ENVIRONMENTAL GROUP, INC.
ENGINEERING, ARCHITECTURE & SURVEYING, PC

July 28, 2017

Julia M. Kenney
Public Health Specialist III
NYS Department of Health
Bureau of Environmental Exposure Investigation
Corning Tower, Room 1787
Albany NY 12237

Re: Destiny BCP Site No. C734135, Site 7
Embassy Suites Hotel Indoor Air Analysis

Dear Ms. Kenny:

Spectra Engineering, Architecture & Surveying, Inc. (Spectra) is pleased to provide the NYS Department of Health with an Indoor Air Sampling Plan for your review and approval. The hotel is located on the Destiny USA Brownfield site No. C734135 in Syracuse, NY. In accordance with the Site's Remedial Work Plan, an indoor air analysis of the ground floor level of the facility will be conducted. Enclosed is the Indoor Air Sampling Plan with the site plan and sampling location map.

Spectra, with input from the NYSDOH and NYSDEC has selected 12 indoor air sampling locations. The proposed locations were determined in accordance with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Upon receipt of the laboratory analysis, Spectra will provide a written report summarizing the results of the air sampling to include a comparison to the DOH Guidance Values.

If you have any questions, please do not hesitate to contact me at (518) 782-0882 or fpeduto@spectraenv.com.

Sincerely,

SPECTRA ENGINEERING, ARCHITECTURE
AND SURVEYING, P.C.

Frank R. Peduto, P.E.
Project Manager

Enclosure: Indoor Air Sampling Plan

Site Plan
Indoor Air Sampling Location Map
Soil Vapor Results
NYSDOH Indoor Air Analysis Questionnaire and Building Inventory

cc w/enc.: Karen Cahill, NYSDEC Region 7
Harry Warner, NYSDEC Region 7
David Aitken, Destiny USA

G:\2015\15209\Correspondence\DOH Indoor Air Cover Letter.docx

ENVIRONMENTAL GROUP, INC.
ENGINEERING, ARCHITECTURE & SURVEYING, PC

INDOOR AIR SAMPLING PLAN
SITE 7

NYSDEC BCP SITE #C734135

BROWNFIELD CLEANUP PROGRAM
DESTINY USA
SYRACUSE, NEW YORK

Prepared for:

New York State
Department of Health
Bureau of Environmental Exposure Investigation
Corning Tower, Room 1787
Albany, New York 12237

Prepared by:

Spectra Engineering, Architecture and Surveying, P.C.
19 British American Boulevard
Latham, New York 12110
Project #15209

July 2017

INDOOR AIR SAMPLING PLAN
SITE 7 - NYSDEC BCP SITE #C734135
DESTINY USA – BROWNFIELD CLEANUP PROGRAM
SYRACUSE, NEW YORK

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APPENDICES

1.0 INTRODUCTION

Spectra Engineering, Architecture & Surveying, Inc. (Spectra) is pleased to provide the NYS Department of Health (NYSDOH) and the NYS Department of Environmental Conservation (NYSDEC) with the Indoor Air Sampling Plan for the hotel located on the Destiny USA Brownfield site in Syracuse, NY. In accordance with the Remedial Work Plan, the Vapor Control System verification testing will be supplemented with an indoor air analysis of the ground floor level of the facility. The sampling will be performed in accordance with the New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006. Spectra is submitting this indoor air quality plan for your approval.

2.0 SITE BACKGROUND

The Destiny USA Brownfield site (Site 7) is located at the southeast end of Onondaga Lake. Site 7 is approximately 22.8 acres and is located across the southern portion of the Destiny land between West Hiawatha Boulevard and Bear Street. The site is bordered by Hiawatha Boulevard to the northwest, I-81 to the northeast, Bear Street to the southeast, and Solar Street to the southwest. Site 7 was most recently (1990's) used by oil companies as a major oil storage facility. An Embassy Suites hotel is being constructed on the northern portion of the site (See Figure 1, Hotel project area).

