December 28, 2009
Ref. No. 31129-063

Mr. Jaspal Walia
Project Manager
New York State Department of Environmental Conservation, Region 9
270 Michigan Avenue
Buffalo, NY 14203-2999

Subject: Groundwater Monitoring Well Installation and Vapor Intrusion Investigation
Leica, Inc. Site; Erie County, Cheektowaga, NY
Inactive Hazardous Waste Disposal Site No. 915156

Dear Mr. Walia:

This letter presents a work plan prepared by Energy*Solutions* on behalf of Leica, Inc. for installation of additional groundwater monitoring wells and for conducting an additional vapor intrusion investigation offsite and downgradient of the former Leica facility (the Site) in Cheektowaga, New York, as shown as Figure 1. This work plan is prepared to address the volatile organic compound (VOC) concentrations identified in downgradient wells as presented in the "Groundwater Monitoring Results" letter dated November 18, 2009.

Background Information

The results of the recently reported shallow groundwater monitoring data at the Site indicate that VOC concentrations, detected at downgradient wells, are low. In 2008, the New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York Department of Health (NYSDOH) requested that Energy*Solutions* conduct a soil vapor intrusion evaluation of two residential homes (30 and 34 Rowan Road) on adjacent properties downgradient and closest to Area C. No VOCs were detected in either residence above regulatory criteria. These residential properties are located on the north side of Rowan Road.

In addition to the vapor intrusion monitoring within the two residential properties, a supplemental investigation of the VOC plume was conducted. This evaluation included the installation and groundwater sampling of two monitoring well pairs, consisting of a shallow overburden monitoring well and a bedrock monitoring well, and identified as monitoring wells MW-25, MW-25A, MW-26, and MW-26A. Groundwater samples were collected from the monitoring wells on September 2, 2009. The groundwater data from the MW-25 well pair indicates that chlorinated VOC compounds were present only in the bedrock aquifer at this location south of Rowan Road. The groundwater data from

the MW-26 well pair indicates that chlorinated VOC compounds were present in the overburden and bedrock aquifers at this location south of Rowan Road.

Objectives

There are two primary objectives for the activities covered under this work plan:

- Further define the southern extent of chlorinated VOCs in groundwater; and
- determine if VOCs have migrated into residential structures south of Rowan Road. The residential structures north of Rowan Road and closest to the former manufacturing site have been previously sampled and determined to not be affected by site VOCs.

Scope of Work

The following Scope of Work includes the installation and sampling of three shallow overburden monitoring wells and three bedrock monitoring wells. Each overburden monitoring well location will be paired with a shallow bedrock monitoring well location. One well pair will be installed on the south side of Rowan Road to the west of the MW-26 well pair, and two pairs will be installed on the west side of Preston Road, south of the MW-26 well pair and opposite the fourth and eighth houses on Preston Road. The well pairs will be installed to approximately the same depths as the MW-25 and MW-26 well pairs. Wells will be installed in the City of Cheektowaga right-of-way in the grassy strip along the edge of the sidewalks, similar to the installations of the MW-25 and MW-26 well pairs.

Due to the presence of VOC concentrations in the groundwater samples collected from the MW-26 well pair, and the proximity to residential properties, we are also planning indoor air sampling at the two residential properties south of the MW-26 well pair (along the west side of Preston Road). Indoor air sampling at each residence will consist of the collection of both sub-slab samples and indoor air samples. This indoor air sampling will be conducted in an identical fashion to the previously approved indoor air sampling conducted at the residences north of Rowan Road. The proposed monitoring well and indoor air sampling locations are shown on Figure 2.

<u>Overburden Well Installation</u>

Three shallow overburden monitoring wells will be installed in the unconsolidated sand and silt. The objective for the completion of the shallow wells is to situate the screened zone in the shallow aquifer above bedrock.

Continuous 24-inch split-spoon samples will be advanced ahead of the hollow stem augers, until bedrock is located. The samples will be logged by a field geologist and recorded on boring logs.

Each well will consist of a 5 foot length of nominal two-inch inside-diameter 10-slot (0.010 inch) polyvinyl chloride (PVC) screen with enough solid PVC riser to reach to the surface. Each section of the PVC will be flush-thread connected. Clean filter pack sand of sufficient size (Morie #00 or equivalent) will be emplaced in the annulus around the screened section of the well and will extend to at least two feet above the top of the screened interval. At least two feet of bentonite chips will be placed above the sand pack and hydrated to serve as a seal. The remainder of the annular space will be filled with a high solids bentonite grout, if necessary, to within two feet of the ground surface. The monitoring wells will be completed with a road box cemented flush to grade. Each well will be surveyed to the same datum as the other wells for this project.

Bedrock Well Installation

One bedrock well will be installed adjacent to each of the shallow overburden wells. The objective for the completion of the bedrock wells is to intercept groundwater within bedrock fracture zones.

Well installation will include the setting of a surface casing to isolate the bedrock aquifer from the unconsolidated overburden aquifer. The well will be advanced using hollow stem augers within the unconsolidated sediments. When auger refusal at the top of bedrock is encountered, the augers will be removed and a temporary 6-inch temporary steel casing will be pounded into the bedrock. A socket will be drilled approximately three to five feet into the top of competent bedrock using a 5-7/8-inch roller bit. A nominal 4-inch inside diameter (ID) steel casing will be lowered into the socket and grouted into place. The temporary casing will be removed and the grout will be allowed to cure for a minimum of 24 hours before continuation of drilling for the remainder of the bedrock well. Drilling through bedrock will be completed using a 3-7/8-inch roller bit and the cuttings will be flushed from the hole using fresh water. The well will be completed as an open borehole well in the bedrock with no well casing installed. The monitoring wells will be completed at the surface with a road box cemented flush to grade. Each well will be surveyed to the same datum as previous wells for this project.

Well Development

Wells will be developed by the driller following installation. Development of the wells will be by pumping and surging. The driller will alternately pump water from the well at a high rate and surge the well using a surge block in order to draw water through the screen to settle the sand pack and flush out the fine sediment that may be present. The removed water will be collected into 55-gallon drums for characterization and disposal.

Groundwater Sampling and Analysis

Two rounds of groundwater samples will be collected from the new monitoring wells. The first round of groundwater samples will be collected after the wells have equilibrated for at least one week after installation and development. A second round of groundwater samples will be collected approximately three months after the first round.

Water level measurements will be made from the top of the surveyed point in each well to the top of the water table using an electronic probe. Casing volumes will be determined for each well. A minimum of three well volumes will be purged from each well prior to sample collection. Purging of each well will be conducted using disposable polyethylene bailers and nylon rope. Field groundwater quality parameters (pH, temperature, and specific conductivity) will be recorded for each purge volume of water and prior to groundwater sampling. Groundwater samples will be collected into the appropriate clean laboratory-supplied glass containers and preserved with the appropriate preservative. Samples will be labeled, logged onto a sample data sheet and onto chain of custody documents, and stored on ice for submittal to an ELAP certified laboratory for analysis. Samples will be prevented from freezing and compromising the sample container. Groundwater samples will be collected and submitted for VOC analysis by EPA Method 8260B.

