MACTEC

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December 23, 2009

Mr. Frank Sowers
Project Manager
New York State Department of Environmental Conservation
Region 8 – Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, NY 14414

Subject: **Work Plan for Sub-Slab Vapor and Indoor Air Investigation**
Residences near the Former Taylor Instruments Site: 64, 70, and 80
Ames Street and 215 and 216 Danforth Street
Rochester, New York
VCA Index #B8-0508-97-02
MACTEC Project Number 3031052006/09

Dear Mr. Sowers:

On behalf of ABB, Inc. (ABB), formerly Combustion Engineering, MACTEC Engineering and Consulting, Inc., (MACTEC) is submitting this work plan to detail a proposed sub-slab vapor and indoor air investigation at four houses (five residences) near the Former Taylor Instruments Site (the Site) located at 95 Ames Street in Rochester, New York. The purpose of the investigation is to determine whether selected volatile organic compounds (VOCs) contaminants of concern [i.e., tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2 dichloroethene (DCE), and vinyl chloride (VC)] are present at levels requiring further investigation or mitigation in the sub-slab vapor or indoor air at residences located downgradient of the Site across Ames Street.

BACKGROUND

ABB has submitted a proposal for site closure. During correspondence and communications with the New York State Department of Environmental Conservation (NYSDEC or the Department) regarding that proposal, ABB was informed that the Department required an additional soil vapor investigation (SVI) as a precondition to approving ABB's *Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System* (MACTEC, 2008).

MACTEC performed the SVI on September 8 and 9, 2009. The results of the SVI were contained in MACTEC's *Report of Soil Vapor Investigation* (MACTEC, 2009). The primary goal of the SVI was to determine whether the VOC contaminants of concern were present in soil vapor in the right-of-way along Ames Street. TCE was detected in two samples collected near the sewer line beneath Ames Street. Therefore, although no direct evidence that the selected VOCs were traveling from the Site onto adjacent residential properties was obtained, ABB intends to investigate sub-slab vapor and indoor air samples from four houses near the Ames Street soil vapor sample locations (i.e., residences at 64, 70, and 80 Ames Street and 216 Danforth Street, if ABB can obtain reasonable access agreements from the property owners). It should also be noted that during a site visit conducted by ABB on November 9, 2009, it was discovered that the residence at 80 Ames Street is a duplex with a second address of 215 Danforth Street. Therefore, 215 Danforth Street will also be included in the investigation.

PROPOSED SUB-SLAB VAPOR AND INDOOR AIR SAMPLING

MACTEC proposes to collect sub-slab vapor and indoor air samples at the five residences (64, 70, and 80 Ames Street and 215 and 216 Danforth Street) near the Site. The residences are shown on the attached Figure (Attachment A). The air samples will be collected consistent with the procedures and techniques described in the New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006* (NYSDOH, 2006).

The targeted sampling approach for each residence will include:

- Completion of the NYSDOH Indoor Air Quality Questionnaire and Building Inventory (Attachment B),
- Collection of one sub-slab vapor sample from each residence basement,
- Collection of one basement ambient air sample from each residence, and
- Collection of an outdoor ambient air sample during each indoor sampling event for comparison to indoor air samples.

Pre-Sampling Inspection

Subject to written access agreements from both the property owners and residents, MACTEC will conduct indoor air surveys and product inventories at each residence prior to sampling to identify

conditions that may affect or interfere with the proposed testing. The inspection information will be identified on the NYSDOH Indoor Air Quality Questionnaire and Building Inventory form (Attachment B). A MiniRae photoionization detector (PID) that measures for the selected VOCs in the low parts per billion concentration range using a 10.6 ionization potential lamp will be used to scan any containers found in the basement area that may be off-gassing VOCs. VOCs listed as an ingredient on the label of any containers found in the inspected areas that are also Site contaminants of concern will be noted on the inventory forms, along with any PID readings. Any container which could contain VOCs but the ingredients are not clearly identifiable will be photo-documented, and the ingredients will be verified with Material Safety Data Sheets after completion of sampling activities. The completed surveys will include sketches of the sampling area layout and the location of sub-slab vapor and indoor air samples.

MACTEC will inspect the concrete slab at each residence and note any penetrations (cracks, drains, perforations, sumps, etc.). The sub-slab vapor sample points will be installed to minimize the potential for ambient air infiltration via floor penetrations based on MACTEC's evaluation of the slab conditions and practical considerations such as homeowner/resident concerns and preferences as to the location of the floor penetration.

