Vapor Intrusion Investigation Sampling Plan

101 Green Acres Road Site
Valley Stream, New York
NYSDEC Site No. 1-30-084

Prepared for:
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Washington, D.C.

On behalf of:
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Contents

1 Introduction

ENVIRON International Corporation (ENVIRON) has prepared this work plan, on behalf of Bulova Corporation (Bulova), to outline the scope of work for additional vapor intrusion investigation sampling at the 101 Green Acres Road site in Valley Stream, New York (the "Site"). The Site location is depicted on Figure 1.

As detailed in prior reports submitted to the New York State Department of Environmental Conservation (NYSDEC), extensive soil vapor investigations have been completed at the Site. The investigations have included the collection and analysis of sub-slab soil vapor samples from 82 locations positioned beneath the prior buildings at the Site and/or beneath the current building at the Site. The prior soil vapor sampling locations are depicted on Figure 2 and the historic soil vapor investigation results (*i.e.,* 1991 – 1999) were summarized in *Vapor Intrusion Investigation Work Plan* (Weston; September 2007). In addition, results of soil vapor sampling conducted in March 2008 were presented in *Vapor Intrusion Potential – Investigation Findings* (Weston; May 2008).

The historic soil vapor investigations identified elevated volatile organic compound (VOC) concentrations, in relation to current New York State Department of Health (NYSDOH) guidance, at isolated areas beneath the former buildings at the Site. The recent soil vapor sampling completed by Weston during March 2008 identified similar conditions beneath the footprint of the existing building, with generally decreasing VOC concentrations beneath the southeast corner of the current building at the Site as compared to historical levels.

At the time of the *Record of Decision* associated with the Site (NYSDEC; March 2000), NYSDEC determined, based on sampling conducted by NYSDOH, that the migration of subsurface soil vapor into on-site or nearby structures was not a concern. NYSDEC also stated that the positive pressure ventilation system associated with the on-site building would serve to suppress subsurface vapors. During an April 2009 meeting with representatives from Bulova and the current property owner, NYSDEC requested that a formal evaluation be completed to document that a positive pressure condition exists within the existing building at the Site.

Based on ENVIRON's review of documents provided by the current property owner and a preliminary evaluation of the building ventilation system, an expansive investigation would be required to confirm the stated positive pressure conditions within the building. As a result, ENVIRON and Bulova propose instead to complete additional sub-slab and indoor air sampling activities to evaluate potential vapor intrusion conditions at the Site. The scope of the investigation, as described in Section 2 of this work plan, has been developed based on an evaluation of prior soil vapor sampling results and in accordance with the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, October 2006).

2 Vapor Intrusion Investigation Sampling Plan

A vapor intrusion investigation will be completed to further characterize certain VOC concentrations in soil vapor and indoor air at the Site. The sampling will include the following activities:

- Collection of two rounds of soil vapor samples (*i.e.,* heating and non-heating seasons) from six sub-slab soil vapor locations; and
- Collection of concurrent indoor air samples from locations positioned immediately adjacent to each proposed sub-slab soil gas sampling locations.

The proposed sub-slab soil vapor and indoor air sampling locations will be positioned immediately adjacent to areas where prior soil gas investigations identified elevated VOC concentrations beneath the footprint of the current building at the Site (*i.e.,* Weston sample locations SL02, SL03, SL06, and SL13) and in non-retail areas at the southwest portion of the building. Proposed sub-slab soil vapor and indoor air sampling locations are depicted on Figure 2. Final soil vapor sample locations may re-positioned in the field based on underground utilities and accessibility.

Active soil gas sampling and indoor air sampling will be conducted in accordance with the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, October 2006). The proposed scope of work and schedule are outlined in the following sections.