Vapor Intrusion Investigation

A vapor intrusion investigation will be conducted for the two residential properties located on Preston Road, downgradient from monitoring well MW-26 and MW-26A. A separate Indoor Air Sampling and Analysis Plan (IASAP) was prepared by EnviroGroup Limited for this effort. The IASAP outlines sub-slab vapor and indoor air sampling proposed for the two residential properties. The IASAP is included as Attachment A.

Soil Cuttings and Rinse Waters

All soil cuttings will be collected into drums and temporarily stored for characterization and future disposal. Rinse and purge waters also will be collected and containerized in drums and temporarily stored for characterization and future disposal.

Disposal of investigation derived waste (IDW) will be arranged by Energy*Solutions*, on behalf of Leica, Inc. All IDW will be disposed according to applicable state and federal regulations.

Laboratory

Columbia Analytical Services, Inc. of Rochester, New York, an ELAP-certified laboratory, will analyze groundwater samples for VOCs by EPA Method 8260B. Indoor air samples will be analyzed by Centek Laboratory of Syracuse, New York, as specified in the indoor air work plan (Attachment A).

Sampling Quality Assurance/Quality Control

Field Sampling

Trip blanks and duplicate samples will be collected and submitted to the laboratory along with the groundwater samples for the purpose of quality assurance/quality control (QA/QC) monitoring.

Trip blanks for VOCs will be collected for each day of groundwater sampling to determine whether samples have been exposed to contamination as a result of sample container handling and transport. The trip blanks will be supplied by the laboratory and will accompany the sample containers from the time they leave the laboratory until the time they are returned to the laboratory as a sample. The trip blank will be labeled as a sample and submitted blind to the laboratory for analysis.

Duplicate samples for laboratory analysis will be collected for the groundwater samples to check the reproducibility of the laboratory analysis. Duplicate sampling will be continued in the order of decreasing parameter volatility by alternating containers in the original set with those of the duplicate set. The duplicate sample will be assigned a different sample number than the original set so that the sample identity is blind to the laboratory. Based on the anticipated number of samples to be collected for each sampling round, one duplicate sample will be collected and submitted to the laboratory.

Equipment blanks are collected for each groundwater sampling event to assess the effectiveness of the decontamination process. It is anticipated that all groundwater sampling equipment will be disposable; therefore, no equipment blanks will be collected.

Laboratory Reporting

The laboratory will provide complete data packages as defined under the requirements of the NYSDEC Analytical Services Protocol Category B or EPA Contract Laboratory Program deliverables. Groundwater data will be reviewed, validated, and verified in terms of their ability to satisfy quality assurance requirements. Quality control procedures will be reviewed to verify consistency with NYSDOH guidance (as presented in the NYSDEC guidance for development of a Data Usability Summary Report).

Reporting

A letter report summarizing the well installation, vapor intrusion investigation, and groundwater sampling activities will be completed following the completion of the second groundwater sampling event. The report will summarize the activities conducted and a brief explanation of the laboratory data and will include field sampling data, laboratory analytical data, data summary tables, and figures as appropriate.

Schedule

We are prepared to begin the implementation of this work plan as soon as approved by the agencies. Additional limitations to implementation include off-site access from the City of Cheektowaga for well installation and from residents for the vapor intrusion investigation, availability of drilling equipment, and weather. Groundwater analytical results and the associated data package are expected to be received within three weeks of sample delivery to the laboratory.

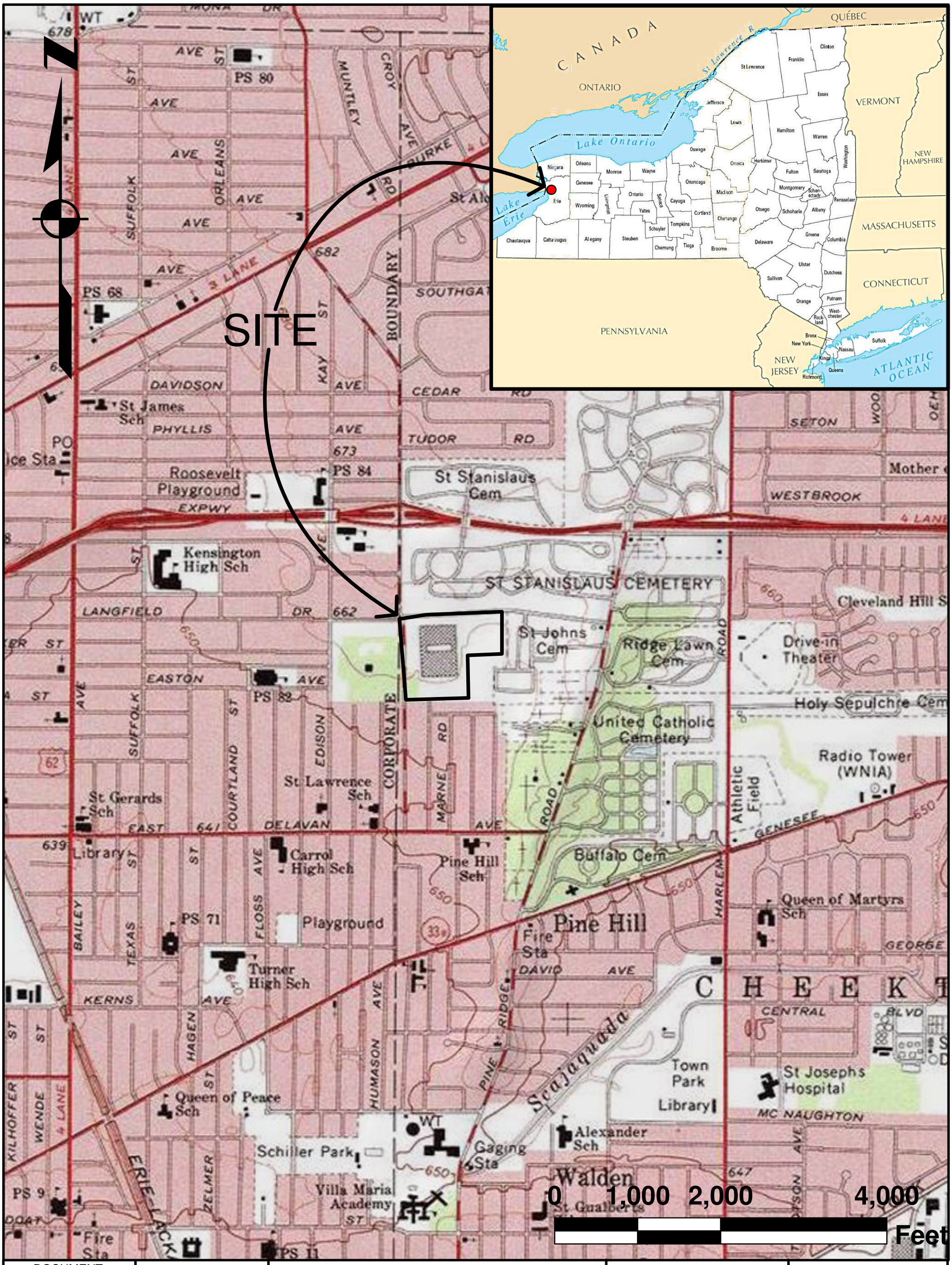
If you have any questions or would like to discuss this work plan, please feel free to call me at 801-303-1092.

