BROWNFIELD CLEANUP PROGRAM

SITE MANAGEMENT PLAN

1155 MAIN STREET SITE
NYSDEC SITE NUMBER: C915341
BUFFALO, NEW YORK

December 2019 0481-019-001

Prepared for:

Main & Dodge LLC

50 Lakefront Boulevard, Suite 103
Buffalo, New York

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

In Association With:

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0635

Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date

SITE MANAGEMENT PLAN
1155 MAIN STREET
SITE NUMBER C915341

Certification Statement

I Thomas H. Forbes, P.E., certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

_____ P.E.

12/6/19
_____ Date

SITE MANAGEMENT PLAN
1155 MAIN STREET SITE
SITE NUMBER C915341

Table of Contents

Table of Contents

SITE MANAGEMENT PLAN
1155 MAIN STREET SITE
SITE NUMBER C915341

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Table of Contents

APPENDICES

List of Acronyms

AS	Air Sparging
ASD	Active Sub-slab Depressurization
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
FOP	Field Operating Procedure
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules, and Regulations
O&M	Operations and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective

List of Acronyms

RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria, and Guidelines
SCO	Soil Cleanup Objective
SMP	Soil Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
SVMS	Soil Vapor Mitigation System
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification:	Site No. C915341 1155 Main Street Site, 1155 Main Street, Buffalo, New York
Institutional Controls:	1. The property may be used for residential, restricted residential, commercial, and industrial use;
	2. All ECs must be operated and maintained as specified in this SMP;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP;
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	7. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
	8. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP
	9. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
	10. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figures 2 and 3, and any potential impacts that are identified must be monitored or mitigated; and

Site Identification:	Site No. C915341 1155 Main Street Site, 1155 Main Street, Buffalo, New York
	11. The Site shall not be used for raising livestock or producing animal products for human consumption;
	12. The above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.
Engineering Controls:	1. Active Sub-slab Depressurization (ASD) system, if deemed necessary

Inspections:	Frequency
1. ASD system, if deemed necessary.	Annually
Monitoring:	
1. ASD system, if deemed necessary, will have a continuous monitoring system, equipped with telemetry to notify contact list of issues with ASD system.	
Maintenance:	
1. Active sub-slab depressurization system fan units	As needed
Reporting:	
1. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 1155 Main Street Site located in Buffalo, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C915341 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Main & Dodge LLC entered into a Brownfield Cleanup Agreement (BCA) on February 19, 2019 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix C.

In accordance with the Remedial Investigation/Interim Remedial Measures Work Plan the Site was remediated to a Conditional Track 1 Unrestricted Use cleanup. No soil contamination is present on-site above the Part 375 unrestricted use soil cleanup objectives (USCOs). However, during the RI and after completion of the remedial work, some low-level chlorinated volatile organic compounds (cVOCs) were detected in the groundwater. There was no building present on the site so a soil vapor intrusion (SVI) assessment could not be completed as required by NYSDEC/NYSDOH. This SMP has been prepared to provide details of the SVI assessment to be completed once the site building is constructed and to identify the Institutional and Engineering Controls (ICs and ECs) that will be necessary if SVI is occurring in the newly constructed building to ensure protection of human health. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site, if it is determined that SVI is occurring in the building to be constructed at the Site. The SVI assessment will be completed after the building is constructed in Summer/Fall 2020, as further discussed in Section 4.2.

This SMP will remain in effect at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental

Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA (Index #C915341-01-19; Site #C915341) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix A of this SMP.

This SMP was prepared by Benchmark Environmental Engineering and Science, PLLC, in association with TurnKey Environmental Restorations, LLC on behalf of Main & Dodge LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Brownfield Cleanup Agreement (BCA), 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- Notice within 48-hours of any damage or defect to the foundation, structures, or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table 1: Notifications*

Name	Contact Information
NYSDEC Project Manager	716-851-7220
NYSDEC Regional HW Engineer	716-851-7220
NYSDEC Site Control .	518-402-9543
NYSDOH Bureau of Environmental Exposure Investigation	518-402-7860 BEEI@doh.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATION & REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Buffalo, Erie County, New York and is identified as Section 100.63 Block 3 and Lot 1.1 on the Erie County Tax Map (see Figure 3). The site consisted of three (3) parcels that were combined into one parcel that will formally appear on the City of Buffalo's tax roll on December 1, 2019. Figure 3 reflects the previous three (3) parcels and the new combined parcel information. The site is an approximately 1.55-acre area and is bounded by Dodge Street to the north, a parking lot to the south, a parking lot and vacant commercial building to the east, and Main Street to the west (see Figure 2). The boundaries of the site are more fully described in Appendix C – Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is/are:

Main & Dodge LLC, 50 Lakefront Boulevard, Suite 103, Buffalo, New York

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a mixed-use commercial and residential building and parking area that are under construction through summer/fall 2020. The Site is zoned N-1C Mixed-Use Core (mixed-use mid-rise development at the edges of downtown) and is currently vacant (under construction).

The site was remediated to the USCOs and therefore no soil contamination remains on-site. Low-level cVOC contamination, specifically tetrachloroethene (PCE), was detected in the groundwater at the site and a SVI assessment is required by NYSDEC/NYSDOH to be completed after the building is constructed (fall/winter 2020 heating season).

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and residential properties. The properties immediately south of the Site include vacant commercial used as a parking lot and NFTA subway station building; the properties immediately north of the Site include Dodge Street and a community facility; the properties immediately east of the Site include vacant commercial and manufacturing; and

the properties to the west of the Site include Main Street, commercial and community properties.

2.2.2 Geology

During the IRM completed at the Site, impacted fill material was removed leaving native sandy soils. Native soils were encountered at depths of approximately 3 to 9 feet below ground surface (fbgs). The Site will be backfilled with approximately 20,000 tons of 2-inch crusher run stone upon construction completion.

2.2.3 Hydrogeology

Four (4) monitoring wells were installed at part of the RI. Groundwater was encountered at depths ranging from approximately 15 to 25 fbgs. In general, groundwater flow direction was estimated to be northwesterly. A groundwater contour map is shown in Figure 4. The four (4) monitoring wells installed as part of the RI were decommissioned in accordance with NYSDEC CP-43: Groundwater Monitoring Well Decommissioning Policy. The decommissioning occurred on June 6, 2019 with NYSDEC approval provided via email on June 4, 2019.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

In accordance with the RI/IRM work plan, the Site was investigated and remediated to the Part 375 USCOs. The remedial action involved the removal of impacted soil/fill to native soils. Approximately 26,746 tons of soil/fill were removed and sent to a permitted landfill facility for disposal (Republic Services Landfill in Niagara Falls, New York). During the RI and IRM three (3) round of groundwater samples were collected from the four (4) monitoring wells installed at the Site.

No SVOCs, PCBs, herbicides, or emergent contaminants were detected above their respective GWQS at the groundwater monitoring locations at the Site. One (1) VOC (PCE),

one (1) pesticides (aldrin), and four (4) metals (iron, magnesium, manganese and sodium) were present in the groundwater at the Site above their respective GWQS.

Iron, magnesium, and sodium were detected in the four (4) wells (including upgradient well MW-4). Manganese was detected at one (1) location slightly above its respective GWQS. The detected exceedances of these analytes the groundwater are attributable to the urban nature of the Site and ubiquitous in urban settings.

Aldrin (pesticide) was detected at a trace and estimated concentration at one (1) location, MW-3. It was not detected in the soil/fill samples collected as part of the RI.

PCE was detected above its GWQS at MW-1 during the 1st sampling event. During the 2nd (pre-IRM) and 3rd (post-IRM) sampling events analyzed for VOCs only, PCE was not detected above its respective GWQS (see Table 2). PCE was not detected above method detection limits in the subsurface soil/fill samples collected during the previous investigation or RI completed at the Site.

The contaminants detected in the groundwater at the Site were not considered a concern. However, NYSDOH has requested a SVI investigation be completed at the Site to assess if vapor intrusion is a concern after the building is constructed. This investigation will take place in the fall/winter 2020 heating season, prior to building occupancy.