Potential interference from products or activities releasing volatile chemicals of concern will be minimized by removing the source from the indoor environment prior to testing, if practical. In particular, if any products that are inventoried list chlorinated solvents as ingredients and also exhibit positive PID results above background and if the homeowner/resident grants permission, then these containers will be removed from the home to an alternative location (i.e., garage, shed, or other available outside location), and MACTEC will wait at least until the following day to commence sampling. If it is not practical to wait to sample based on homeowner/resident access conditions to the residence, MACTEC will document potential indoor sources of volatile chemicals of concern prior to sampling.

Collection of Samples

A total of five sub-slab vapor samples, five indoor air samples, and an outdoor ambient air sample during each 24 hour sampling event will be collected. At 64 and 70 Ames Street and 216 Danforth Street, which are single family residences, one sub-slab vapor and one indoor air sample will be collected at each residence. 80 Ames Street and 215 Danforth Street are located within a duplex, reportedly with a

wall dividing the basement into two areas. Therefore, at the 80 Ames Street/215 Danforth Street duplex, one sub-slab vapor and one indoor air sample will be collected at each residence.

Sub-Slab Vapor Samples

One sub-slab vapor sample will be collected from beneath the concrete floor slab at each of the five residences. MACTEC will use a hammer drill to advance a 1-inch hole 2 inches into the slab. The hole will be continued with a 3/8-inch drill bit to penetrate the floor and create a drill hole in the underlying substrate to a depth of up to 2 inches beneath the slab. The hole will then be swept to remove drill cuttings/dust from the area. A temporary sub-slab vapor point will be installed by placing 1/4-inch diameter Teflon® (owned by Dupont) tubing in each hole to a depth of no more than 2 inches below the slab. Glass beads will be used to fill any annular space around the tubing, if necessary, and the tubing will extend through a rubber stopper within the drilled hole. The stopper will be sealed to the floor using melted beeswax to prevent infiltration of ambient air.

Prior to and immediately after sampling helium leak tests will be conducted at all locations to ensure samples are representative of sub-slab conditions and not indoor ambient air. To conduct the leak test, a shroud will be placed over the sample point, and the Teflon tubing will protrude through the shroud. The shroud and penetrations will be as air-tight as possible. The shroud will be filled with helium such that the atmosphere within the shroud approaches a helium concentration of 100%. The sample port will then be purged using a low-flow setting on the helium detector (<200 milliliters per minute [ml/min]) for one minute. If leak test results indicate that that the beeswax seals are not adequate (i.e., more than 10 percent helium is detected in the sample tubing), then an alternative material, such as grout or hydraulic cement) will be used to seal the penetration.

Sub-slab vapor samples will be collected over 24 hours into clean-certified 6-liter SUMMA® (owned by Molectrics)-type canisters with certified 24-hour flow regulators. The sample flow rate will be set to near 3 to 5 ml/min. Sampling will continue for approximately 24 hours until a sufficient volume of sample has been collected, to be determined based on vacuum pressure readings on the SUMMA® canisters. Canister vacuum typically starts at approximately -28 to -30 inches of mercury (in/Hg) and at the canister valve will be shut-off after 24-hours or when the pressure reading on the can's gauge measures approximately -5 in/Hg. Upon completion of the sampling the sample port seal will be

inspected to confirm its integrity, the sample tubing and stopper will be removed from the hole, and the hole will be filled with cement.

Indoor Air Samples

Concurrent with sub-slab vapor sample collection, indoor air samples will be collected from each residence basement to assess potential exposure to occupants. Indoor air samples will be collected by staging clean-certified SUMMA® canisters with certified 24-hour flow regulators approximately 3 feet above the basement floor. Samples will be collected over a 24-hour period coincident with the sub-slab vapor sampling. Sample flow rates and volume determination will mimic those for sub-slab vapor sampling. During sampling personnel will avoid lingering in the sample area as much as practical.

Quality Assurance

Concurrent with sub-slab and indoor air sample collection, an outdoor air sample will be collected during each 24-hour indoor sampling activity to evaluate the potential influence, if any, of outdoor air on indoor air quality. The outdoor air samples will be collected by staging a clean-certified SUMMA® canister with a certified 24-hour flow regulator at a location interpreted to be upwind of the five residences. To aid in interpretation of sampling results, various outdoor conditions will be documented, including locations of potential interferences (e.g., fuel stations, factories, etc.), weather conditions, and other pertinent observations (e.g., odors, PID readings). Samples will be collected over a 24-hour period coincident with the sub-slab vapor and indoor air sampling. Sampling procedures, including flow rates and volume determination, will mimic those for indoor air sampling.