Sincerely,

Robert E. McPeak, Jr., P.E., LEP
Department Manager, Environmental Services

REM/lhc
Enclosures
cc: J. Egan
C. Grabinski
E. Lovenduski
B. Sye Marvuglio

Figure 1
Site Location Map



DOCUMENT CONTROL NO.	PROJECT	LEICA MICROSYSTEMS INC. 203 EGGERT ROAD CHEEKTOWAGA, NY	ENERGY SOLUTIONS 100 Mill Plain Road Danbury, CT 06811 203-797-8301	PROJECT # 137015
				FILENAME:
REVISION NO.	DRAWING	SITE LOCATION MAP		SCALE: *SEE SCALEBAR* / DATE: 12/23/09
				BY: MT / CK:
				FIGURE # 1

Figure 2
Proposed Well and Indoor Air Sampling Locations

DOCUMENT CONTROL NO.	PROJECT	LEICA MICROSYSTEMS INC. 203 EGGERT ROAD CHEEKTOWAGA, NY	ENERGY SOLUTIONS 100 Mill Plain Road Danbury, CT 06811 203-797-8301	PROJECT # 137015 FILENAME:
REVISION NO.	DRAWING	PROPOSED WELL AND INDOOR AIR SAMPLING LOCATIONS		SCALE: *SEE SCALEBAR* DATE: 12/23/09 BY: MT CK: PM FIGURE # 2

Attachment A
Indoor Air Sampling and Analysis Plan

Indoor Air Sampling and Analysis Plan
Preston Road Residences
Cheektowaga, New York

Prepared by:

EnviroGroup Limited
Saratoga Springs, New York

Prepared for:

Energy*Solutions*
New Milford, Connecticut

December 23, 2009

Project No. LE-0614

Indoor Air Sampling and Analysis Plan
Preston Road Residences
Cheektowaga, New York

Prepared by:

EnviroGroup Limited
Saratoga Springs, New York

Prepared for:

Energy*Solutions*
New Milford, Connecticut

December 23, 2009

Project No. LE-0614

Prepared by	12/23/2009 Date
Reviewed by	12/23/2009 Date
Approved by	12/23/2009 Date

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1.0 INTRODUCTION

This Indoor Air Sampling and Analysis Plan (IASAP) has been prepared by EnviroGroup Limited (EnviroGroup) on behalf of Energy*Solutions*. The IASAP describes procedures for collecting and analyzing indoor air, sub-slab vapor, and ambient air samples in the two residences near monitoring wells MW-26 and MW-26A, along Preston Road, on the south side of Rowan Road, south of Leica Area C (the Site) in Cheektowaga, New York (Figure 1). Additional residences may be sampled if VOCs are detected in sub-slab vapor samples exceeding the NYSDOH Decision Matrix values recommending monitoring (NYSDOH, 2006) based on the step out criteria defined herein. Energy*Solutions* is currently conducting investigations to evaluate the presence, nature and extent of certain volatile organic compounds (VOCs) in groundwater south of the Site (EnviroGroup, 2008, 2009). We understand that Energy*Solutions* has proposed to install additional monitoring wells west and south of wells MW-26 and MW-26A for the purpose of further delineating the VOCs in groundwater.

The following sections of the IASAP present the sampling locations (Section 2.0); the sampling and analytical methods (Section 3.0); the data evaluation and reporting (Section 4.0); the proposed schedule (Section 5.0); and references (Section 6.0).

2.0 SAMPLING LOCATIONS

This section of the IASAP describes the proposed indoor air, ambient air, and sub-slab sampling locations, followed by a description of proposed quality assurance samples.

2.1 INDOOR AIR SAMPLING LOCATIONS

Indoor air samples will be collected in the basements, if any, of the homes at 130 and 134 Preston Road as presented on Figure 2, subject to the granting of access by the home owners. If there is no response to requests for access, or if access is denied, the homes in question will not be sampled and the New York State Department of Conservation (NYSDEC) and New York State Department of Health (NYSDOH) (i.e. Agencies) will be notified.

A 24-hour sample will be taken from the lowest potential living/working space within each home, away from vents and windows and in a centrally-located area, at a height of approximately 3 feet above the floor. Homes with operating radon mitigation systems will not be sampled, unless the radon system has been turned off for at least one week prior to sampling and remains off during sampling. Sampling procedures will follow those specified in Section 2.7.3 of the NYSDOH Soil Vapor Intrusion Guidance (October, 2006).

2.2 OUTDOOR AIR SAMPLING LOCATION

One 24-hour outdoor air sample will be collected, contemporaneous with indoor air sampling, for comparison to the indoor air results. The results of the outdoor air sample will assist in the determination of whether soil vapor is the source of any VOCs in the indoor air samples. The outdoor air sample will be collected immediately outside one of the two homes, on the upwind side, away from any exhaust from the buildings (e.g. exhaust vents) or wind obstructions, and distant from any obvious source of VOCs at the

homes. Sampling procedures will follow those specified in Section 2.7.4 of the NYSDOH Soil Vapor Intrusion Guidance (NYSDOH, 2006).

2.3 SUB-SLAB VAPOR SAMPLING LOCATIONS

One 24-hour sub-slab vapor sample will be collected below each separate slab[1] at each home, contemporaneous with the indoor air sampling, for comparison to the indoor air results. The results of the sub-slab vapor samples will assist in the determination of whether soil vapor is the source of any VOCs in the indoor air samples. To the extent possible and as permitted by the owners, the sub-slab vapor samples will be collected in a central location, away from foundation footings and obvious slab perforations.