3.0 CURRENT SOIL VAPOR CONDITIONS

A subsurface soil vapor investigation was conducted at Site 7 on July 2 and 3, 2013. Six, temporary vapor points were installed, sampled, and analyzed for VOC via EPA Method TO-15 (See Figure 1). Soil vapor sampling results are semi-quantitative in nature. They may not correlate directly to soil and or groundwater concentrations directly beneath them.

The following analytical soil vapor sampling results were collected on Site 7. The compound list has been abridged to include several of the more significant results. Other VOCs were detected and are shown on Figure 2.

Compound	Minimum Detection Value (µg/m³)	Maximum Detection Value (µg/m³)
Benzene	59.1 (S1-V5)	690 (S1-V1)
Cyclohexane	146 (S1-V5)	10,800 (S1-V6)
Propylene	42.7 (S1-V5)	1,210 (S1-V6)
n-Hexane	261 (S1-V3)	15,100 (S1-V6)
Heptane	143 (S1-V3)	4,920 (S1-V6)
Toluene	265 (S1-V5)	889 (S1-V1)
Carbon disulfide	32.4 (S1-V5)	349 (S1-V1)
2,2,4-Trimethylpentane	377 (S1-V3)	111,000 (S1-V6)

Sample S1-V1, located within the hotel footprint, identified the presence of several VOCs including 2,2,4 Trimethylpentane (4860 ug/m^3). This will be mitigated by a subslab vapor control system beneath the building footprint. Sample S1-V2 adjacent to the ballroom, will be located under a grassy area.

Samples S1-V2, S1-V3, S1-V5 and S1-V6 each identified the presence of VOCs. These locations will be paved and used for parking.

The presence of volatile subsurface contaminants with a potential for vapor intrusion has resulted in the implementation of an engineering control in the form of a positive pressure sub-slab vapor control system beneath the proposed building footprint. The sub-slab system will be in operation and it's performance verified prior to the indoor air sampling event.

4.0 BUILDING PREPARATION

Sampling will take place prior to occupation of the building to mitigate the disturbance of building activities and the influence of building occupants on sample results. Following NYSDOH and EPA guidelines, Spectra will perform a pre-sampling site visit to identify any potential chemicals or conditions that may affect air sampling results. Spectra will use the NYSDOH Indoor Air Quality Questionnaire and Building Inventory prepared by the Center for Environmental Health (See Appendix B). NYSDEC will be provided with at least 7 days' notice of the pre-sampling site inspection/inventory and the sampling event.

Inventory items will include cleaning supplies, odor eliminators, aerosols, building-repair or maintenance products, fuel, oil, and other volatile organic-containing products. If possible,

identified items will be removed from the building at least 24 hours prior to sampling. PID readings of all products and/or containers will be recorded. The location and number of these products will be documented and used to interpret air sampling results.

Spectra will follow the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 and avoid certain listed activities 24 hours prior to sampling. The building will have the HVAC system operating for a minimum 24 hours prior to the sampling event.

In accordance with the Soil Vapor Intrusion Guidance, the sampling results will be compared with the background databases listed in Section 3.2.4 to include the recently revised Soil Vapor Indoor Air Matrix, May 2017 (Appendix A) to evaluate the indoor air quality of the newly constructed hotel.

5.0 SAMPLING EVENT

During the sampling event, windows and doors will remain closed, and HVAC systems will operate under normal "on conditions". Air flow in the building is temperature controlled. The NYSDOH recommends that prior to sampling, the building be flushed out with an appropriate volume of air based on the square-footage of the building. Spectra will follow this recommendation to the extent practical and consult the building HVAC engineer to determine the appropriate amount of air and time required to adequately flush the building. New filter media will be installed if possible. Air samples will be collected using 2.6 L summa canisters with 8-hour regulators and 4-5 mL/min flow rates. The canisters will be batch-certified and placed in pre-approved locations at a breathing level of 4-5 feet above the floor surface and draw vapors over an 8-hour period. The full TO-15 analyte list will be analyzed consistent with the 2013 sampling event and the aforementioned NYSDOH Guidance for Evaluation Soil Vapor Intrusion.