One duplicate indoor air sample will be collected to assess precision of sampling methods as well as laboratory data. The duplicate sample will be collected in accordance with the indoor air sampling procedures.

For all samples, pertinent information including the time of sample collection, starting and ending canister vacuum (in/Hg), PID measurements, etc., will be recorded in a field log book and on sampling record forms (Attachment C).

Laboratory Analytical Testing and Results

Vacuum measurements will be collected from each sample can upon receipt by the project laboratory. Vacuum pressures will be reported to MACTEC and will be reviewed along with the analytical data. If zero-vacuum is measured in any of the sampling cans, the analytical data from that sample will be assessed by MACTEC for representativeness based on concentrations of compounds detected in other samples collected from the residences, and the vacuum data will be presented in the vapor investigation report.

All vapor samples will be submitted to Con-Test Analytical Laboratory under chain-of-custody protocol for analyses of the four VOC contaminants of concern using United States Environmental Protection Agency (EPA) Method TO-15. The selected VOCs are the Site contaminants of concern, as follows:

- PCE;
- TCE;
- DCE; and
- VC.

For undiluted samples using EPA Method TO-15 for VOCs, Con-Test has standard reporting limits of 1 microgram per cubic meter (mg/m^3) for sub-slab vapor and 0.25 mg/m^3 for indoor air and outdoor ambient air. Con-Test will provide a Category B deliverable as defined in the NYSDEC *Analytical Services Protocols* (NYSDEC, 2000). The analytical results will be used in conjunction with the Soil Vapor/Indoor Air Matrix tables in the NYSDOH 2006 Guidance document (NYSDOH, 2006) to aid in the assessment of soil vapor intrusion at the residences. TCE and VC concentrations will be evaluated by using Matrix 1 guidance values. PCE and DCE will be evaluated using Matrix 2 guidance values.

VAPOR INVESTIGATION REPORT

Upon completion of the field program and receipt of analytical data, MACTEC will prepare a vapor investigation report. The report will document the field activities completed, provide results of the laboratory analysis, and provide conclusions and recommendations. Copies of sampling forms, field

data records, the NYSDOH questionnaire, field instrument calibration records, photos of sampling locations, and laboratory analytical data will be included as appendices to the report.

COMMUNITY OUTREACH

ABB representatives, accompanied by a NYSDOH representative (Katherine Comerford), met with an occupant of each residence during November to discuss the results of the September sampling event in the right of way and the need for, and process associated with, indoor air and sub-slab sampling. All interviewed residents indicated apparent willingness to cooperate with the process.

Prior to initiation of field activities, MACTEC will obtain appropriate access agreements. Once signed access agreements are obtained, MACTEC will schedule the sampling activities with each owner and/or resident. MACTEC acknowledges the NYSDOH request for the sampling to occur before March 31, 2010. MACTEC will notify both the NYSDEC and the NYSDOH at least two weeks prior to our sampling activities.

CLOSING

Mr. Sowers, we appreciate your consideration of our proposed sub-slab vapor and indoor air investigation. Following approval of this work plan, MACTEC will commence with the efforts to secure access agreements and schedule sampling dates. Should you have any questions, please contact me at (865) 588-8544 (ext. 1113), or via email at raryan@mactec.com.

Sincerely,

MACTEC Engineering and Consulting, Inc.

Ricky A. Ryan, P.E. with permission
Senior Principal Engineer/Project Manager

K. Joe Deatherage
Senior Environmental Engineer

[963]

cc w/ enc:

Bart Putzig, NYSDEC
James D. Charles, NYSDEC
Katherine Comerford, NYSDOH
Jeffrey Kosmala, MCHD
John Conant, ABB *(electronic)*
Jean McCreary, Nixon Peabody LLP
Libby Ford, Nixon Peabody LLP
Nelson Walter, MACTEC *(electronic)*
Melody Christopher, ABB

References

MACTEC, 2008. *Work Plan for Accelerated Bioremediation and Permanent Decommissioning of the Remedial Treatment System, Former Taylor Instruments Site, Rochester, New York.* Prepared for the New York State Department of Environmental Conservation. October 9.