Sub-slab vapor probe installation and sampling procedures will be consistent with Section 2.7.2 of the NYSDOH Soil Vapor Intrusion Guidance (NYSDOH, 2006). Temporary probes will be installed by drilling approximately 3/8" diameter holes through the basement or first floor slabs, as applicable, no further than 2 inches into the underlying sub-slab materials. The 3/8" hole will be over-drilled with a larger (3/4" or 1") hole to a depth of about 1 inch below the slab surface. A new, clean length of 1/8" or 1/4" nylon tubing will be inserted into the hole to the base of slab (leaving the bottom of the tube exposed for gas entry), and sealed in the hole with Sculpey modeling clay (as recommended by NYSDEC, D. Folkes communication with Bill Wertz, NYSDEC, February 23, 2007) or hydrated bentonite. The hole will be cleaned carefully prior to inserting the tubing to ensure a good bond between the concrete and the clay.

The sampling train will be configured in a manner similar to the Sub-Slab Soil Vapor SOP (Appendix A). The probe and tubing will be purged (three volumes) using a calibrated syringe as required by NYSDOH (2006) guidance and helium tracer gas will be used during the purging phase (in the same manner as recommended for soil vapor probes) to ensure that the probes are well sealed (as recommended by NYSDEC, D.

[1] e.g., separate sub-slab vapor samples will be collected below slabs that are separated by grade beams or foundation walls, if identified, or slabs that are at different grades.

Folkes communication with Bill Wertz, NYSDEC, February 23, 2007). Samples will be collected over a 24 hour period concurrent with the indoor air samples, as described in the previous section.

2.4 QUALITY CONTROL SAMPLES

Indoor air duplicate samples will be incorporated into the sampling program at a rate of 1 in 20 or at least a duplicate per event to assist in the identification and quantification of sources of sampling and analytical error. The results of control samples and the implications related to data quality will be discussed in the final report.

2.5 STEP OUT CRITERIA

Based on the results of the data collected at the proposed homes, additional residences may warrant sampling. Additional residences will be sampled if VOCs are detected in sub-slab vapor samples exceeding the NYSDOH Decision Matrix values recommending monitoring (NYSDOH, 2006). Additional residences will be selected by moving one property to the east and west, and one property to the south, when the sub-slab samples collected during this phase exceed this matrix value by less than one order of magnitude. If a sub-slab sample exceeds the minimum sub-slab Decision Matrix value by more than one order of magnitude, step-out sampling will be conducted two properties to the south and one property to the east and west of the homes with such an exceedance. This stepping out will continue in all directions until sub-slab VOC values are less than the NYSDOH matrix values which recommend monitoring.

Furthermore, additional properties may require sampling based on the results of the new monitoring wells Energy*Solutions* will install west and south of wells MW-26 and MW-26A.

3.0 SAMPLING AND ANALYTICAL METHODS

The various air and vapor samples will be collected and analyzed using standard equipment and procedures as described below.

3.1 SAMPLING METHODS AND EQUIPMENT

All indoor air, outdoor air, and sub-slab vapor samples will be collected and analyzed by EPA Method TO-15. This method employs a passivated (inert), 1 Liter (or 6 Liter) stainless-steel, evacuated sampling sphere for collecting the air samples. The canister is received from the laboratory, certified clean, evacuated, and prepared for sampling. The pressure in the canister is approximately 50 millitorr (compared to 760 torr of pressure in the atmosphere at sea level).

The canisters are then fitted with a sampling valve that uses a critical orifice and mass flow controller to regulate the air flow into the canister. The orifice is selected by size to allow for a 24-hour sampling period. The mass flow controller helps maintain relatively constant air flow rates throughout the sampling period. The canisters will then be placed at the homes, sub-slab points, and outdoor air locations for sampling. The pressure in the canister is monitored with a pressure gauge at the beginning and the end of the sampling period as well as before and after shipment of the containers at the laboratory. The target final field vacuum after 24 hours will be approximately 5 inches of mercury (127 torr). Samples with a final field vacuum of greater than 10 inches of mercury (254), or equal to zero (760 torr), will be flagged (usability of data will depend on sample volume and reporting limits that can be achieved).

Samples will be shipped to the laboratory within three days of sampling so that no sample will exceed the 30-day holding time (since receipt from the lab) for the TO-15 method. Full chain of custody will be maintained for all canisters from time of shipping from the laboratory to the time of analysis.

3.2 INDOOR AIR SURVEYS

An occupant questionnaire and chemical survey, developed by NYSDOH, will be administered by field personnel prior to each sampling event. This questionnaire includes questions that address specific activities that might affect test results, including recent painting, remodeling, smoking, attached garages, carpet cleaning, dry-cleaning, use of solvents or adhesives, and other activities that might contribute VOCs to indoor air. Scheduling of indoor sampling will be contingent on survey findings in order to minimize the potential for confounding of results.

At the time of canister pickup, occupants will be asked a brief series of questions about any conditions or events that may have affected the tests. A copy of the survey form is included in Appendix B.

3.3 LABORATORY ANALYTICAL METHODS

The air samples will be analyzed at Centek Laboratory (Centek), in Syracuse, New York. This laboratory is certified for conducting indoor air analysis in New York by NYSDOH.

The indoor air samples will be analyzed in accordance with EPA Toxic Organic Method TO-15 and NYSDOHs Vapor Intrusion Guidance (NYSDOH, 2006) using a mass spectrometer operated in the SCAN Mode for the full list of TO-15 analytes during the initial test phase. Reporting limits for carbon tetrachloride, TCE, and vinyl chloride will be 0.25 ug/m^3 (as required by Matrix 1 of NYSDOH Guidance) with the remaining compounds having a reporting limit of less than or equal to 1 ug/m^3.

4.0 DATA EVALUATION AND REPORTING

All air samples collected will be subject to data validation and evaluation prior to the reporting of results.

4.1 DATA VALIDATION

All air samples will be subject to data validation by EnviroGroup Limited. This will verify that they were collected and tested according to the procedures specified in this Indoor Air Sampling and Analysis Plan and as required by the NYSDOH (2006) guidance.

Data validation will include the following items:

- Ensuring that sample documentation and holding time requirements were met for all samples.
- Ensuring that chain of custody requirements are met.
- Evaluation of field duplicates.
- Evaluation of pre-test and post-test vacuum.
- Evaluation of the concentration of the leak test compound for sub-slab samples.
- Ensuring that laboratory control samples and standards are within laboratory specified control ranges for the VOCs analyzed.
- Ensuring the method blank results are non-detect at the reporting limits.
- Ensuring that instrument tuning procedures are documented.
- Ensuring that all surrogate recoveries are within acceptable ranges.
- Ensuring that the data summary sheets are correct, based on an evaluation of the raw data.

4.2 DATA EVALUATION

Any detected VOCs in the indoor air samples will be compared to sub-slab vapor levels and outdoor air levels and, as applicable, will be evaluated according to the NYSDOH Indoor Air Decision Matrices presented in the NYSDOH (2006) guidance. If the winter heating season sub-slab and indoor air results from both homes meet "*no further action*" criteria outlined in NYSDOH Vapor Intrusion Guidance (NYSDOH, 2006), it is expected that no further testing would be required in homes on the south side of Rowan Road, if the results from the new monitoring wells to be installed return lower concentration results than those for MW-26 (i.e., indicate that these were the probable worst case homes).