Spectra, with input from the NYSDEC and NYSDOH, has selected 12 indoor air sampling locations and two outdoor upwind locations (see Figure 2). These indoor sampling stations will be placed on the first level between 4 to 6 feet above the floor to reflect the ambient air quality within the breathing zone. Two (2) duplicate samples will be collected for quality control purposes.

Two (2) outdoor ambient samples, placed upwind of the building, will be collected simultaneously with the indoor samples. The specific locations for these samples are dependent on the prevailing winds and will be determined on the day of sampling.

The proposed locations were determined in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 and with concurrence from the DEC and DOH project managers. The locations were selected based on areas with a heavy public presence and physical distribution of the building. The indoor air sampling event will be scheduled following the approval of this sampling plan and the readiness of the building.

6.0 LABORATORY ANALYSIS

The summa canisters will be delivered by Spectra to Alpha Analytical, a New York State ELAP Certified Laboratory, for analysis of volatile organic compounds via TO-15 SIMS (low-level detection). Samples will be analyzed on a standard turnaround time (TAT) of 5 business days.

7.0 REPORT PREPARATION

Spectra will provide a written report describing the sample collection process, a summary of the air sampling results and the final laboratory report. Information collected will include:

a. sample identification and location;

b. date and time of sample collection;

c. sampling height;

d. identity of samplers;

e. sampling methods and devices;

f. volume of air sampled;

g. PID readings in the sampling areas;

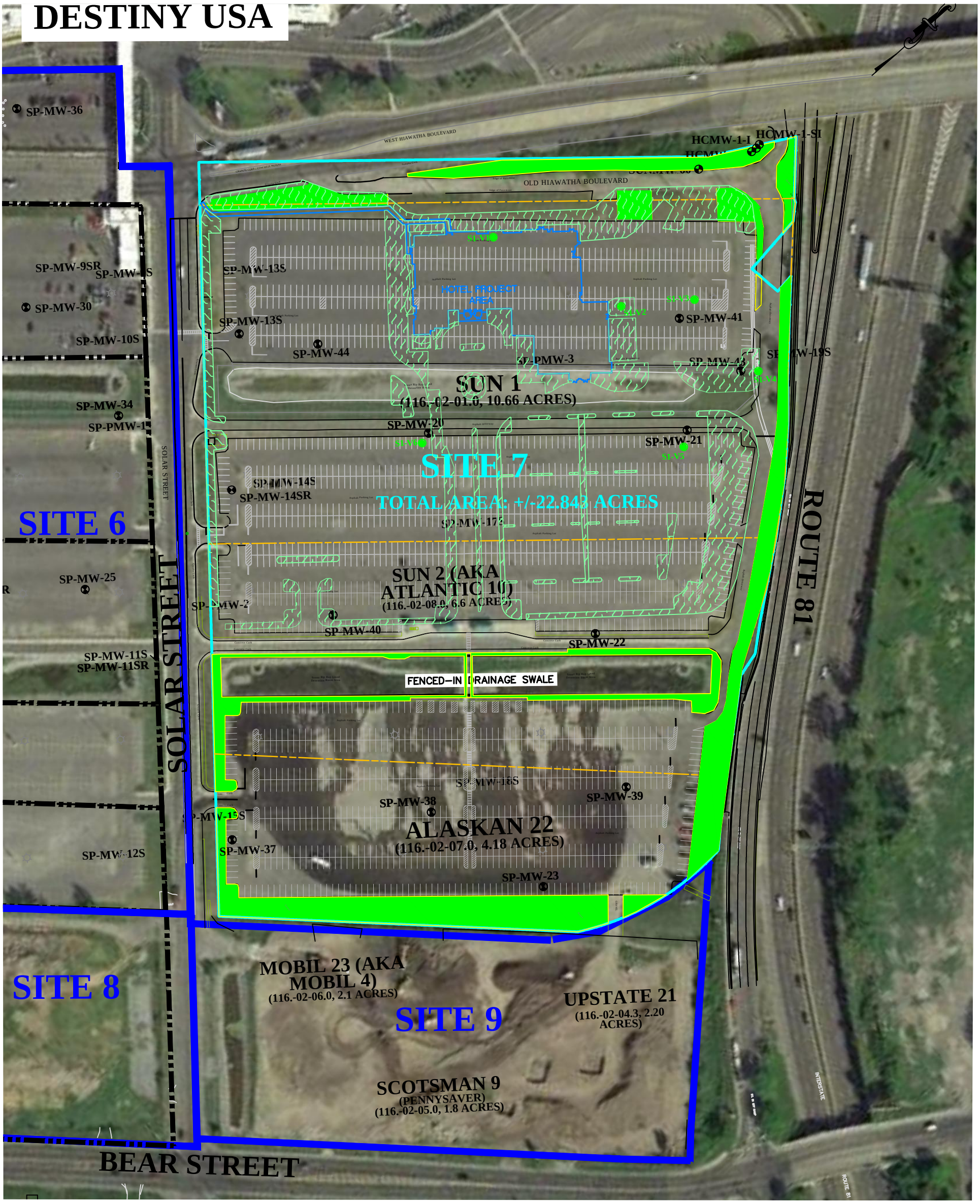
h. vacuum of canisters before and after samples collected; and