2.1 Building Walkthrough Survey

Prior to conducting the vapor intrusion investigation, a building walkthrough and survey shall be completed to identify potential background sources of indoor air contamination. If background sources of indoor air contamination are identified, the sources shall be removed from the building, to the extent practical, before the commencement of the indoor air sampling event. An *Indoor Air Quality Questionnaire and Building Inventory* form will be completed following the pre-sampling building walkthrough to document the site conditions. A copy of this form is provided as Appendix A. As requested by NYSDEC, the Building Inventory will focus on materials utilized at the Site and any spills that may have occurred recently.

During a June 5, 2009 site walk, ENVIRON observed that several of the soil vapor points associated with the March 2008 investigation were damaged or broken. On September 22, 2009, ENVIRON properly sealed and abandoned all existing sampling points.

2.2 Sub-Slab Soil Vapor and Indoor Air Sample Collection

Sampling to evaluate potential indoor air concerns at the Site will consist of the collection of six sub-slab soil gas samples (see Figure 2); six indoor air locations immediately adjacent to the sub-slab soil gas sampling locations; and one outdoor ambient air reference sample. Prior to and during the installation and sampling, ENVIRON will collect information on site-specific conditions including the type of sub-slab soil and backfill, the presence/absence of water, and

the thickness of the flooring, and whether sumps, cleanouts or floor drains are present. A utility clearance will also be performed at each sub-slab sample location prior to installation.

Semi-permanent sub-slab soil vapor probes will be installed and sub-slab soil vapor samples will be collected as follows:

- A 3/8-inch hole will be drilled through the concrete slab using an electric drill. The semi-permanent probes will be located away from cracks and penetrations, if present, in the floor. The drill bit will be advanced approximately 3-inches into the sub-slab material to create an open cavity. The top 1 inch of the hole will be over drilled to a diameter of 1 inch. A vapor probe will be inserted flush[1] with the top of the concrete slab and a non-volatile emitting surface sealing material[2] will be used to seal the annular space. The vapor probe will be constructed from small diameter[3] chromatography grade 316 stainless steel tubing and stainless steel compression to thread fittings[4]. The threaded stainless steel fitting can be equipped with either a fitting to facilitate sampling or a cap to seal the probe when not in use. The probe will be allowed to cure for at least 2 hours prior to the initial sampling event and will remain in-place for a confirmation sampling event during the heating season.
- During each sampling event, the vapor probe will be connected to a "T" fitting made of stainless steel flexible line and an in-line valve. The vapor probe and sampling lines will be purged by drawing 3 volumes through the probe and connecting tubing at a low flow rate that does not exceed 0.2 liters per minute. In addition, a shroud will be placed around the sample probe. An inert tracer gas (*i.e.*, helium) will then be released under the shroud. The initial soil vapor (after purging) will be monitored using field-screening instruments for elevated concentrations (>5%) of the tracer gas (based on the original tracer gas concentration in the shroud). A similar tracer gas screening will be completed after collection of the soil vapor samples. If there is evidence of the tracer gas in the soil vapor, an additional soil gas location will be completed to ensure the surface seal is not leaking and that the soil vapor sample is representative.

As described above, each indoor air sample location will be positioned immediately adjacent to the sub-slab soil vapor locations. Sampling canisters will be positioned in the breathing zone (3 to 5 feet above the floor surface). An ambient air sample will also be collected during the investigation. The ambient air sample will be located outside the building in area that is reasonably representative of background conditions and not adjacent to a high traffic area.

Sampling activities will take place while the heating, ventilation, and cooling (HVAC) system is operating in a manner consistent with normal operating conditions. Written documentation that the HVAC system was in normal operations during the time that samples were collected will be prepared and provided with the investigation results report. The following information will also be documented during the field investigation and included in the vapor intrusion investigation

[1] Care will be given to ensure that the vapor probe is completely flush with the concrete surface to avoid problems for the occupants of the building.
[2] Example: hydraulic cement.
[3] Example: 0.64 cm or ¼ inch OD x 0.46 cm or 0.18 ID.
[4] Example: 0.64 cm or ¼ inch OD x 0.32 cm or 1/8 NPT Swagelok female thread connectors.

results report: sampling point construction, start/end vacuum, PID/helium detections, purge volume, serial number or regulator and canister, outdoor weather conditions, and laboratory vacuum.