MACTEC, 2009. *Report of Soil Vapor Investigation, Former Taylor Instruments Site, Rochester, New York.* Prepared for the New York State Department of Environmental Conservation. November 5.

NYSDEC, 2000. *Analytical Services Protocols.* Prepared by the New York State Department of Environmental Conservation. June.

NYSDOH, 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.* Prepared by the New York State Department of Health. October.

Acronyms

ABB	ABB, Inc.
DCE	cis-1,2-dichloroethene
Department	New York State Department of Environmental Conservation
EPA	Environmental Protection Agency (United States)
in/Hg	inches of mercury
MACTEC	MACTEC Engineering and Consulting, Inc.
ml/min	milliliters per minute
mg/m^3	Micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	tetrachloroethene
PID	photoionization detector
Site	Former Taylor Instruments Site
SVI	soil vapor investigation
TCE	trichloroethene
VC	vinyl chloride
VOC	volatile organic compound

ATTACHMENT A

FIGURE

Prepared by: mlv
Checked by: kjd

MACTEC

Proposed Sub-Slab Vapor and Indoor Air Sampling - Residences at 64, 70, and 80 Ames Street and 215 and 216 Danforth Street

Former Taylor Instruments Site
Rochester, New York

Project 3031052006-10

ATTACHMENT 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

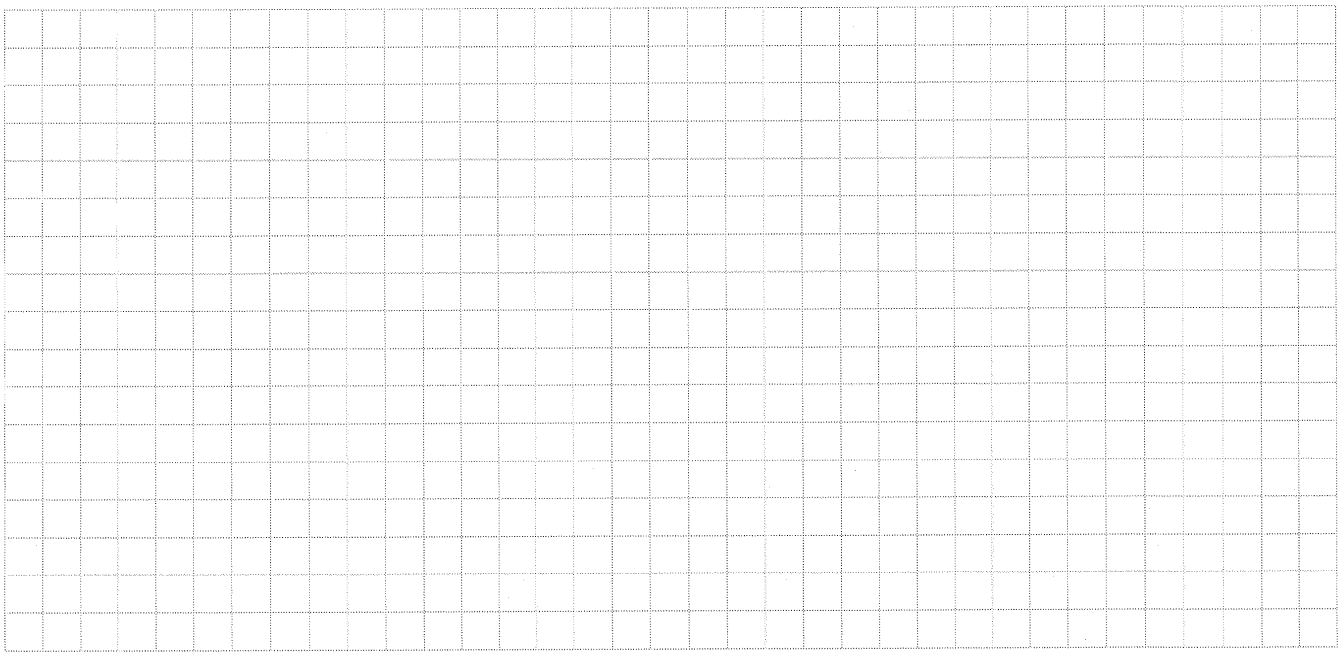
c. Responsibility for costs associated with reimbursement explained? Y / N