4.3 DATA REPORTING

When all analytical data from the laboratory have been received and validated, a final report will be prepared. The following topics will be covered in this report:

- Results for all air and sub-slab vapor samples,
- Comparisons of indoor air concentrations to outdoor air concentrations, NYSDOH residential background tables, and sub-slab vapor concentrations,
- Evaluation of results according to applicable decision matrices

The report will include the indoor air cis-1,2-DCE; and vinyl chloride results shown on a map of the site. Hard copies of laboratory analytical reports and a full Category B deliverable package (as defined under the requirements of the NYSDEC ASP) sufficient to meet the NYSDEC Data Usability Summary Report (DUSR) requirements also will be provided.

To be consistent with New York State regulatory requirements (NYS Article 27, Title 24), sample results will also be reported to the individual homeowners within 30 days

after laboratory data are received and validated. We understand that the Agencies will be making this notification.

5.0 SCHEDULE

Energy*Solutions* anticipates conducting the air sampling program described in this IASAP during the winter 2010 heating season[2], pending the Agencies approval. The schedule is also contingent upon individual owners and/or tenants granting access, scheduling of air tests and completing the planned testing event. Energy*Solutions* will request access from owners and/or tenants subsequent to written approval of this work plan from the Agencies. Some or all test results could be delayed if individuals do not respond. Should any such delays move the schedule beyond April, the sampling may be delayed until the following heating season, depending on the concentrations detected in other tested homes.

Once owners have signed an access agreement, they will be asked to allow a brief walk-through in order to identify any potential background sources of VOCs that can be removed prior to testing.

Results will be reported to the Agencies no later than 14 days after completion of laboratory analyses and data validation. Following a technical review conference with the Agencies, Energy*Solutions* anticipates that representatives from either the NYS or Erie County DOH will be responsible for communicating any interpretation of the results to the owners and occupants of the residences. Energy*Solutions* is prepared to participate in these discussions as a supporting party.

[2] Nominally the end of March, but the heating season may continue beyond the end of March if outdoor air temperatures remain cool enough to require heating.

6.0 REFERENCES

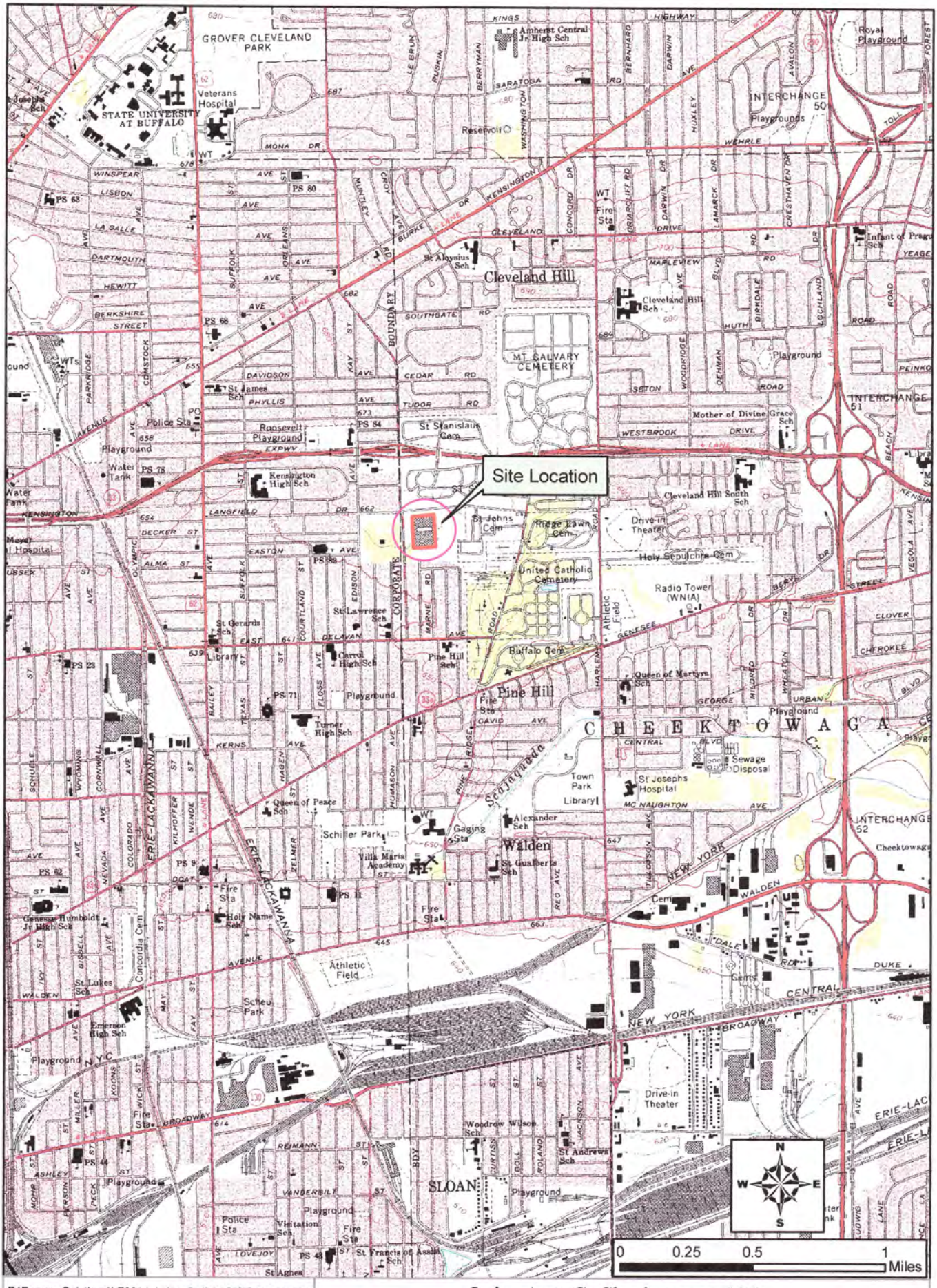
EnviroGroup Limited, 2008, Vapor Intrusion Investigation Work Plan, Leica Area C, Cheektowaga, New York, December 23, 2008.

EnviroGroup Limited, 2009, Rowan Road Groundwater Investigation Report, Leica Area C, Cheektowaga, New York, November 16, 2009.

New York State Department of Health, 2005, Indoor Air Sampling & Analysis Guidance, February 1, 2005.

New York State Department of Health, 2006, Final NYSDOH Center for Environmental Health, Bureau of Environmental Exposure Investigation, Soil Vapor Intrusion Guidance, October 2006.