i. chain of custody protocols and records used to track samples from sampling point to analysis.

All air sample results will be reported in ug/m^3.

FIGURES

DESTINY USA



LEGEND

- DESTINY BCP SITE 7
- ADJACENT DESTINY BCP SITES
- CURRENT TAX PARCEL BOUNDARY
- VAPOR POINTS
- GENERAL LANDSCAPE AREA– 2 FT OF CLEAN FILL THAT MEETS COMMERICAL SCOs
- APPROXIMATE GRASSY AREAS– 1 FT OF CLEAN FILL THAT MEETS COMMERICAL SCOs

BASEMAP: 2017 AERIAL

PROJECT	
PROJ. MGR:	FRP
PROJ. NO.:	15209
PREPARED BY:	JCK
DRAFTED BY:	JCK
CHECKED BY:	
APPROVED BY:	
DATUM:	
CONTOUR INTERVAL =	FEET

0 75 150 300

1"=150'

SITE 7

SITE PLAN

DESTINY USA

CITY OF SYRACUSE — ONONDAGA CO., NY

SPECTRA ENVIRONMENTAL GROUP, INC.
19 British American Blvd
Latham, N.Y. 12110

DATE: 5/11/17	SCALE: 1"=150'	DWG. NO. 15209G	FIGURE: 1

S1-V6	
Parameter	**[ug/m3]**
Benzene	174
Cyclohexane	10800
Propylene	1210
n-Hexane	15100
Heptane	4920
Toluene	840
Carbon disulfide	98.1
2,2,4-Trimethylpentane	111000

S1-V1	
Parameter	**[ug/m3]**
Benzene	690
Acetone	957
p/m-Xylene	248
Cyclohexane	898
Propylene	809
Ethylbenzene	79.1
n-Hexane	1840
Heptane	516
o-Xylene	67.8
Isopropanol	20.1
4-Ethyltoluene	15.2
Toluene	889
1,2,4-Trimethylbenzene	30.2
Chloromethane	4.21
Carbon disulfide	349
1,3-Butadiene	18.9
2,2,4-Trimethylpentane	4860
2-Butanone	75.5

S1-V2	
Parameter	**[ug/m3]**
Benzene	276
Cyclohexane	1810
Propylene	723
n-Hexane	2660
Heptane	384
Toluene	784
Carbon disulfide	124
2,2,4-Trimethylpentane	71000
2-Butanone	97.9