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

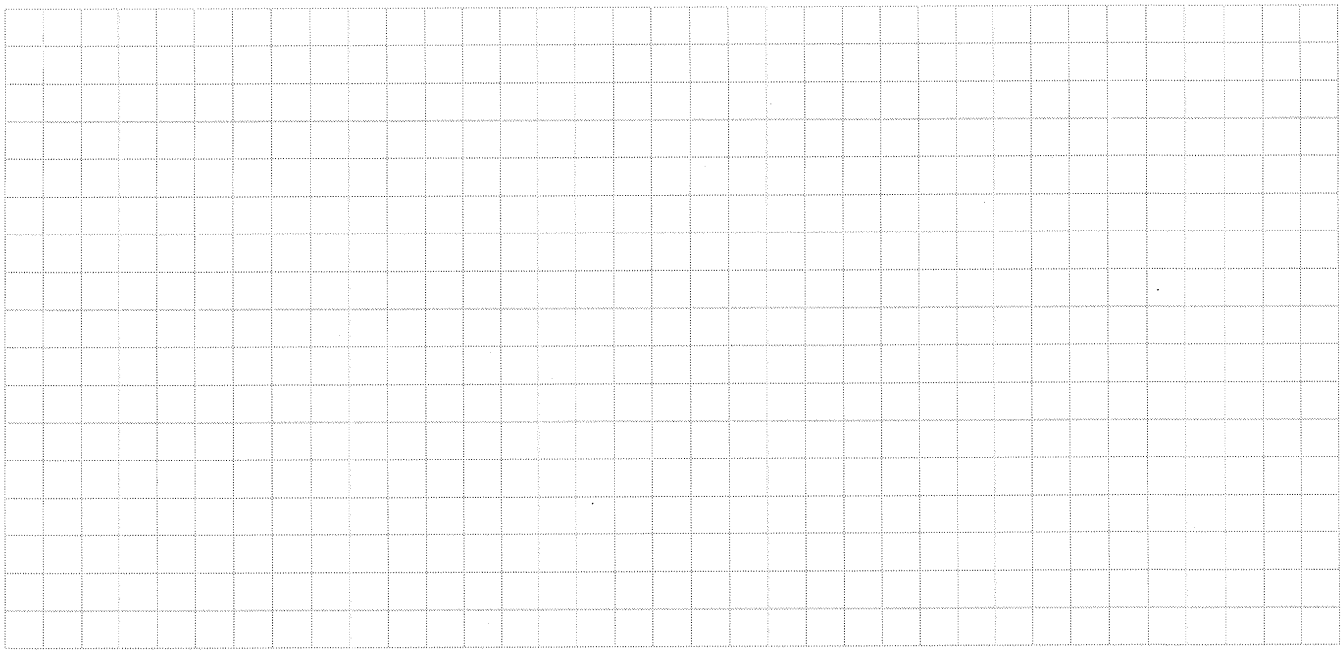
11. FLOOR PLANS

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:



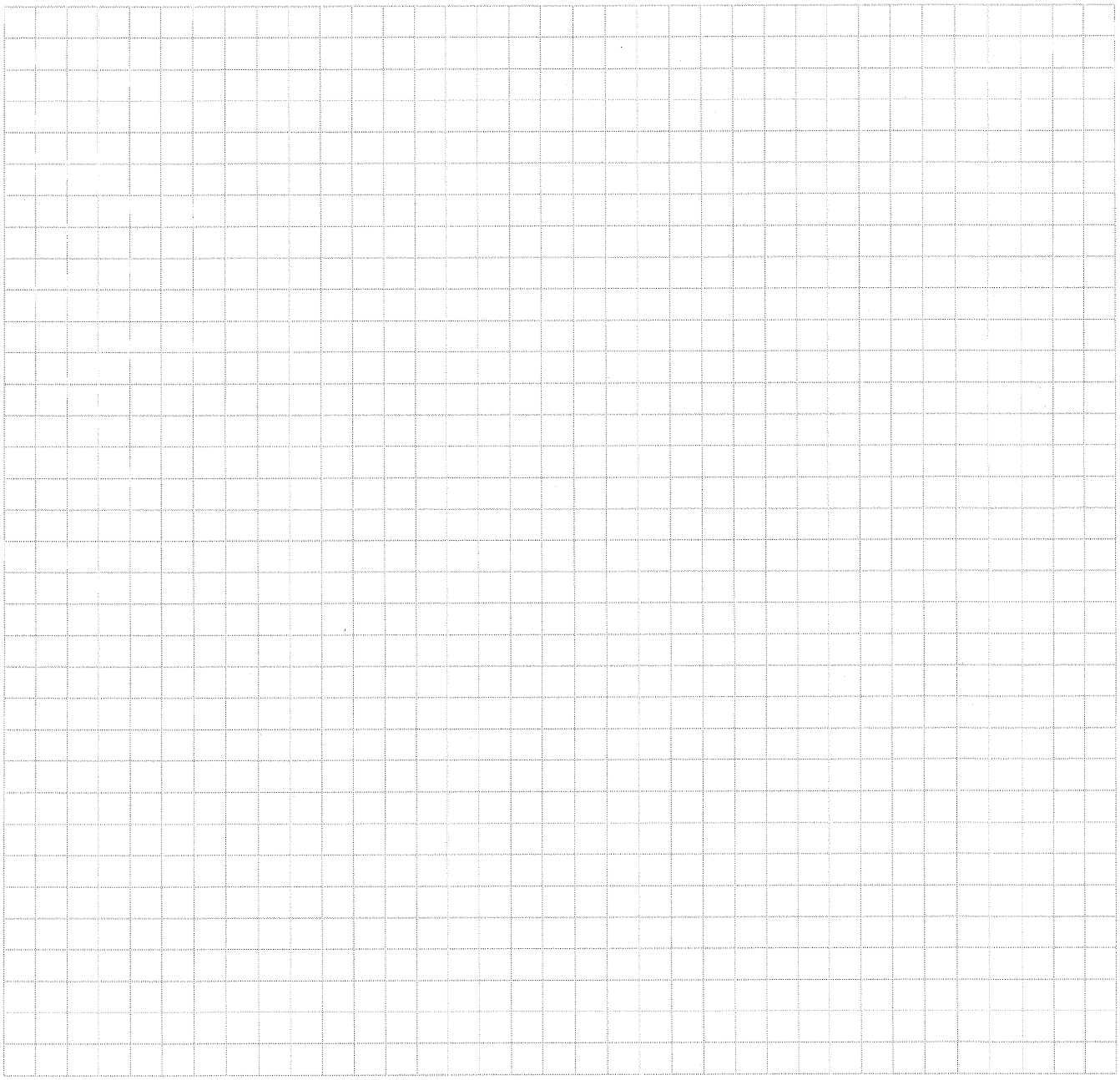
First Floor:



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.

ATTACHMENT C

SUB-SLAB VAPOR AND INDOOR AIR SAMPLING RECORD

AIR SAMPLING RECORD

Project Name:_____ Client:_____ Location ID:_____

Project Number:_____ Collector:_____ Date:_____

SUMMA Canister Record Information:

SUBSLAB SOIL VAPOR SAMPLE		INDOOR AIR - BASEMENT		ASSOCIATED AMBIENT	
Flow Regulator No:		Flow Regulator No:		Flow Regulator No:	
Flow Rate (mL/min):		Flow Rate (mL/min):		Flow Rate (mL/min):	
Canister Serial No:		Canister Serial No:		Canister Serial No:	
Start Date/Time:		Start Date/Time:		Start Date/Time:	
Start Pressure ("Hg):		Start Pressure ("Hg):		Start Pressure ("Hg):	
Stop Date/Time:		Stop Date/Time:		Stop Date/Time:	
Stop Pressure ("Hg):		Stop Pressure ("Hg):		Stop Pressure ("Hg):	
Sample ID:		Sample ID:		Sample ID:	

Other Sampling Information:

Finished Basement, Crawl Space, Unfinished Basement		Story/Level:		Direction from Building:	
Floor Slab Thickness:		Room:		Distance from Building:	
Potential Vapor Entry Points:		Potential Vapor Entry Points:		Distance from Roadway:	
Floor Surface:		Floor Surface:		Ground Surface:	
Noticable Odor:		Noticable Odor:		Noticable Odor:	
PID Reading (ppb):		PID Reading (ppb):		PID Reading (ppb):	
Intake Depth/Height:		Intake Height:		Intake Hieght Above Ground Surface:	
Helium Test Conducted? Breakthrough %:		Indoor Air Temp:		Intake Tubing Used?	

Comments/Location Sketch:

MACTEC
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