Personal communication between Bill Wertz, NYSDEC, and David Folkes, EnviroGroup Limited, on February 23, 2007.



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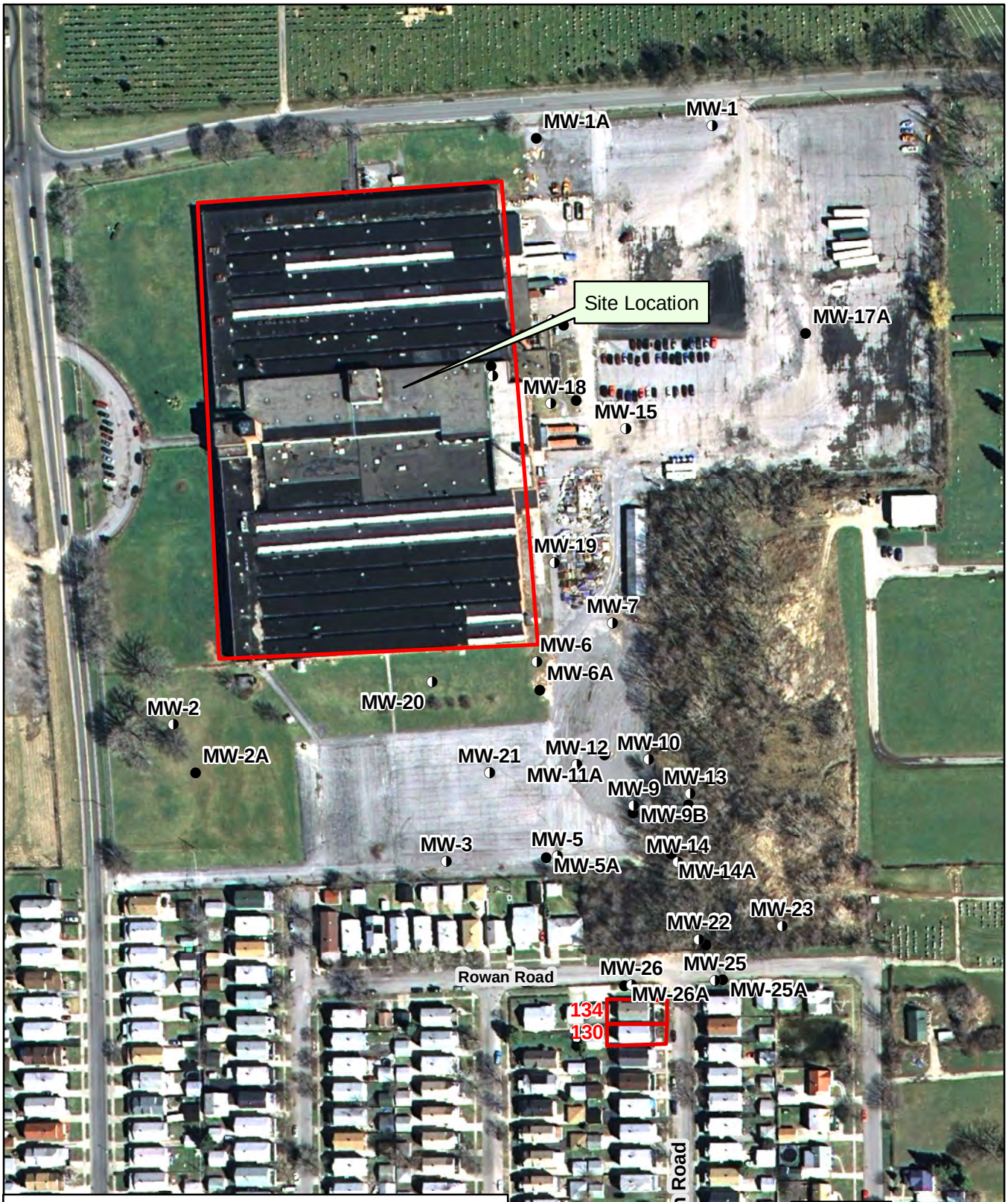
EnviroGroup Limited
Centennial, Colorado

Figure 1
LE-0614

Leica Area C, Cheektowaga, NY

Site Map



Legend

- OverburdenWells
- BedrockWells
- Indoor Air/Sub-Slab Sampling Locations

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EnviroGroup Limited
Centennial, Colorado

Figure 2
LE-0614

Leica Area C, Cheektowaga, NY

LOCATIONS OF INDOOR AIR AND SUB-SLAB VAPOR SAMPLING

APPENDIX A

STANDARD OPERATING PROCEDURES
SUB-SLAB SOIL VAPOR SAMPLING

Standard Operating Procedure:

Sub-Slab Vapor Probe Installation & Sampling

The following standard operating procedure (SOP) is for installation and sampling of sub-slab vapor probes for the analysis of volatile organic (VOC) compounds. This SOP is based on procedures developed by H&P Mobile Geochemical (2004), modified by EnviroGroup Limited as necessary to comply with the New York State Department of Health (NYSDOH) "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York", October 2006.

SOP Objectives

The objective of this SOP is to obtain a vapor sample from soil or fill materials located immediately below a concrete slab. This is accomplished by drilling a small diameter hole through the slab, sealing a clean tube composed of an inert material in the hole, and collecting a sample of the sub-slab vapor though the tube by EPA Method TO-15, using a passivated (inert), stainless-steel, evacuated sampling sphere. Sub-slab vapor samples should be collected over the same time interval as associated indoor air and ambient air samples.

Materials

Tubing: Laboratory or food grade nylon or Teflon tubing (temporary installations), brass or stainless steel tubing (permanent installations), or other materials approved by NYSDOH and NYSDEC (agencies).

Tubing Diameter: Nominally 1/8" OD or 1/4" OD.

Tubing Length: Sufficient length to extend to the base of the slab but no more than 2 inches below slab. Tubing for temporary installations will connect directly to sampling device or valve, with sufficient length to pass through helium tracer shroud (see below). Permanent installations will be completed with cap or valve slightly recessed below finished floor.

Surface Termination: Swagelok fittings (permanent) or plastic 3-way valve (temporary).

Probe Installation Protocol

1. Inspect building floor prior to installation. Note and record any penetrations, cracks, sumps, drains, etc. in floor.
2. Locate probes away from construction joints, open cracks, and other features that might facilitate infiltration of indoor air into the sub-slab region. Select locations that are unlikely to be disturbed by building occupants during test, to the extent practicable.

3. Ensure all sub-slab utilities (public and building specific) are marked prior to installation.

4. Drill a 3/4" to 1 ¼" diameter recess to a depth of 1" in the concrete using a hammer drill. Then drill a 1/2" to 3/4" OD hole through the slab and the recess hole. Do not use water. If dust prevention necessary, cover the location with a towel/cloth and drill through a pre-cut hole in the cloth.