S1-V3	
Parameter	**[ug/m3]**
Benzene	122
Acetone	950
p/m-Xylene	205
Tetrachloroethene	2.82
Cyclohexane	184
Propylene	70.7
Ethylbenzene	51.7
Trichloroethene	4.43
n-Hexane	261
Tetrahydrofuran	1.42
Heptane	143
Dichlorodifluoromethan	3.21
o-Xylene	50.4
Isopropanol	4.2
4-Ethyltoluene	11.9
Toluene	497
Trichlorofluoromethane	4.6
Styrene	4.3
Ethanol	19.2
1,2,4-Trimethylbenzene	21.4
Chloromethane	3.53
Carbon disulfide	52.9
1,3,5-Trimethylbenzene	6.59
1,3-Butadiene	2.7
2,2,4-Trimethylpentane	377
2-Butanone	14.5

S1-V4	
Parameter	**[ug/m3]**
Benzene	109
Acetone	708
p/m-Xylene	200
Cyclohexane	406
Propylene	75.7
Ethylbenzene	52.6
n-Hexane	2490
Heptane	1390
o-Xylene	52.1
4-Ethyltoluene	11.6
Toluene	426
1,2,4-Trimethylbenzene	20.2
Carbon disulfide	145
1,3-Butadiene	6.9
2,2,4-Trimethylpentane	4950
2-Butanone	17.2

S1-V5	
Parameter	**[ug/m3]**
Benzene	59.1
Acetone	425
p/m-Xylene	169
Tetrachloroethene	1.65
Cyclohexane	146
Propylene	42.7
Ethylbenzene	40.4
Trichloroethene	3.13
n-Hexane	270
Tetrahydrofuran	1.38
Heptane	150
Dichlorodifluoromethane	2.67
o-Xylene	44.3
Isopropanol	5.33
4-Ethyltoluene	11.7
Toluene	265
Trichlorofluoromethane	2.99
Styrene	3.44
Ethanol	24.9
1,2,4-Trimethylbenzene	22.8
Chloromethane	1.16
Carbon disulfide	32.4
1,3,5-Trimethylbenzene	6.29
1,3-Butadiene	0.96
2-Butanone	9.47

WEST HIAWATHA BOULEVARD

SOLAR STREET

ROUTE 81

HOTEL PROJECT AREA

SUN 2 (AKA ATLANTIC 10) (116.-02-08.0, 6.6 ACRES)

ALASKAN 22 (116.-02-07.0, 4.1 ACRES)

SP-MW-42R
SP-MW-13S
SP-MW-44
SP-MW-20
SP-MW-14SR
SP-MW-37
SP-MW-40
SP-MW-38
SP-MW-23
SP-MW-22
SP-MW-39
SP-MW-21
SP-MW-43
SP-MW-41
SUNMW-60
HCMW-1-S
HCMW-1-I
HCMW-1-D

S1-V1
S1-V2
S1-V3
S1-V4
S1-V5
S1-V6

DRAINAGE SWALE

Stone Rip Rap Lined Detention Basin

Stone Rip Rap Lined Detention Basin Area

GRANITE CURB / CONCRETE MEDIAN

Granite Curb

Concrete Curb

Edge of Pavement

Asphalt Parking Lot

Asphalt Driveway

Grass

Gravel

Bollards

Guide Rail

LEGEND

- BCA SITE 7 BOUNDARY
- CURRENT PROPERTY BOUNDARY
- MONITORING WELL
- SOIL BORINGS
- SOIL VAPOR POINTS

NO.	DATE	RECORD OF WORK	DRN	CKD

PROJECT

PROJ. MGR:	FRP
PROJ. NO.:	15209
PREPARED BY:	JCK
DRAFTED BY:	JCK
CHECKED BY:	
APPROVED BY:	
DATUM:	
CONTOUR INTERVAL =	FEET