Samples will be collected into an evacuated, laboratory-cleaned 6-Liter stainless steel Summa® canister and transported to an Environmental Laboratory Approval Program (ELAP) certified laboratory. Laboratory services will be provided by Accutest Laboratories of Dayton, New Jersey. Consistent with the March 2008 vapor intrusion investigation, each sample will be analyzed for PCE, TCE, TCA, 1,1,-DCA, 1,1-DCE, and Freon 113 using USEPA Method TO-15. In addition, for quality assurance purposes, one duplicate sample and one ambient air field blank sample will be collected. The Summa® canisters will be equipped with regulators pre-set by the laboratory to correspond to an 8-hour sampling time. Reporting Limits (RLs) and Method Detection Limits (MDLs), for undiluted air samples, for the selected constituents are outlined below.[5]

Constituent	Reporting Limit (ug/m3)	Method Detection Limit (ug/m3)
PCE	0.27	0.14
TCE	0.21	0.099
TCA	1.1	0.13
1,1-DCA	0.81	0.13
1,1-DCE	0.79	0.17
Freon 113	1.5	0.17

[5] The RL is the lowest concentration standard in the calibration range of each compound analyzed. This value is also the low limit for unqualified quantitative data. The MDL is determined via experimentation and verified through additional testing. This value represents the lowest concentration of each compound that can be qualitatively identified by the method in use.

3 Schedule

ENVIRON can complete the additional sampling within one week of receiving work plan approval from NYSDEC/NYSDOH and property access approval from the current owner. Based upon the scope of work described above and assuming there are no weather-related delays or other conditions outside of ENVIRON's control that would inhibit or delay the additional sampling activities, it is anticipated that an initial sampling event can be completed during October 2009. A second confirmation round of soil gas and indoor air samples will be collected during January 2010.

ENVIRON anticipates that a report, outlining the findings of the vapor intrusion investigation sampling activities will be provided to the NYSDEC and NYSDOH within 45 days of completion of the proposed sampling activities. The report will include a Data Usability Summary Report (DUSR) prepared in accordance with Section 2.1 and Appendix 2B of draft Technical Guidance for Site Investigation and Remediation (DER-10). A resume of the person that will prepare the DUSR is provided as Appendix B.