5. Continue the smaller diameter hole to a depth of approximately 3 to 6 inches below the slab. Clean the recess hole using a wisk broom to ensure an adequate seal for clay or cement (see below). Do not use vacuum when hole is open.

6. Measure slab thickness. Cut tubing to appropriate length to reach base of slab or extend no more than 2" below base of slab and to give required type of surface termination (flush, recessed, protruding).

7. Insert tubing. If temporary installation, seal top end using a plastic 3-way valve or clamp. Add inert clean backfill material (e.g., glass beads, silica sand) to cover lower 1 inch of tube.

8. For temporary installations, tightly seal space between tubing and larger recess hold with Sculpey modeling clay or similar non-shrinking material that is free of VOCs.

9. For permanent installations, grout to surface with quick drying cement.

10. If applicable, wait for material to fully set before sampling.

Soil Gas Sample Collection

Since sub-slab sampling is from very shallow depths (typically 2" to 6" below surface), minimum purge volumes and low volume samples are preferred to minimize potential breakthrough from the surface. Tracer/leak gas is necessary to ensure breakthrough does not occur.

Tubing: 1/8" or 1/4" OD nylon or Teflon tubing, if required to connect permanent installation to sampling canister. For temporary installations, use probe tubing.

Sample Canister: Passivated, evacuated stainless steel canister (e.g., Summa® canister), of sufficient volume to achieve required reporting limits (1 to 6 L for TO-15 analyses in residential settings unless smaller canisters are demonstrated to be adequate). Canisters should be certified clean to the required reporting limits by the laboratory.

Other Materials: Syringe, tedlar bag, plastic 3-way valve, vacuum gauge and sampling train as necessary.

Notes: Ensure flow chokes are dedicated to the canister or cleaned before reuse on another canister.

1. Place small plastic pail or tub (helium tracer gas shroud) over hole. Seal base of shroud to floor using foam pipe insulation or bentonite bead. Weigh shroud down to maintain seal. Pass tubing through similar diameter hole in shroud and connect to purging device. Inject helium into shroud through a second port until concentrations are at least 20 times the meter detection limit. Measure helium concentration using a portable meter.
2. Connect 60 cc syringe to sampling train and purge out 3 dead-volumes of the connecting tubing plus the sampling train at a rate not to exceed 0.2 L (200 ml) per minute. Purged gas should be injected into a tedlar bag, which can then be emptied outdoors (after step 3), to avoid impacting indoor air.
3. Measure helium concentration in tedlar bag. If less than or equal to 10% of helium concentration in shroud, continue with sampling (after this step, it is no longer necessary to maintain helium in shroud). If helium concentration in tedlar bag is greater than 10% of the shroud concentration, stop test and improve probe seal or reinstall probe.
4. Connect canister to sampling train or connecting tubing. Ensure all connections and fittings are tight.
5. Check and record canister vacuum (minimum vacuum 27" Hg except for high altitude locations). Canisters flow controllers should be set for 24 hours for residential samples and 8 hours for commercial or industrial settings, unless otherwise approved by the agency.
6. Open canister valve and collect sample.
7. After 24 hours check and record canister vacuum. Close valve and ship canister to laboratory under strict chain of custody.
8. Remove sample tubing and seal material.
9. Backfill and seal sub-slab sample hole with quick set concrete filler.

Field Records

A building inspection, chemical survey, and occupant questionnaire should be completed consistent with the requirements of the NYSDOH (2006) guidance.

Prepare a floor plan sketch showing the sample locations (including indoor air), chemical storage areas, garages, doorways, stairways, sumps, drains, utility perforations, HVAC supply and return air ducts in room, footings that separate the sub-slab region (if known), north direction, and other pertinent information.

The field technician maintains a log sheet summarizing:

- Sample identification
- Probe location

- Date and time of sample collection
- Sampling depth
- Identity of samplers
- Weather conditions, including indoor and outdoor temperatures, ventilation conditions and HVAC equipment operation, status of windows and doors (opened or closed)
- Sampling methods and devices
- Soil gas purge volumes
- Helium concentrations in shroud and purge gas
- Volume of soil gas extracted
- Vacuum of canisters before and after samples collected.
- Apparent moisture content (dry, moist or saturated etc.) of the sampling zone
- Chain of custody protocols and records used to track samples from sampling point to analysis.

APPENDIX B

NYSDOH INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

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

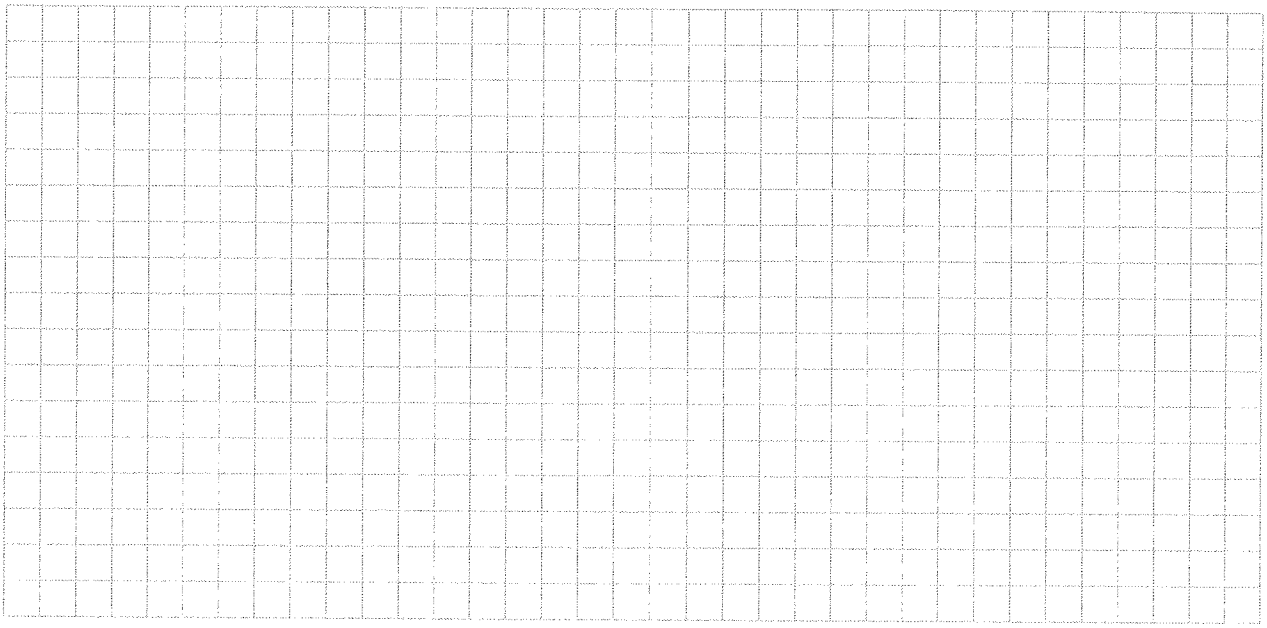
c. Responsibility for costs associated with reimbursement explained? Y / N

