare a Soil Vapor Intrusion Report (SVIR) in accordance with DER10. The SVIR will include the following:

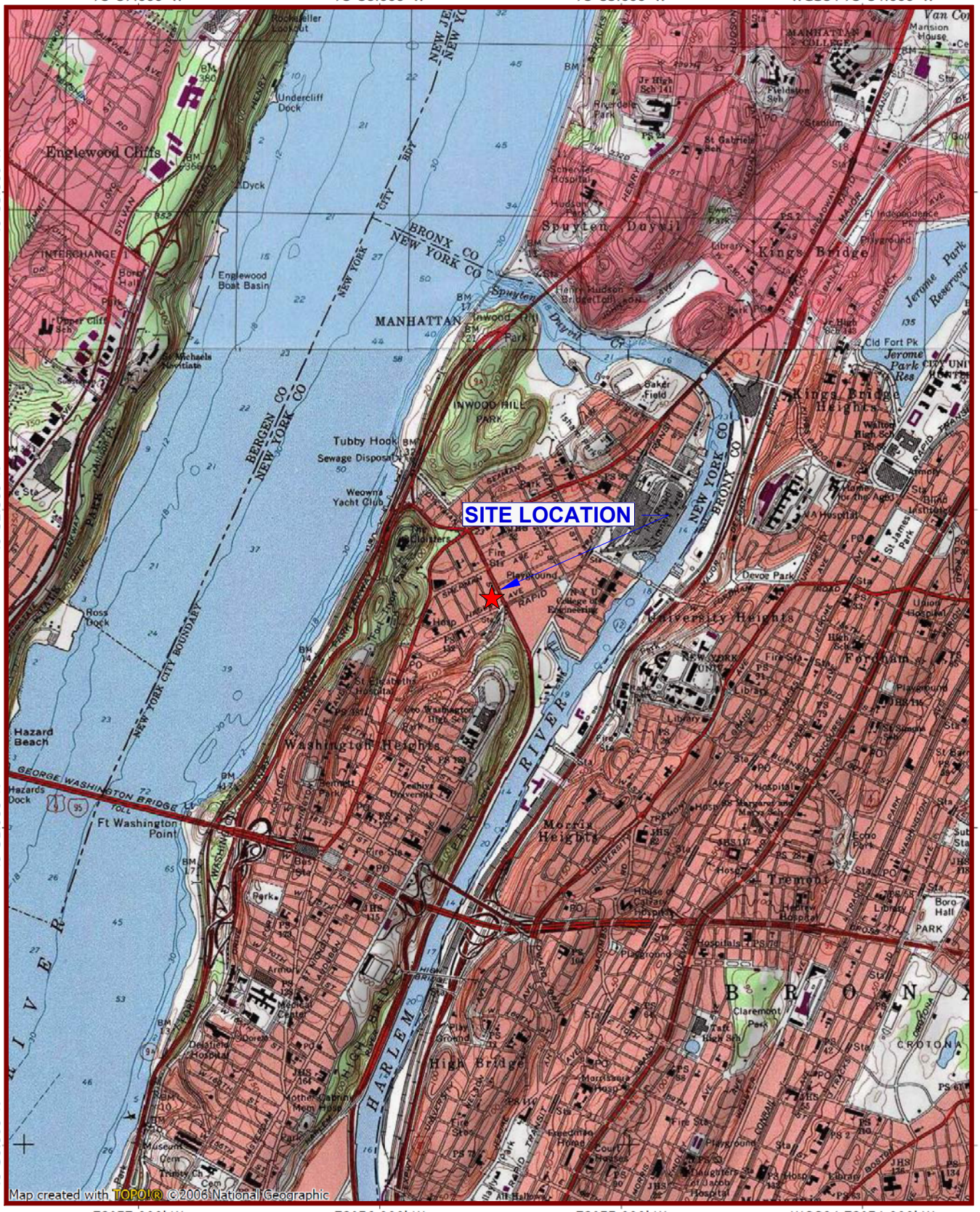
1. A description of the work which was performed under the SVI.
2. Any modification from this work scope and the reason for the modifications
3. The nature and extent of contaminants in soil vapor and the potential for migration into adjacent buildings
4. Analytical data in tabular form comparing results to NYSDOH Decision Matrices.
5. Data figures
6. Laboratory analytical data, sampling logs for all samples and areas covered by the investigation
7. Scaled drawings showing the locations of temporary sampling points
8. Laboratory analytical data, sampling logs for all samples and areas covered by the investigation
9. Scaled drawings showing the locations of temporary sampling points

TABLES

TABLE 1
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Subslab Soil Vapor	3 to 5 subslab soil vapor points to be installed in the each adjacent building.	16	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Ambient air	3 to 5 air samples collected concurrent with subslab soil vapor samples in each building	16	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Outdoor air	1 air samples collected concurrent with subslab soil vapor samples and indoor air sample for each building	4	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Total (Soil Gas and Air)		36		

FIGURES



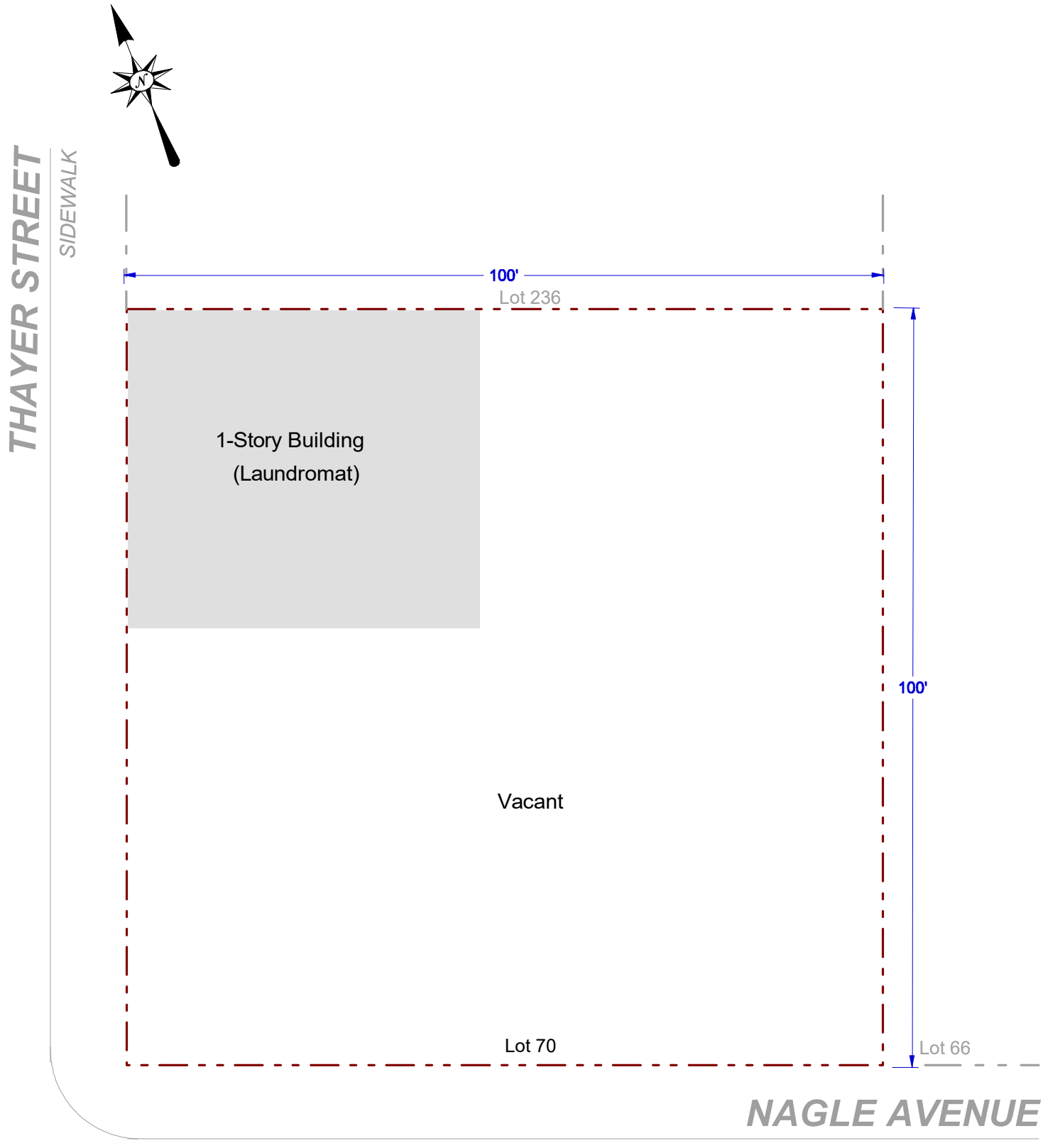
EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 1