0 20 40 1"=80' 160

80

SITE 7

SOIL VAPOR RESULTS

DESTINY USA

CITY OF SYRACUSE — ONONDAGA CO., NY

SPECTRA ENVIRONMENTAL GROUP, INC.
19 British American Blvd
Latham, N.Y. 12110

DATE:	12/15/16	SCALE:	1"=80'	DWG. NO.	15209C	FIGURE:	2

STAFF LOUNGE

DINING AREA

OFFICE

EXERCISE ROOM

13 OUTDOOR AMBIENT SAMPLES LOCATIONS TBD

14

ADMIN

DUPLICATE

OFFICE

LOBBY

STORAGE

SUITE

DUPLICATE

BALLROOM

PRE FUNCTION

PRE-FUNCTION

1 GROUND FLOOR PLAN
SCALE: 3/32"=1'0"

KEITH E. CARLSON ARCHITECT

REGISTERED ARCHITECT CARLSON KEITH EUGENE 036779 STATE OF NEW YORK

5/12/16

ARCHITECTURE
PLANNING
INTERIORS

3221 WEST ALABAMA
HOUSTON, TEXAS 77098
713/522-1054
713/522-4496 FAX

SYRACUSE HOTEL

Syracuse, New York

GROUND FLOOR PLAN

DATE
6/23/16 ISS'D F CONSTRUCT.
8/11/16 CITY COMMENTS
09/08/16 100% HILTON REVIEW
9/30/16 ISS'D F BRAND –INT.
10/5/16 ASI 17 –INTERIORS

PROJECT NUMBER: 1405

SHEET NUMBER: A2–1

APPENDIX A

SOIL VAPOR/ INDOOR AIR DECISION MATRIX

Soil Vapor/Indoor Air Matrix A

May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX A

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor/Indoor Air Matrix B

May 2017

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX B

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor/Indoor Air Matrix C

May 2017

Analytes Assigned:
Vinyl Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)	
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX C

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

APPENDIX B

NYSDOH INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

(BLANK)

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	Steam 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

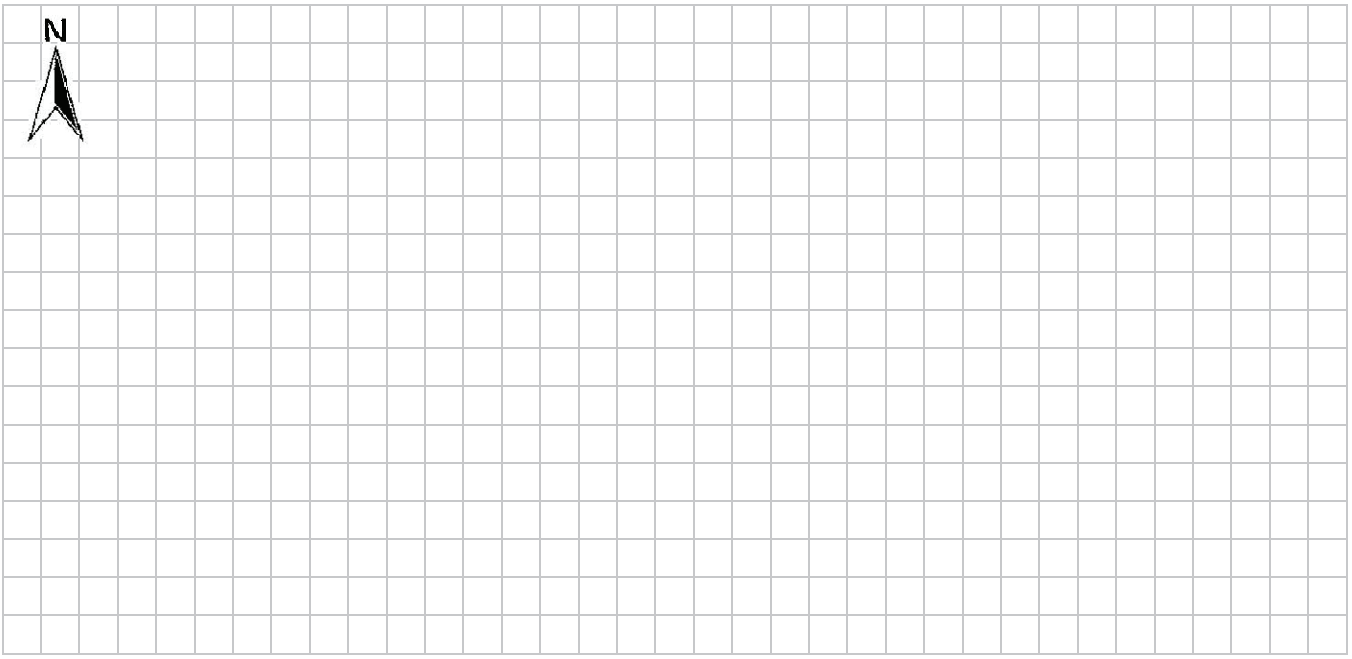
c. Responsibility for costs associated with reimbursement explained? Y / N