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

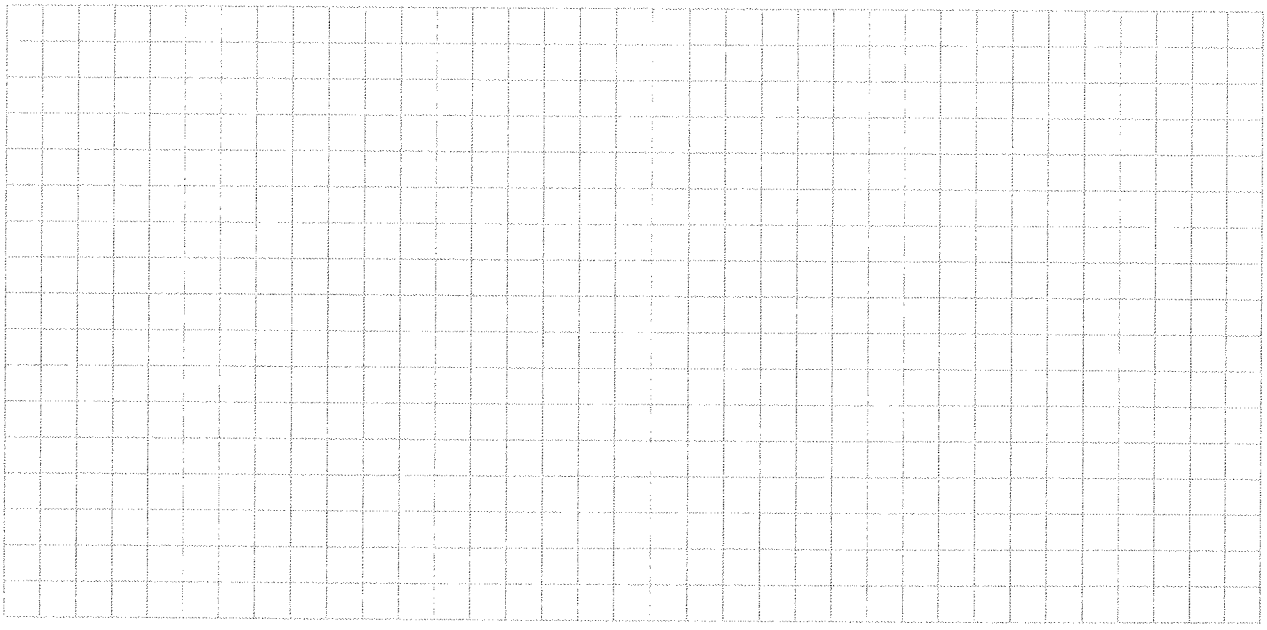
11. FLOOR PLANS

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:



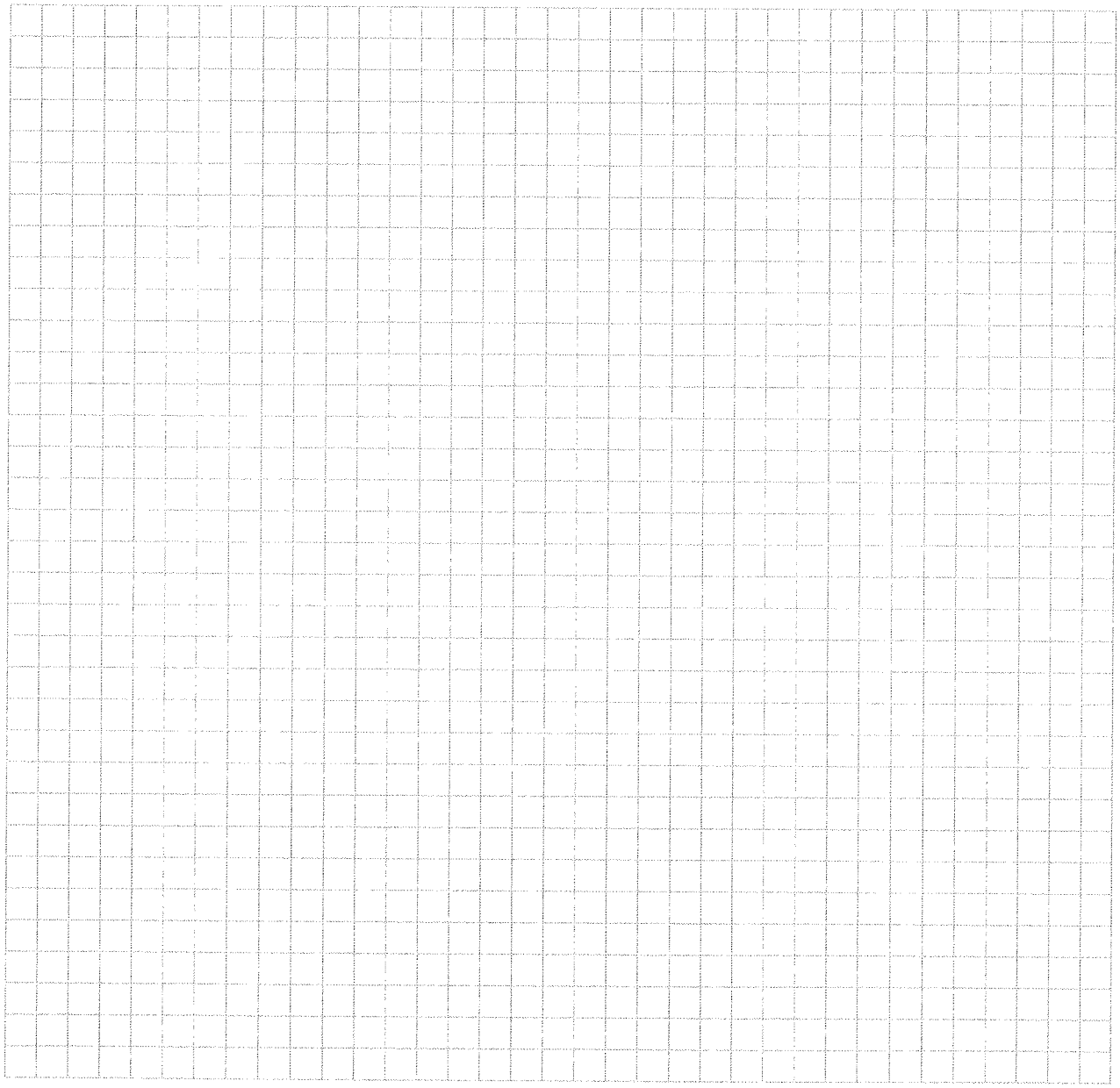
First Floor:



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.