Site Name: 148 Nagle Site

Site Address: 148 Nagle Avenure, Manhattan, NY

Drawing Title: Site Location Map



SCALE:

0 9 18

Scale 1 Inch = 18 feet

KEY:

Property Boundary

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 2

Site Name: 148 NAGLE SITE

Site Address: 148 NAGLE AVENUE, MANHATTAN, NY

Drawing Title: SITE PLAN

EBC
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Fax 631. 924 .2870

Figure No. 3

Site Name: 148 NAGLE SITE

Site Address: 148 NAGLE AVENUE, MANHATTAN, NY

Drawing Title: OFF-SITE SOIL VAPOR LOCATION MAP

APPENDIX A
NYSDOH Building Condition / Chemical Inventory Forms

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

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.

OSR – 3 Example 1 Correct

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 Mary Jones Date/Time Prepared 10/22/04 10:00am

Preparer's Affiliation XYZ Consulting Phone No. 518-555-1212

Purpose of Investigation Thomasville Soil Vapor Intrusion Investigation (Site#32141)

1. OCCUPANT:

Interviewed: (Y)/ N

Last Name: Smith First Name: Carol

Address: 25 Main Street Thomasville, New York 25230

County: Albany

Home Phone: 518-556-2222 Office Phone: 518-556-2400

Number of Occupants/persons at this location 2 Age of Occupants 36, 10

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

Interviewed: Y (N)

Last Name: White First Name: Frank

Address: 64 Mountain Road Bainbridge, New York 26390

County: Dutchess

Home Phone: 845-876-1301 Office Phone: 845-227-2430

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

(Residential)	School	Commercial/Multi-Use
Industrial	Church	Other: _____

Example Correct 2

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? NA

If the property is commercial, type?

Business Type(s) NA

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

Other characteristics:

Number of floors 1 Building age 20 years

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

Basement air flows up to 1st floor through plumbing waste line and domestic water line floor penetrations

Airflow near source

Yes, furnace/oil tank area open to rest of basement

Outdoor air infiltration

Outdoor air enters at loose bilco doorway openings, and at sill plate near furnace.

Infiltration into air ducts

Basement air flows into bottom of hot air unit and in loose cold air return joints.

Example Correct

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: 6 (feet)

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

Floor drain in laundry area

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: gas

Boiler/furnace located in:	(Basement)	Outdoors	Main Floor	Other _____
Air Conditioning:	Central Air	(Window units)	Open Windows	None

Example Correct

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.

Cold air return ductwork on ceiling in basement. Cold air return joints appear loose.

7. OCCUPANCY

Basement / Is lowest level occupied? Full time Occasionally (Seldom) Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	Storage and laundry
1st Floor	living area and bedrooms
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 etc.) (Y) N / NA Please specify lawnmower, car

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? w/in week - windex, tilex

i. Have cosmetic products been used recently? (Y) N When & Type? yesterday - hairspray

Example Correct

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? carpet in dining room

l. Have air fresheners been used recently? Y / (N) When & Type? _____

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

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, automechanic or autobody shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist etc.)

If yes, what types of solvents are used? hair salon dyes, alcohols, peroxides, acetone

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

Is there a radon mitigation system for the building/structure? (Y) / N Date of Installation: June 2000
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: not applicable

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

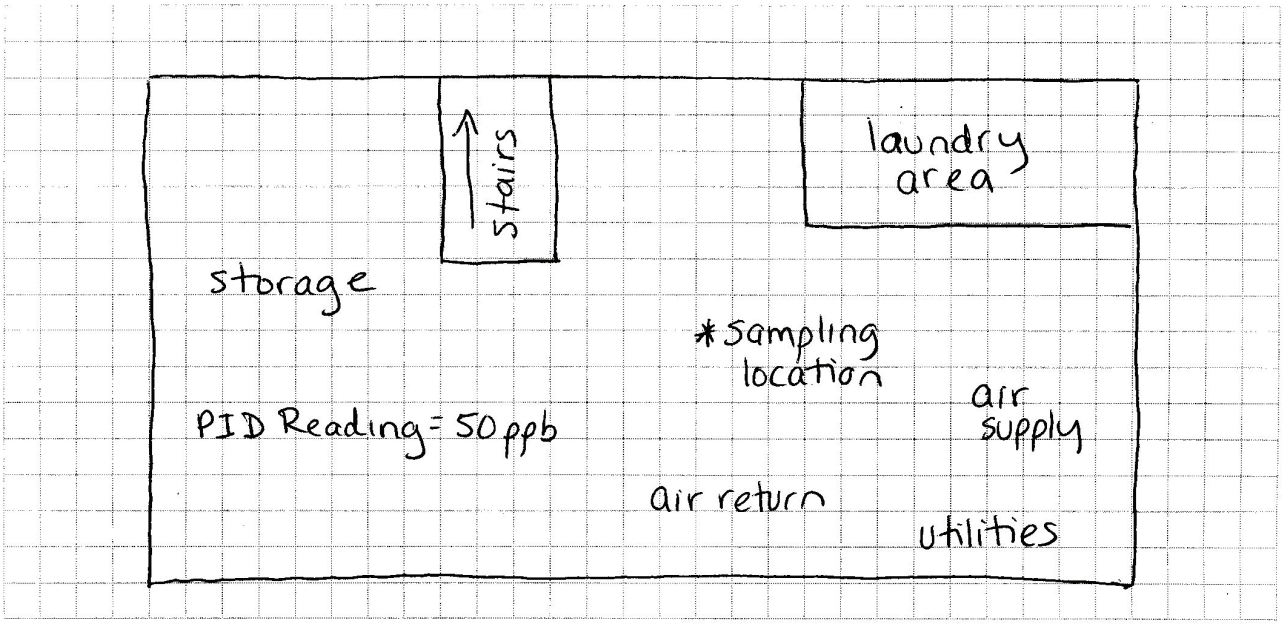
d. Relocation package provided and explained to residents? Y / N