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

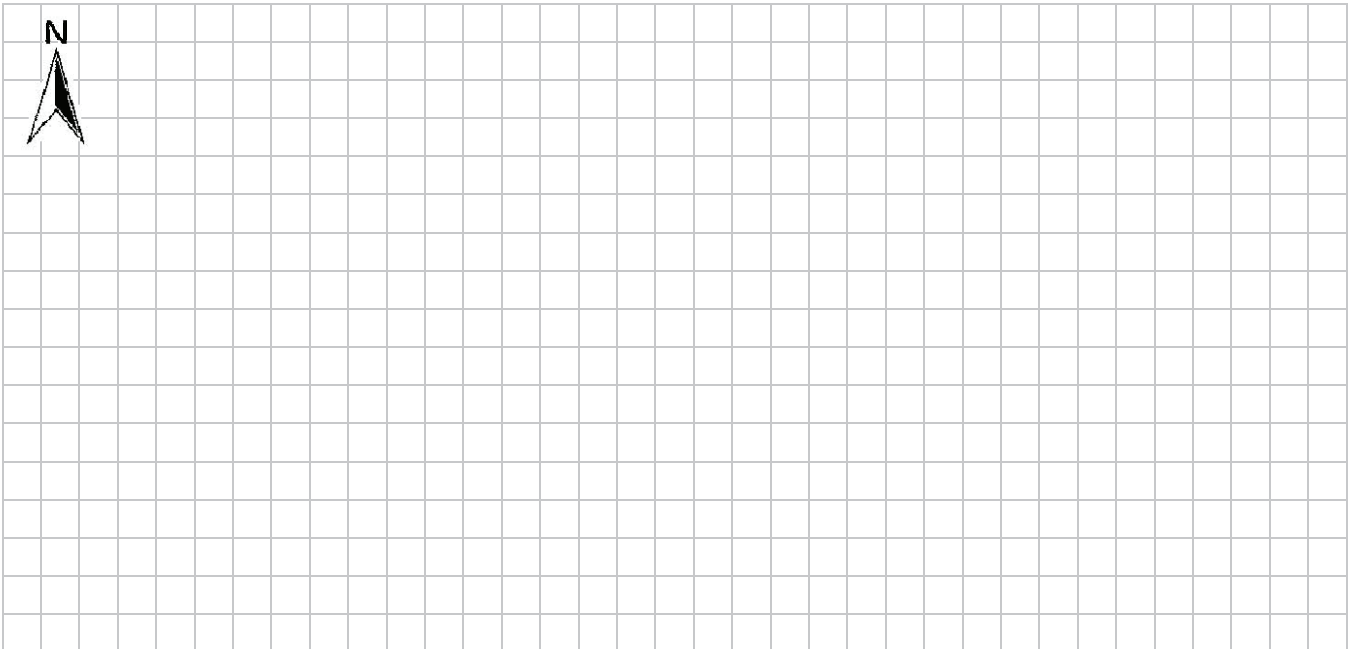
11. FLOOR PLANS

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:



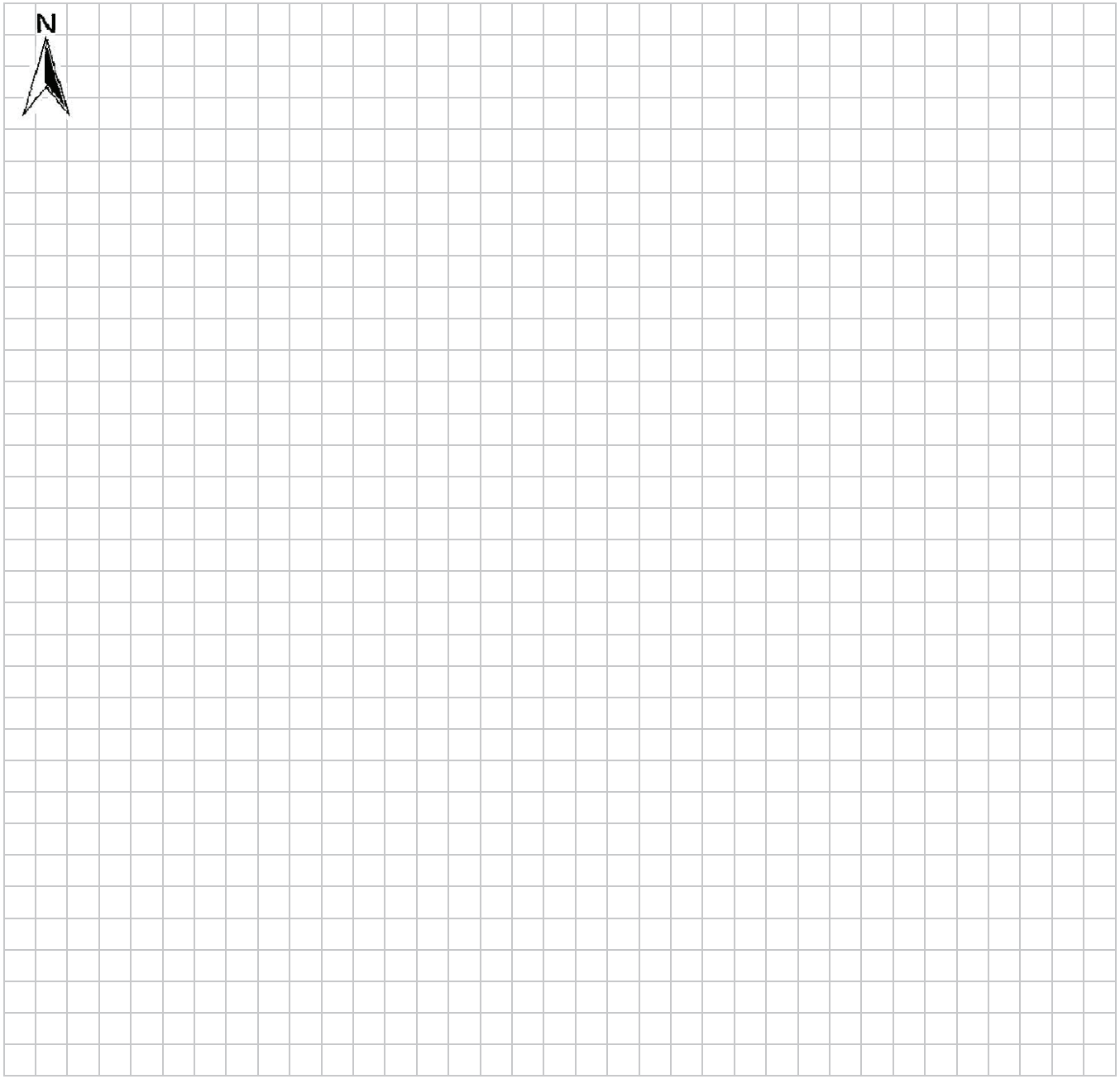
First Floor:



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.