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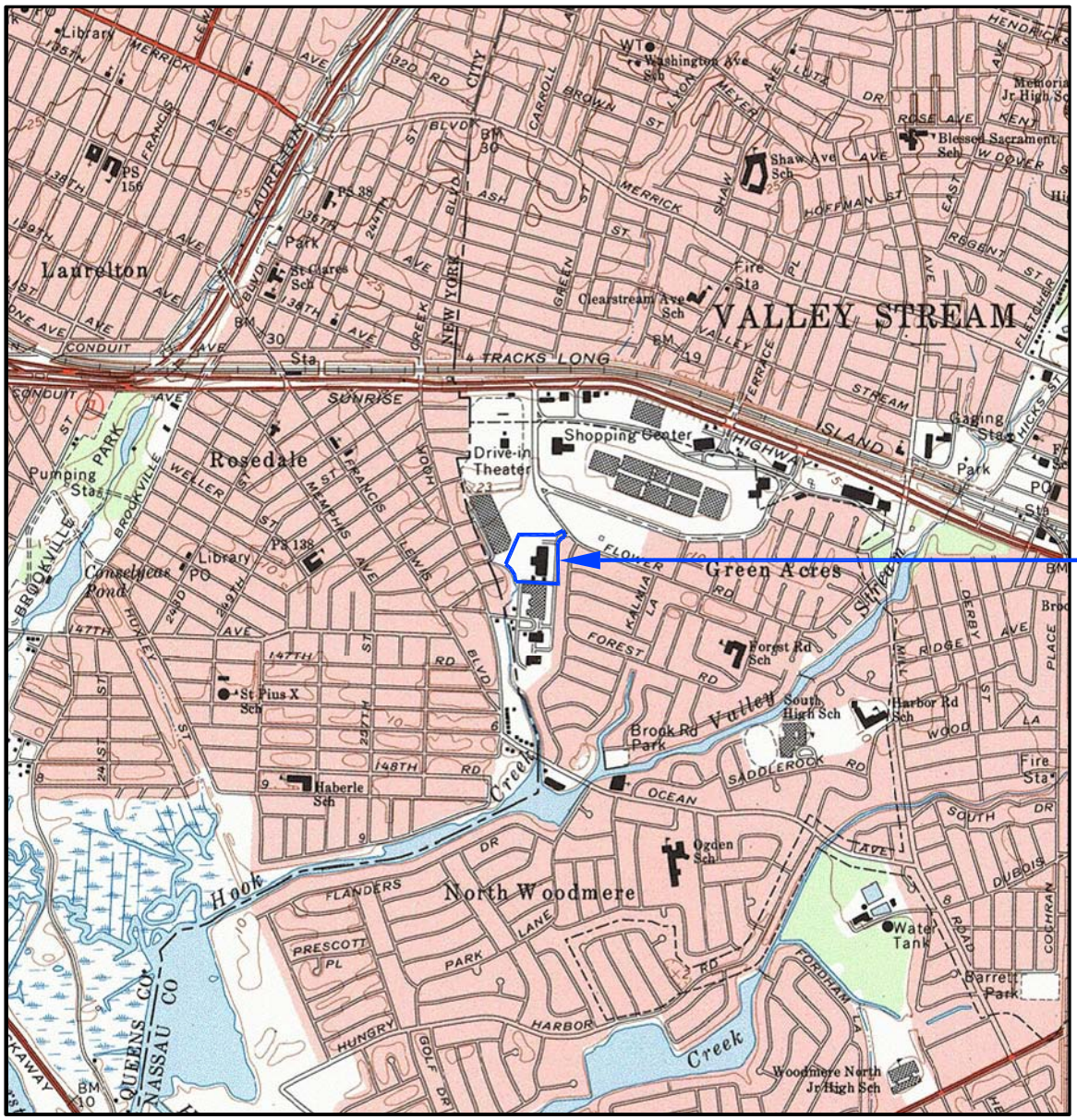
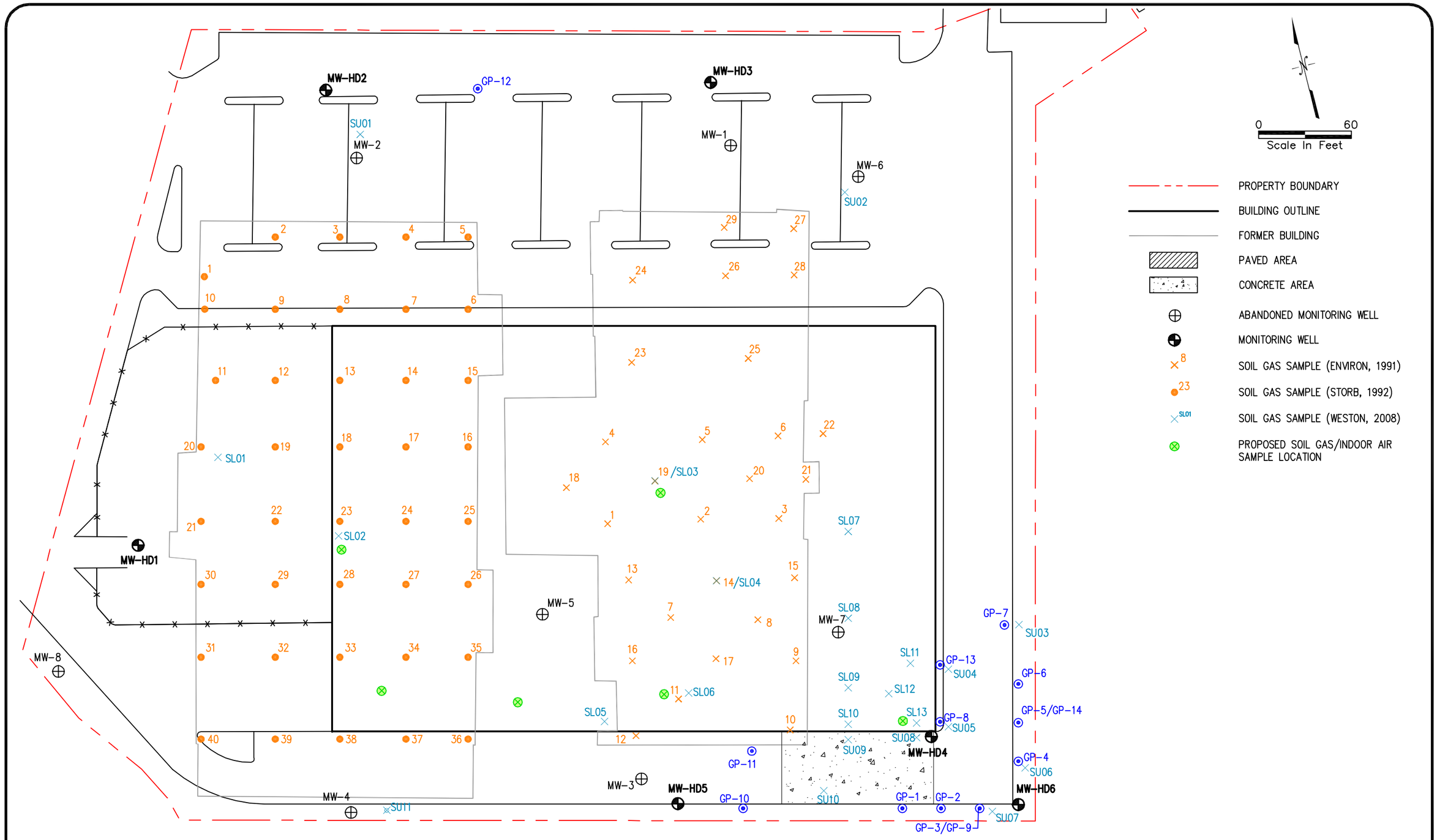
Figures