Example Correct

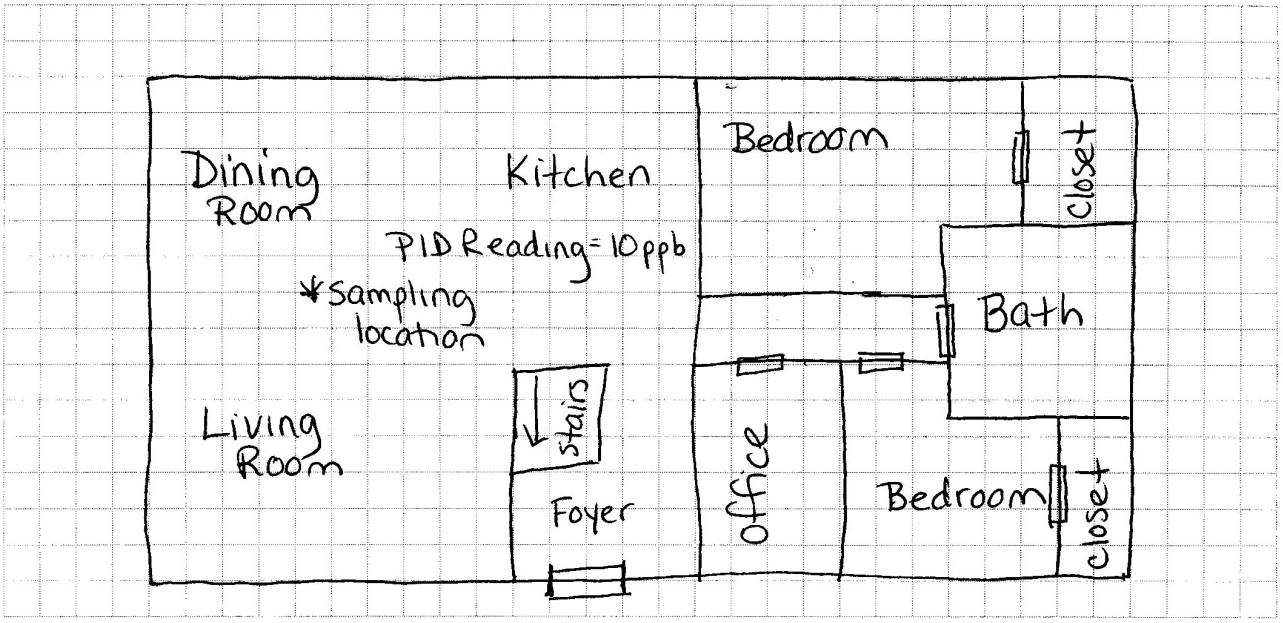
11. FLOOR PLANS

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:

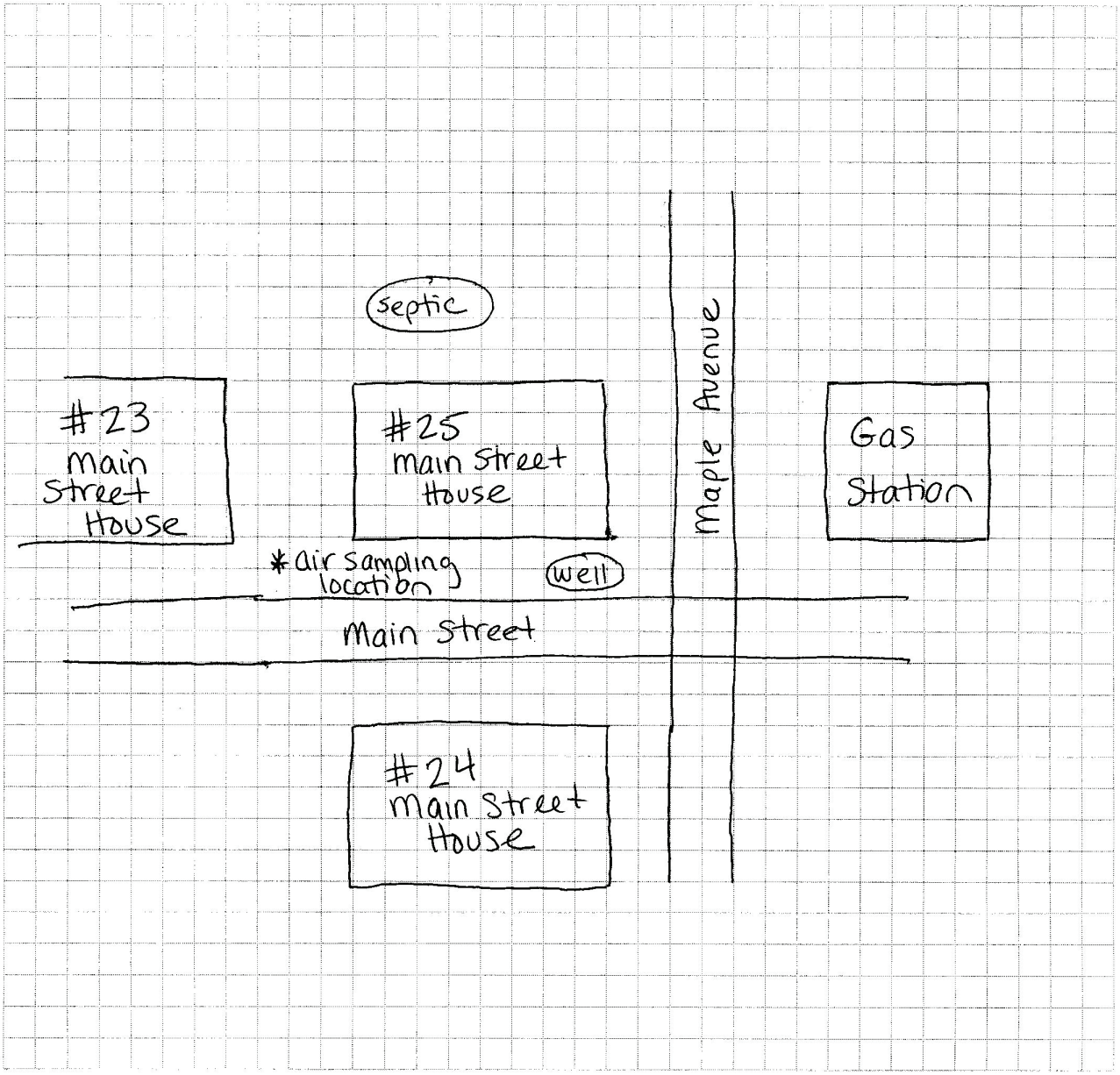


Example Correct 7

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.



N

Wind direction = NE

Example Correct 8

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: RAE photoionization detector

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

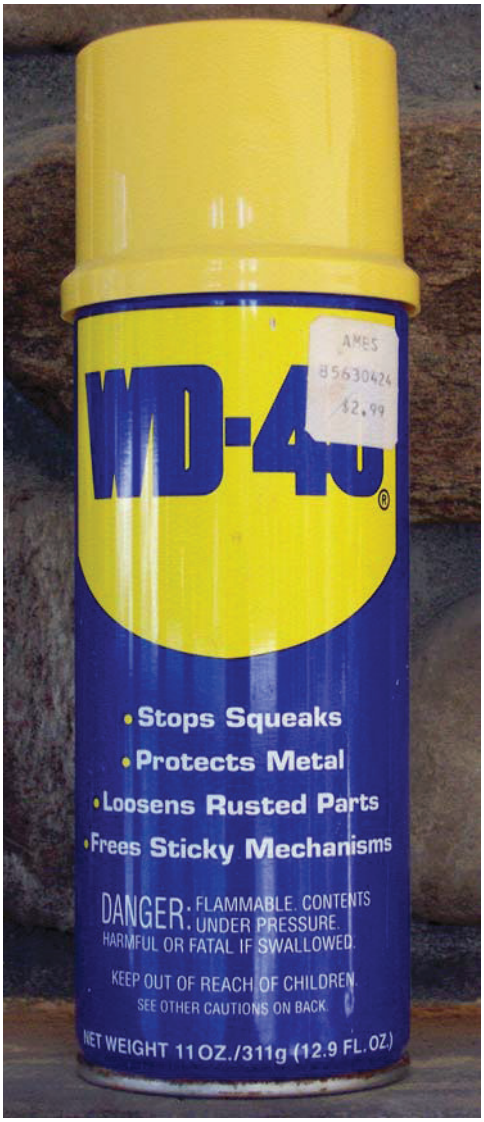
Location	Product Description	Size (oz.)	Condition*	Chemical Ingredients	Field Instrument Reading	Photo** Y / N
Kitchen	WD-40	12oz	UO	See photo	10 ppb	Y
garage	mineral spirits	24oz	U	benzene, toluene	15 ppb	N
garage	American Semi-Gloss latex paint	64oz	U	titanium dioxide, ethylene, glycol, aluminum hydroxide, 2,2,4-trimethyl 1-1,3-pentanediol isobutyrate, Vinyl acetate	2 ppb	N
garage	Krylon Semi-gloss oil paint	64oz	D	butane, propane, titanium dioxide, xylene, ethylbenzene, acetone, MEK, butanol, MIK	10 ppb	N
garage	Rustoleum	12oz	U	talc, calcium carbonate, titanium dioxide, xylene, ethylbenzene, acetone, liquified petroleum gases, pentaerythritol	4 ppb	N
garage	Deep 6 Double Strength Insect Repellent	8oz	D	propane, isobutane, N,N-Diethyl-meta-toluamide, Di-n-propyl isocinchomeronate	0.5 ppb	N
basement	12 cans latex paint	128oz	U	talc, titanium dioxide, Kaolin clay, 2,24-trimethyl-1,3 pentanediol isobutyrate, vinyl acetate	0	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**

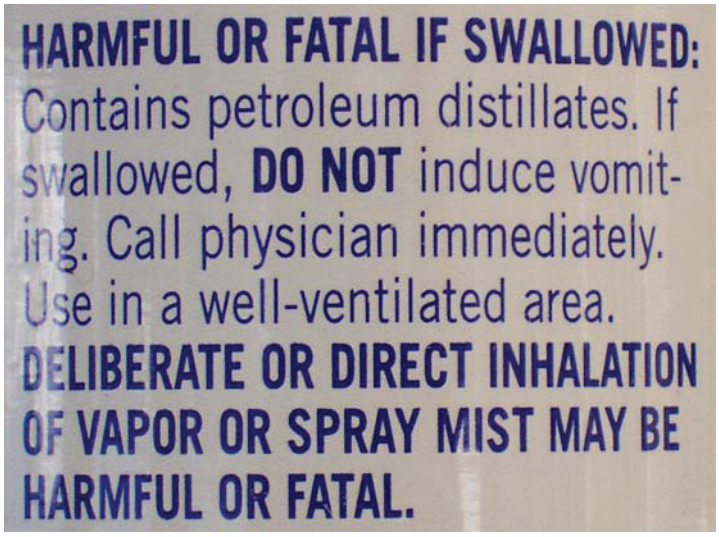
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Attachment — 25 Main Street, City

WD-40 FRONT



WD-40 INGREDIENTS



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APPENDIX B
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
148 Nagle Avenue, New York, NY

Prepared on behalf of:

Dyckman Crestview Realty, LLC
279 West 231st Street
Bronx, New York, 10463

MARCH 2021

Prepared by:

EBC
Environmental Business Consultants
Ridge, NY 11961

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QUALITY ASSURANCE PROJECT PLAN
148 Nagle Avenue
New York, NY

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1.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved work plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Kevin Brussee will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. As Project Director, Mr. Brussee will also serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Chawinie Reilly will serve as the Project Manager and will be responsible for implementation of the Remedial Investigation and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Tom Gallo; who will serve as the on-Site qualified environmental professional who will record observations, direct the drilling crew and be responsible for the collection and handling of all samples.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager

.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Operations	Supervision of Field Crew, sample collection and handling	T. Gallo, EBC
Project Manager	Implementation of the RI according to the RIWP.	C. Reilly, EBC
Laboratory Analysis	Analysis of soil, groundwater and soil vapor samples by NYSDEC ASP methods	NYSDOH-Certified Laboratory
Data review	Review for completeness and compliance	3rd party validation

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2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory that is certified in the appropriate categories. Data generated from the laboratory will be used to evaluate contaminants such as chlorinated and other volatile organic compounds (VOCs) in soil vapor. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005) and useful for comparison with clean-up objectives. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP 07/2005).

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte free matrix which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the

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entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Trip Blanks.

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will not be opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSD/MSB) Analysis

No MS, MSD and MSB analyses will be performed with this investigation for soil vapor.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

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Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 + D^2)/2} \times 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Investigation Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP Category B reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records

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- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

2.9 Sample Handling and Decontamination Procedures

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4ºC.

Dedicated disposable sampling materials will be used for soil, groundwater and soil vapor samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of one for every eight samples collected. No field filtering will be conducted; any required filtration will be completed by the laboratory.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory and duplicate samples will be collected at a rate of one per ten samples submitted to the laboratory.

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3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for one or more of the following parameters: VOCs in air by USEPA Method TO15 (Table 2). If any modifications or additions to the standard procedures are anticipated and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

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4.0 DATA REDUCTION, VALIDATION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

Sample analysis will be provided by a New York State certified environmental laboratory. All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples, if analyzed, will be in results only format and will not be evaluated in the DUSR.

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5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

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TABLE 1
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Subslab Soil Vapor	3 to 5 subslab soil vapor points to be installed in the each adjacent building.	16	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Ambient air	3 to 5 air samples collected concurrent with subslab soil vapor samples in each building	16	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Outdoor air	1 air samples collected concurrent with subslab soil vapor samples and indoor air sample for each building	4	For use in evaluating soil vapor samples using NYSDOH decision matrices	VOCs EPA Method TO15
Total (Soil Gas and Air)		36		

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

Sample Type	Matrix	Sampling Device	Parameter	Sample Container	Sample Preservation	Analytical Method#	CRQL / MDL	Holding Time
24 hr Avg	Soil Gas	6-Liter Summa Canister	VOCs	6-Liter Summa Canister	None	EPA Method TO15	<0.5 ppbv	30 days if pressure difference between sampling and analysis is <5psi

Notes:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit
NA = Not available or not applicable.

APPENDIX C
SVI Access Letters

Certified, Return Receipt Requested

March 22, 2021

John Mavroudis
GVS Properties IV LLC
C/O Alma Realty
31-10 37th Avenue, Suite 500
Long Island City, NY 11101

Sub: Request for Access to conduct a soil vapor investigation at
9 Thayer Street, New York, NY 10040
(Block 2174 Lot 236)

Re.: 148 Nagle
148 Nagle Avenue
Manhattan, NY 10040
BCP Site #C231124

Dear John Mavroudis:

New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Environmental Business Consultant (EBC) request your cooperation for conduct a soil vapor intrusion (SVI) investigation at your property at 9 Thayer Street, Manhattan, NY. This investigation is voluntary and will only be conducted with your written permission. Additionally, the SVI investigation will be performed at no cost to you or the occupant. The SVI investigation will be conducted by Environmental Business Consultant (EBC), hired by Dyckman Crestview Realty, LLC, the owner of the "148 Nagle" Brownfield Cleanup Program ("BCP") site (Site No C231124).

148 Nagle is a BCP Site located at 148 Nagle Avenue, Manhattan (the "BCP Site"), which is adjacent to your Property. The BCP Site is currently undergoing an environmental investigation and cleanup under the NYSDEC Brownfield Cleanup Program to address tetrachloroethylene (PCE) and its degradation products in soil, soil vapor and groundwater beneath the BCP Site.

As part of the investigation, the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) request that the owner of the BCP Site conduct a SVI investigation at your property, which includes collection and analyses of soil vapor samples from beneath the basement floor and from the indoor air. The bore hole into the basement floor will be less than 1 inch in diameter and will extend to 6 inches below the slab. The sampling duration will be 24 hours. At the termination of the collection of the sub-slab vapor sample, the bore hole will be properly sealed. The purpose of this investigation is to delineate the possible off-site extent of soil vapor associated with PCE and its degradation products.

EBC personnel will coordinate the exact sampling location with you or your designated representative. Please note that the sampling canisters should not be touched or moved after they are set up by EBC personnel.

Once the laboratory results for the sub-slab soil vapor and indoor air samples are received, results will be validated, and a copy of the SVI results will be forwarded to you by the Department and the New York State Department of Health (NYSDOH).

Please respond to this letter by April 16, 2021. If so, you will not receive a second letter requesting your positive or negative response. EBC understands if you decline this complimentary environmental service, but encourages you to provide the requested access so NYSDOH can determine if there is a public health concern at your property.

EBC requests that you sign this form (signature and date acknowledgement listed below) and consent to entry onto your property by Environmental Business Consultant (EBC) personnel. Please feel free to contact me with any questions you may have on this matter via email at creilly@ebcincny.com or call me at (631) 504-6000 Ext 123.