SOURCE: 40°39'35" N, 73°43'28" W WGS84 TOPO! map printed on 01/20/00 from "NYC.tpo"

ENVIRON	SITE LOCATION MAP 101 GREEN ACRES ROAD SITE VALLEY STREAM, NEW YORK	FIGURE 1
DRAFTED BY: KPM/PMASCARO | DATE: 2/19/09		021961BJ01



SOURCE: HENDERSON AND BODWELL CONSULTING ENGINEERS GRADING & UTILITIES PLAN, SEPT. 1992

ENVIRON

DRAFTED BY: KPM/PRM | DATE:

SITE LAYOUT AND SAMPLE LOCATIONS

FORMER BULOVA CORPORATION FACILITY

VALLEY STREAM, NEW YORK

FIGURE 2

021961BS03

PMASCARO

Appendix A

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.

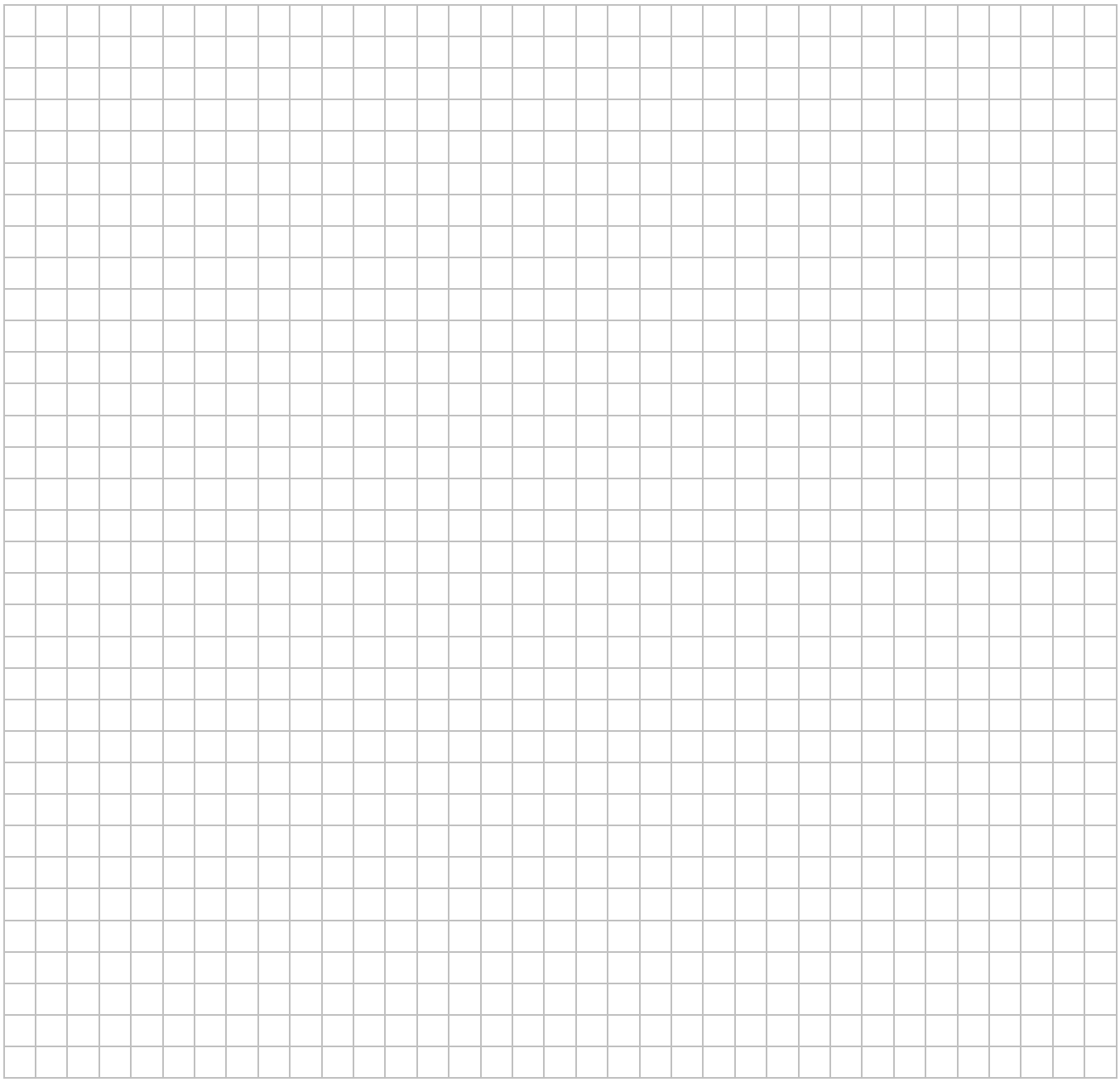
Basement:

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.

Appendix B

Jacquelynn M. Backus

Ms. Backus is an Associate in the Herndon Virginia office. Ms. Backus' previous experience is as an analytical chemist in an industrial R&D setting. For over five years, she worked for Brewer Science, Inc. a world leader in Anti-Reflective Coatings which are used for critical dimension control in semiconductor photolithography processes. As analytical lead for several product teams, Ms. Backus was responsible for proposal, design, and coordination of analytical experiments used to help develop, improve, and characterize current or new materials and processes. This position afforded Ms. Backus with the opportunity to work directly with internal and external customers in a problem solving capacity. In addition, Ms. Backus has extensive chromatographic method development experience and directed and mentored junior staff in those areas. Outside of the analytical areas, Ms. Backus was an internal auditor and an active member of the corporate quality systems team responsible for implementation of ISO9001 QMS at Brewer Science, Inc.

Ms. Backus has a MS in Biochemistry from Boston College and a BS in Chemistry from Clarkson University.