Very truly yours,
Environmental Business Consultants

Chawinie Reilly
Senior Project Manager

Property Owner Acknowledgment for Access to 9 Thayer Street, Manhattan, NY

Signature _____ Address _____

Date _____

Print Name _____

Enclosures:
- Vapor Intrusion Evaluations Availability and Disclosure of Sampling Data and Other Information
- VOC Products Factsheet
- Soil Vapor Intrusion (SVI) frequently ask questions

ec: John Grathwol, NYSDEC
Scarlett McLaughlin, NYSDOH
Sadique Ahmed, NYSDEC
Renata Ockerby, NYSDOH

1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Certified, Return Receipt Requested

March 22, 2021

Susan Moy
President
3 Thayer Street Realty Corp
341 East 149th Street
Bronx, NY 10451

Sub: Request for Access to conduct a soil vapor investigation at
140 Nagle Avenue, New York, NY 10040
(Block 2174 Lot 73)

Re.: 148 Nagle
148 Nagle Avenue
Manhattan, NY 10040
BCP Site #C231124

Dear Susan Moy:

New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Environmental Business Consultant (EBC) request your cooperation for conduct a soil vapor intrusion (SVI) investigation at your property at 140 Nagle Avenue, Manhattan, NY. This investigation is voluntary and will only be conducted with your written permission. Additionally, the SVI investigation will be performed at no cost to you or the occupant. The SVI investigation will be conducted by Environmental Business Consultant (EBC), hired by Dyckman Crestview Realty, LLC, the owner of the "148 Nagle" Brownfield Cleanup Program ("BCP") site (Site No C231124).

148 Nagle is a BCP Site located at 148 Nagle Avenue, Manhattan (the "BCP Site"), which is adjacent to your Property. The BCP Site is currently undergoing an environmental investigation and cleanup under the NYSDEC Brownfield Cleanup Program to address tetrachloroethylene (PCE) and its degradation products in soil, soil vapor and groundwater beneath the BCP Site.

As part of the investigation, the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) request that the owner of the BCP Site conduct a SVI investigation at your property, which includes collection and analyses of soil vapor samples from beneath the basement floor and from the indoor air. The bore hole into the basement floor will be less than 1 inch in diameter and will extend to 6 inches below the slab. The sampling duration will be 24 hours. At the termination of the collection of the sub-slab vapor sample, the bore hole will be properly sealed. The purpose of this investigation is to delineate the possible off-site extent of soil vapor associated with PCE and its degradation products.

EBC personnel will coordinate the exact sampling location with you or your designated representative. Please note that the sampling canisters should not be touched or moved after they are set up by EBC personnel.

Once the laboratory results for the sub-slab soil vapor and indoor air samples are received, results will be validated, and a copy of the SVI results will be forwarded to you by the Department and the New York State Department of Health (NYSDOH).

Please respond to this letter by April 16, 2021. If so, you will not receive a second letter requesting your positive or negative response. EBC understands if you decline this complimentary environmental service, but encourages you to provide the requested access so NYSDOH can determine if there is a public health concern at your property.

EBC requests that you sign this form (signature and date acknowledgement listed below) and consent to entry onto your property by Environmental Business Consultant (EBC) personnel. Please feel free to contact me with any questions you may have on this matter via email at creilly@ebcincny.com or call me at (631) 504-6000 Ext 123.

Very truly yours,
Environmental Business Consultants

Chawinie Reilly
Senior Project Manager

Property Owner Acknowledgment for Access to 140 Nagle Avenue, Manhattan, NY

Signature _____ Address _____

Date _____

Print Name _____

Enclosures:
- Vapor Intrusion Evaluations Availability and Disclosure of Sampling Data and Other Information
- VOC Products Factsheet
- Soil Vapor Intrusion (SVI) frequently ask questions

ec: John Grathwol, NYSDEC
Scarlett McLaughlin, NYSDOH
Sadique Ahmed, NYSDEC
Renata Ockerby, NYSDOH

1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Certified, Return Receipt Requested

March 22, 2021

William Fernandez
President
151 Nagle Realty Corp
C/O Genesis Realty Group LLC
4419 Third Avenue, Suite 4A
Bronx, NY 10457

Sub: Request for Access to conduct a soil vapor investigation at
151 Nagle Avenue, New York, NY 10040
(Block 2173 Lot 29)

Re.: 148 Nagle
148 Nagle Avenue
Manhattan, NY 10040
BCP Site #C231124

Dear William Fernandez:

New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Environmental Business Consultant (EBC) request your cooperation for conduct a soil vapor intrusion (SVI) investigation at your property at 151 Nagle Avenue, Manhattan, NY. This investigation is voluntary and will only be conducted with your written permission. Additionally, the SVI investigation will be performed at no cost to you or the occupant. The SVI investigation will be conducted by Environmental Business Consultant (EBC), hired by Dyckman Crestview Realty, LLC, the owner of the "148 Nagle" Brownfield Cleanup Program ("BCP") site (Site No C231124).

148 Nagle is a BCP Site located at 148 Nagle Avenue, Manhattan (the "BCP Site"), which is adjacent to your Property. The BCP Site is currently undergoing an environmental investigation and cleanup under the NYSDEC Brownfield Cleanup Program to address tetrachloroethylene (PCE) and its degradation products in soil, soil vapor and groundwater beneath the BCP Site.

As part of the investigation, the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) request that the owner of the BCP Site conduct a SVI investigation at your property, which includes collection and analyses of soil vapor samples from beneath the basement floor and from the indoor air. The bore hole into the basement floor will be less than 1 inch in diameter and will extend to 6 inches below the slab. The sampling duration will be 24 hours. At the termination of the collection of the sub-slab vapor sample, the bore hole will be properly sealed. The purpose of this investigation is to delineate the possible off-site extent of soil vapor associated with PCE and its degradation products.

EBC personnel will coordinate the exact sampling location with you or your designated representative. Please note that the sampling canisters should not be touched or moved after they are set up by EBC personnel.

Once the laboratory results for the sub-slab soil vapor and indoor air samples are received, results will be validated, and a copy of the SVI results will be forwarded to you by the Department and the New York State Department of Health (NYSDOH).

Please respond to this letter by April 16, 2021. If so, you will not receive a second letter requesting your positive or negative response. EBC understands if you decline this complimentary environmental service, but encourages you to provide the requested access so NYSDOH can determine if there is a public health concern at your property.

EBC requests that you sign this form (signature and date acknowledgement listed below) and consent to entry onto your property by Environmental Business Consultant (EBC) personnel. Please feel free to contact me with any questions you may have on this matter via email at creilly@ebcincny.com or call me at (631) 504-6000 Ext 123.

Very truly yours,
Environmental Business Consultants

Chawinie Reilly
Senior Project Manager

Property Owner Acknowledgment for Access to 151 Nagle Avenue, Manhattan, NY

Signature _____ Address _____

Date _____

Print Name _____

Enclosures:
- Vapor Intrusion Evaluations Availability and Disclosure of Sampling Data and Other Information
- VOC Products Factsheet
- Soil Vapor Intrusion (SVI) frequently ask questions

ec: John Grathwol, NYSDEC
Scarlett McLaughlin, NYSDOH
Sadique Ahmed, NYSDEC
Renata Ockerby, NYSDOH

Certified, Return Receipt Requested

March 22, 2021

Ann Farley
Owner
Dyckman Crestview Realty, LLC
13 Harding Terrace
Morristown, NJ 07960

Sub: Request for Access to conduct a soil vapor investigation at
156 Nagle Avenue, New York, NY 10040
(Block 2174 Lot 66)

Re.: 148 Nagle
148 Nagle Avenue
Manhattan, NY 10040
BCP Site #C231124

Dear Ann Farley:

New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and Environmental Business Consultant (EBC) request your cooperation for conduct a soil vapor intrusion (SVI) investigation at your property at 156 Nagle Avenue, Manhattan, NY. This investigation is voluntary and will only be conducted with your written permission. Additionally, the SVI investigation will be performed at no cost to you or the occupant. The SVI investigation will be conducted by Environmental Business Consultant (EBC), hired by Dyckman Crestview Realty, LLC, the owner of the "148 Nagle" Brownfield Cleanup Program ("BCP") site (Site No C231124).

148 Nagle is a BCP Site located at 148 Nagle Avenue, Manhattan (the "BCP Site"), which is adjacent to your Property. The BCP Site is currently undergoing an environmental investigation and cleanup under the NYSDEC Brownfield Cleanup Program to address tetrachloroethylene (PCE) and its degradation products in soil, soil vapor and groundwater beneath the BCP Site.

As part of the investigation, the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) request that the owner of the BCP Site conduct a SVI investigation at your property, which includes collection and analyses of soil vapor samples from beneath the basement floor and from the indoor air. The bore hole into the basement floor will be less than 1 inch in diameter and will extend to 6 inches below the slab. The sampling duration will be 24 hours. At the termination of the collection of the sub-slab vapor sample, the bore hole will be properly sealed. The purpose of this investigation is to delineate the possible off-site extent of soil vapor associated with PCE and its degradation products.

EBC personnel will coordinate the exact sampling location with you or your designated representative. Please note that the sampling canisters should not be touched or moved after they are set up by EBC personnel.

Once the laboratory results for the sub-slab soil vapor and indoor air samples are received, results will be validated, and a copy of the SVI results will be forwarded to you by the Department and the New York State Department of Health (NYSDOH).

Please respond to this letter by April 16, 2021. If so, you will not receive a second letter requesting your positive or negative response. EBC understands if you decline this complimentary environmental service, but encourages you to provide the requested access so NYSDOH can determine if there is a public health concern at your property.

EBC requests that you sign this form (signature and date acknowledgement listed below) and consent to entry onto your property by Environmental Business Consultant (EBC) personnel. Please feel free to contact me with any questions you may have on this matter via email at creilly@ebcincny.com or call me at (631) 504-6000 Ext 123.

Very truly yours,
Environmental Business Consultants

Chawinie Reilly
Senior Project Manager

Property Owner Acknowledgment for Access to 156 Nagle Avenue, Manhattan, NY

Signature _____ Address _____

Date _____

Print Name _____

Enclosures:
- Vapor Intrusion Evaluations Availability and Disclosure of Sampling Data and Other Information
- VOC Products Factsheet
- Soil Vapor Intrusion (SVI) frequently ask questions

ec: John Grathwol, NYSDEC
Scarlett McLaughlin, NYSDOH
Sadique Ahmed, NYSDEC
Renata Ockerby, NYSDOH

1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

NEW YORK STATE
DEPARTMENT OF HEALTH

SOIL VAPOR INTRUSION

Frequently Asked Questions

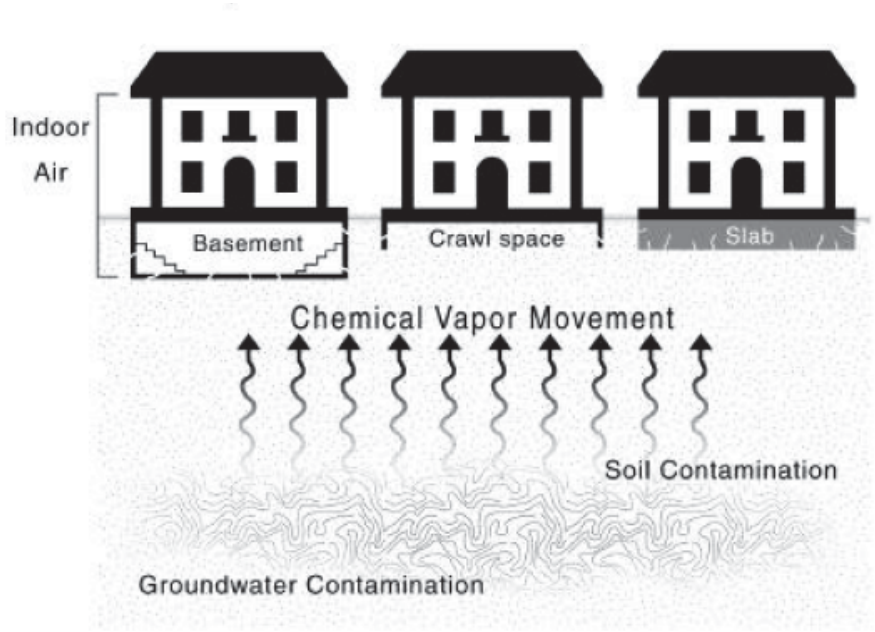
What is soil vapor intrusion?

The phrase "soil vapor intrusion" refers to the process by which volatile chemicals move from a subsurface source into the indoor air of overlying buildings.

Soil vapor, or soil gas, is the air found in the pore spaces between soil particles. Because of a difference in pressure, soil vapor enters buildings through cracks in slabs or basement floors and walls, and through openings around sump pumps or where pipes and electrical wires go through the foundation. Heating, ventilation or air-conditioning systems may create a negative pressure that can draw soil vapor into the building. This intrusion is similar to how radon gas seeps into buildings.

Soil vapor can become contaminated when chemicals evaporate from subsurface sources and enter the soil vapor. Chemicals that readily evaporate are called "volatile chemicals." Volatile chemicals include volatile organic compounds (VOCs). Subsurface sources of volatile chemicals may include contaminated soil and groundwater, or buried wastes. If soil vapor is contaminated, and enters a building as described above, indoor air quality may be affected.

When contaminated vapors are present in the zone directly next to or under the foundation of the building, vapor intrusion is possible. Soil vapor can enter a building whether it is old or new, or whether it has a basement, a crawl space, or is on a slab (as illustrated in the figure).



[Source: United States Environmental Protection Agency, Region 3]

How am I exposed to chemicals through soil vapor intrusion?

Humans can be exposed to soil vapor contaminated with volatile chemicals when vapors from beneath a building are drawn through cracks and openings in the foundation and mix with the indoor air. Inhalation is the route of exposure, or the manner in which the volatile chemicals actually enter the body, once in the indoor air.

Current exposures are when vapor intrusion is documented in an occupied building. *Potential* exposures are when volatile chemicals are present, or are accumulating, in the vapor phase beneath a building, but have not affected indoor air quality. Potential exposures also exist when there is a chance that contaminated soil vapors may move to existing buildings not currently affected or when there is a chance that new buildings can be built over existing subsurface vapor contamination. Both current and potential exposures are considered when evaluating soil vapor intrusion at a site that has documented subsurface sources of volatile chemicals.

In general, exposure to a volatile chemical does not necessarily mean that health effects will occur. Whether or not a person experiences health effects depends on several factors, including inhalation exposure, the length of exposure (short-term or acute versus long-term or chronic), the frequency of exposure, the toxicity of the volatile chemical, and the individual's sensitivity to the chemical.

What types of chemicals associated with environmental contamination may be entering my home via soil vapor intrusion?

Volatile organic compounds, or VOCs, are the most likely group of chemicals found in soil vapor, and which can move through the soil and enter buildings. Solvents used for dry cleaning, degreasing and other industrial purposes (e.g., tetrachloroethene, trichloroethene, 1,1,1-trichloroethane and Freon 113) are examples of VOCs. Examples of petroleum-related VOCs from petroleum spills are benzene, toluene, ethyl benzene, xylenes, styrene, hexane and trimethylbenzenes.

Is contaminated soil vapor the only source of volatile chemicals in my indoor air?

No. Volatile chemicals are also found in many household products. Paints, paint strippers and thinners, mineral spirits, glues, solvents, cigarette smoke, aerosol sprays, mothballs, air fresheners, new carpeting or furniture, hobby supplies, lubricants, stored fuels, refrigerants and recently dry-cleaned clothing all contain VOCs. Household products are often more of a source of VOCs in indoor air in homes than contaminated soil vapor.

Indoor air may also become affected when outdoor air containing volatile chemicals enters your home. Volatile chemicals are present in outdoor air due to their widespread use. Gasoline stations, dry cleaners, and other commercial/industrial facilities are important sources of VOCs to outdoor air.

What should I expect if soil vapor intrusion is a concern near my home?

If you live near a site that has documented soil, groundwater and/or soil vapor contaminated with volatile chemicals, you should expect that the potential for vapor intrusion is being, or has been, investigated. You may be contacted by the site owner or others working on the cleanup with information about the project. Your cooperation and consent would be requested before any testing/sampling would be done on your property. You may ask the person contacting you any questions about the work being done. You can also contact the NYSDOH's project manager for the site at 1-800-458-1158 (extension 2-7850) for additional information.

How is soil vapor intrusion investigated at sites contaminated with volatile chemicals?

The process of investigating soil vapor intrusion typically requires more than one set of samples to determine the extent of vapor contamination. Furthermore, four types of environmental samples are collected: soil vapor samples, sub-slab vapor samples, indoor air samples and outdoor air (sometimes referred to as "ambient air") samples.

Soil vapor samples are collected to characterize the nature and extent of vapor contamination in the soil in a given area. They are often collected before sub-slab vapor and/or indoor air samples to help identify buildings or groups of buildings that need to be sampled. Soil vapor samples are used to determine the *potential* for human exposures. *Soil vapor* samples are not the same as *soil* samples.

Sub-slab vapor samples are collected to characterize the nature and extent of vapor contamination in the soil immediately beneath a building with basement foundations or a slab. Sub-slab vapor results are used to determine the potential for *current* and *future* human exposures. For example, an exposure could occur in the future if cracks develop in the building's foundation or changes in the operation of the building's heating, ventilation or air-conditioning system are made that make the movement of contaminated soil vapor into the building possible.

Indoor air samples are collected to characterize the nature and extent of air contamination within a building. Indoor air sample results help to evaluate whether there are *current* human exposures. They are also compared to sub-slab vapor and outdoor air results to help determine where volatile chemicals may be coming from (indoor sources, outdoor sources, and/or beneath the building).

Outdoor air samples are collected to characterize site-specific background air conditions. Outdoor air results are used to evaluate the extent to which outdoor sources, such as automobiles, lawn mowers, oil storage tanks, gasoline stations, commercial/industrial facilities, and so forth, may be affecting indoor air quality.

What should I expect if indoor air samples are collected in my home?

You should expect the following:

- Indoor air samples are generally collected from the lowest-level space in a building, typically a basement, during the heating season. Indoor air samples may also be collected from the first floor of living space. Indoor air is believed to represent the greatest exposure potential with respect to soil vapor intrusion.
- Sub-slab vapor and outdoor air samples are usually collected at the same time as indoor air samples to help determine where volatile chemicals may be coming from (indoor sources, outdoor sources, and/or beneath the building).
- More limited sampling may be performed outside of the heating season. For example, sub-slab vapor samples without indoor air or outdoor air samples may be collected to identify buildings and areas where comprehensive sampling is needed during the heating season.
- An indoor air quality questionnaire and building inventory will be completed. The questionnaire includes a summary of the building's construction characteristics; the building's heating, ventilation and air-conditioning system operations; and potential indoor and outdoor sources of volatile chemicals. The building inventory describes products present in the building that might contain volatile chemicals. In addition, we take monitoring readings from a real-time organic vapor meter (also known as a photoionization detector or PID). The PID is an instrument that detects many VOCs in the air. When indoor air samples are collected, the PID is used to help determine whether

products containing VOCs might be contributing to levels that are detected in the indoor air.

What happens if soil vapor contamination or soil vapor intrusion is identified during investigation of a site?

Depending on the investigation results, additional sampling, monitoring or mitigation actions may be recommended. Additional sampling may be performed to determine the extent of soil vapor contamination and to verify questionable results. Monitoring (sampling on a recurring basis) is typically conducted if there is a significant potential for vapor intrusion to occur should building conditions change. Mitigation steps are taken to minimize exposures associated with soil vapor intrusion. Mitigation may include sealing cracks in the building's foundation, adjusting the building's heating, ventilation and air-conditioning system to maintain a positive pressure to prevent infiltration of subsurface vapors, or installing a sub-slab depressurization system beneath the building.

What is a sub-slab depressurization system?

A sub-slab depressurization system, much like a radon mitigation system, essentially prevents vapors beneath a slab from entering a building. A low amount of suction is applied below the foundation of the building and the vapors are vented to the outside (see illustration). The system uses minimal electricity and should not noticeably affect heating and cooling efficiency. This mitigation system also essentially prevents radon from entering a building, an added health benefit. The party responsible for cleaning up the source of the soil vapor contamination is usually responsible for paying for the installation of this system. If no responsible party is available, New York State will install the system. Once the contamination is cleaned up, the system should no longer be needed. In areas where radon is a problem, the NYSDOH recommends that these systems remain in place permanently.

What else can I do to improve my indoor air quality?

Household products and other factors, such as mold growth, carbon monoxide, and radon, can degrade the quality of air in your home. Consider the following tips to improve indoor air quality:

- Be aware of household products that contain VOCs. Do not buy more chemicals than you need at a time.
- Store unused chemicals in tightly-sealed containers in a well-ventilated location, preferably away from the living space in your home.
- Keep your home properly ventilated. Keeping it too air-tight may promote build up of chemicals in the air, as well as mold growth due to the build up of moisture.
- Fix all leaks promptly, as well as other moisture problems that encourage mold growth.
- Make sure your heating system, hot water, dryer and fireplaces are properly vented and in good condition. Have your furnace or boiler checked annually by a professional.
- Test your home for radon; take actions to reduce radon levels if needed.
- Install carbon monoxide detectors in your home; take immediate actions to reduce carbon monoxide levels if needed.

Where can I get more information?

For additional information about soil vapor intrusion, contact the NYSDOH's Bureau of Environmental Exposure Investigation at 1-800-458-1158 (extension 2-7850).

Volatile Organic Compounds (VOCs) in Commonly Used Products

People spend most of their time indoors – at home, school and work. This makes the quality of the indoor air you breathe important. This fact sheet focuses on certain kinds of chemicals called *volatile organic compounds* or *VOCs* that are found in many products that we commonly use. It is designed to help you think about what VOCs may be present in your indoor air and steps you can take to reduce them.

What are VOCs?

VOCs are chemicals that easily enter the air as gases from some solids or liquids. They are ingredients in many commonly used products and are in the air of just about every indoor setting. The table to the right shows some examples of products that contain VOCs.

How do VOCs get into indoor air?

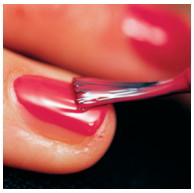
Products containing VOCs can release these chemicals when they are used and when they are stored. Many times you'll notice an odor when using these products. Product labels often list VOC ingredients and recommend that they should be used in well ventilated areas. *Ventilation* means bringing in fresh, outdoor air to mix with indoor air.

When you use a product containing VOCs indoors, the levels of these chemicals in the air increase, then decrease over time after you stop using them. The amount of time the chemical stays in the air depends on how quickly fresh air enters the room and the amount of the chemical used. Levels of VOCs will decrease faster if you open windows or doors, or use exhaust fans.

Building materials and furnishings, such as new carpets or furniture, slowly release VOCs over time. It may be necessary to ventilate areas with new carpeting or furniture for longer time periods because VOC levels can build up again after the windows are closed. If possible, unroll new carpets or store furniture outside your home (in a shed or detached garage) to minimize odors before bringing them in the home. If that's not possible, open windows, close doors and try to stay out of rooms until odors are reduced.

If VOC containing products are used outdoors near your home, you may want to close windows and nearby vents to prevent chemicals from coming inside.

Products used at home or work can release VOCs into the air when used and stored.



Examples of Household Products	Possible VOC Ingredients
Fuel containers or devices using gasoline, kerosene, fuel oil and products with petroleum distillates: paint thinner, oil-based stains and paint, aerosol or liquid insect pest products, mineral spirits, furniture polishes	BTEX (benzene, toluene, ethylbenzene, xylene), hexane, cyclohexane, 1,2,4-trimethylbenzene
Personal care products: nail polish, nail polish remover, colognes, perfumes, rubbing alcohol, hair spray	Acetone, ethyl alcohol, isopropyl alcohol, methacrylates (methyl or ethyl), ethyl acetate
Dry cleaned clothes, spot removers, fabric/ leather cleaners	Tetrachloroethene (perchloroethene (PERC), trichloroethene (TCE))
Citrus (orange) oil or pine oil cleaners, solvents and some odor masking products	d-limonene (citrus odor), a-pinene (pine odor), isoprene
PVC cement and primer, various adhesives, contact cement, model cement	Tetrahydrofuran, cyclohexane, methyl ethyl ketone (MEK), toluene, acetone, hexane, 1,1,1-trichloroethane, methyl-iso-butyl ketone (MIBK)
Paint stripper, adhesive (glue) removers	Methylene chloride, toluene, older products may contain carbon tetrachloride
Degreasers, aerosol penetrating oils, brake cleaner, carburetor cleaner, commercial solvents, electronics cleaners, spray lubricants	Methylene chloride, PERC, TCE, toluene, xylenes, methyl ethyl ketone, 1,1,1-trichloroethane
Moth balls, moth flakes, deodorizers, air fresheners	1,4-dichlorobenzene, naphthalene
Refrigerant from air conditioners, freezers, refrigerators, dehumidifiers	Freons (trichlorofluoromethane, dichlorodifluoromethane)
Aerosol spray products for some paints, cosmetics, automotive products, leather treatments, pesticides	Heptane, butane, pentane
Upholstered furniture, carpets, plywood, pressed wood products	Formaldehyde

VOCs can also get into indoor air from contaminated soils and groundwater under buildings. The chemicals enter buildings through cracks and openings in basements or slabs. When nearby soil or groundwater is contaminated, you might be asked for permission to investigate indoor air at your property. More information can be found at *www.nyhealth.gov/environmental/indoors/vapor_intrusion/*.

Should I be surprised if VOCs are in the air I breathe?

No. Because they are commonly used, some VOCs are almost always found in indoor air. The New York State Department of Health (DOH) and other agencies have studied typical levels of VOCs that may be present in indoor and outdoor air. Sometimes these levels are called "*background levels*".

The term "background levels" can be confusing because they can vary depending on where an air sample was collected and whether VOCs were used or stored. For example, a study of VOCs in urban areas might find higher levels than another study in rural areas. Some studies look at office environments, others examine residences. Please keep in mind study findings may or may not make sense for your setting.

More information about levels of VOCs collected by DOH is available in Appendix C of the guidance for evaluating vapor intrusion at *www.nyhealth.gov/environmental/investigations/soil_gas/svi_guidance.*

How can VOCs affect human health?

Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*. No matter how dangerous a substance or activity is, it cannot harm you without exposure.

Whether or not a person will have health effects after breathing in VOCs depends on:

1. The *toxicity* of the chemical (the amount of harm that can be caused by contact with the chemical).
2. How much of the chemical is in the air.
3. How long and how often the air is breathed.

Differences in age, health condition, gender and exposure to other chemicals also can affect whether or not a person will have health effects.

Short-term exposure to high levels of some VOCs can cause headaches, dizziness, light-headedness, drowsiness, nausea, and eye and respiratory irritation. These effects usually go away after the exposure stops. In laboratory animals, long-term exposure to high levels of some VOCs has caused cancer and affected the liver, kidney and nervous system. In general, we recommend minimizing exposure to chemicals, if possible.

How can I reduce the levels of VOCs indoors?

- Find out if products used or stored in your home contain VOCs. Information about the chemicals in many household products are listed on the front of this fact sheet and a larger list is on the National Institute of Health's website at *hpd.nlm.nih.gov/products.htm*.
- If you must store products containing VOCs, do so in tightly sealed, original containers in a secure and well-ventilated area. If possible store products in places where people do not spend much time, such as a garage or outdoor shed. Better yet, buy these products in amounts that are used quickly.
- Dispose of unneeded products containing VOCs. Many of these products are considered *household hazardous wastes* and should be disposed of at special facilities or during special household hazardous waste collection programs in your area. Contact your town or visit the New York State Department of Environmental Conservation's website at *www.dec.ny.gov/chemical/8485.html* for more information about disposing of these products.
- Use products containing VOCs in well-ventilated areas or outdoors. Open windows and doors or use an exhaust fan to increase ventilation. Repeated or prolonged ventilation may be necessary for reducing levels from building materials (new carpeting or furniture) that release VOCs slowly over time.
- Carefully read labels and follow directions for use.

Where can I find out more?

- **New York State Department of Health**
  (800) 458-1158
  www.nyhealth.gov/environmental/
- **Indoor Air Quality and Your Home** from the New York State Energy Research and Development Authority *www.nyserda.org/publications/iaq.pdf*
- **The Inside Story: A Guide to Indoor Air Quality**
  www.epa.gov/iaq/pubs/insidest.html
- **New York State Department of Environmental Conservation** website for information about household hazardous waste disposal
  www.dec.ny.gov/chemical/8485.html
- **National Institute of Health's** website for information about chemicals found in many household products.
  hpd.nlm.nih.gov/products.htm

December 2007

About Exposure

What is Exposure?

Exposure is contact. No matter how dangerous a substance or activity, without exposure, it cannot harm you.

Amount of Exposure

Over 400 years ago, a scientist said "...nothing [is] without poisonous qualities. It is only the dose that makes a thing poison." The **dose** is the amount of a substance that enters or contacts a person. An important factor to consider in evaluating a dose is body weight. If a child is exposed to the same amount of chemical as an adult, the child (who weighs less) can be affected more than the adult. For example, children are given smaller amounts of aspirin than adults because an adult dose is too large for a child's body weight.

The greater the amount of a substance a person is exposed to, the more likely that health effects will occur. Large amounts of a relatively harmless substance can be toxic. For example, two aspirin tablets can help to relieve a headache, but taking an entire bottle of aspirin can cause stomach pain, nausea, vomiting, headache, convulsions or death

Routes of Exposure

There are three major means by which a toxic substance can come into contact with or enter the body. These are called routes of exposure.

Inhalation (breathing) of gases, vapors, dusts or mists is a common route of exposure. Chemicals can enter and irritate the nose, air passages and lungs. They can become deposited in the airways or be absorbed through the lungs into the bloodstream. The blood can then carry these substances to the rest of the body.

Direct contact (touching) with the skin or eyes is also a route of exposure. Some substances are absorbed through the skin and enter the bloodstream. Broken, cut or cracked skin will allow substances to enter the body more easily.

Ingestion (swallowing) of food, drink, or other substances is another route of exposure. Chemicals that get in or on food, cigarettes, utensils or hands can be swallowed. Children are at greater risk of ingesting substances found in dust or soil because they often put their fingers or other objects in their mouths. Lead in paint chips is a good example. Substances can be absorbed into the blood and then transported to the rest of the body.

The route of exposure can determine whether or not the toxic substance has an effect. For example, breathing or swallowing lead can result in health effects, but touching lead is not usually harmful because lead is not absorbed particularly well through the skin.

Length of Exposure

Short-term exposure is called **acute exposure**. Long-term exposure is called **chronic exposure**. Either may cause health effects that are immediate or health effects that occur days or years later.

Acute exposure is a short contact with a chemical. It may last a few seconds or a few hours. For example, it might take a few minutes to clean windows with ammonia, use nail polish remover or spray a can of paint. The fumes someone might inhale during these activities are examples of acute exposures.

Chronic exposure is continuous or repeated contact with a toxic substance over a long period of time (months or years). If a chemical is used every day on the job, the exposure would be chronic. Over time, some chemicals, such as PCBs and lead, can build up in the body and cause long-term health effects.

Chronic exposures can also occur at home. Some chemicals in household furniture, carpeting or cleaners can be sources of chronic exposure.

Sensitivity

All people are not equally **sensitive** to chemicals, and are not affected by them in the same way. There are many reasons for this.

- People's bodies vary in their ability to absorb and break down or eliminate certain chemicals due to **genetic differences.**

- People may become **allergic** to a chemical after being exposed. Then they may react to very low levels of the chemical and have different or more serious health effects than nonallergic people exposed to the same amount. People who are allergic to bee venom, for example, have a more serious reaction to a bee sting than people who are not.
- Factors such as **age, illness, diet, alcohol use, pregnancy and medical or nonmedical drug use** can also affect a person's sensitivity to a chemical. Young children are often more sensitive to chemicals for a number of reasons. Their bodies are still developing and they cannot get rid of some chemicals as well as adults. Also, children absorb greater amounts of some chemicals (such as lead) into their blood than adults.

For More Information

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