Retrofitting an approximate 25,000 square foot building with varying concrete slab elevations, grade beams, and numerous small residential apartment units is difficult and costly compared to installing a sub-slab piping network prior to pouring the concrete slabs of the building. Therefore, as part of the IRM, the network of sub-slab piping was installed prior to placing the vapor barrier and pouring the concrete slab of the new building. If it is determined that an ASD system is necessary based on the results of the SVI investigation, the mechanical components of the ASD system (i.e., vacuum fans) and the above ground piping will be installed, and the system activated to mitigate the building. Post-installation communication testing will be completed to the confirm that the system is operating as designed.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated December 2019 are as follows:

2.4.1 Groundwater:

RAOs for Public Health Protection

- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

2.4.2 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

2.5 Remaining Contamination

2.5.1 Soil

The Site was remediated to USCOs and there is no remaining soil contamination at the Site after completed of the IRM.

2.5.2 Groundwater

Three (3) rounds of groundwater sampling were completed at the Site. During the 1st round, no SVOCs, PCBs, herbicides, or emergent contaminants were detected above their respective GWQS at the groundwater monitoring locations at the Site. One (1) VOC (PCE), one (1) pesticide (aldrin), and four (4) metals (iron, magnesium, manganese and sodium) were present in the groundwater at the Site above their respective GWQS.

Iron, magnesium, and sodium were detected in the four (4) wells (including upgradient well MW-4). Manganese was detected at one (1) location slightly above its respective GWQS. The detected exceedances of these analytes in the groundwater are attributable to the urban nature of the Site and ubiquitous in urban settings.

Aldrin (pesticide) was detected at a trace and estimated concentration at one (1) location, MW-3. It was not detected in the soil/fill samples collected as part of the RI.

PCE was detected above its GWQS at MW-1 during the 1st sampling event. PCE was not detected above method detection limits in the subsurface soil/fill samples collected during previous investigations or the RI completed at the Site.

In the subsequent sample rounds (2 and 3), NYSDEC only required VOC sample analysis. During the 2nd (pre-IRM) and 3rd (post-IRM) sampling events analyzed for VOCs only, PCE was not detected above its respective GWQS. Due to the low concentrations of PCE detected in the groundwater in the 2nd and 3rd rounds of sampling, NYSDEC approved the decommissioning of the four (4) monitoring wells installed during the RI.

Table 2 and Figure 4 summarize the results of all samples of groundwater that exceed the SCGs after completion of the remedial action.

2.5.3 Soil Vapor

NYSDOH has requested an SVI assessment be completed within the building after it is constructed to assess for SVI. The sampling will be completed in the fall/winter 2020 heating season.

3.0 INSTITUTIONAL & ENGINEERING CONTROL PLAN

3.1 General

Since it is unknown if a SVI issue exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) may be required to protect human health. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site, if necessary. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of an ASD system, if deemed necessary; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs may be required by the Decision Document if SVI is determined to be a concern. The ICs will be to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to residential, restricted residential, commercial and/or industrial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 2 and 3. These ICs are:

- The property may be used for: residential, restricted residential; commercial, industrial use;

- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
-
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figures 2 and 3, and any potential impacts that are identified must be monitored or mitigated; and
- Farming on the site is prohibited;

3.3 Engineering Controls

3.3.1 Active Sub-slab Depressurization System

If SVI is determined to be a concern, an ASD system will be installed and operated within the building.

Procedures for operating and maintaining the ASD system will be provided in the Operation and Maintenance Plan (Section 5.0 of this SMP) if it is determined to be necessary. As built drawings, signed and sealed by a professional engineer, will also added to Appendix

D – Operations and Maintenance Manual if the ASD system is constructed. Figures 5 and 6 shows the proposed ASD system layout if it is deemed necessary.

As part of the IRM, the sub-slab piping network shown on Figure XX was installed during building construction due to the difficulties and expenses associated with retrofitting an approximate 25,000 square foot building with an ASD system.

The ASD system, if deemed necessary by the SVI investigation to be completed as discussed in Section 4.2, will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the ASD system may no longer be required, a proposal to discontinue the ASD system will be submitted by the remedial party to the NYSDEC and NYSDOH.

4.0 SVI INVESTIGATION PLAN

A SVI investigation will be completed at the Site within the new building in the fall/winter 2020 heating season prior to building occupancy. The SVI investigation will involve collecting three (3) indoor air (IA), three (3) sub-slab vapor (SSV), and one (1) outdoor air (OA) samples. Figure 5 shows the proposed location of the SVI investigation samples to be collected.

4.1 Sub-Slab Vapor Pre-Sample Assessment

Prior to completing the SVI sampling, a pre-sampling inspection will be performed within the building to identify and minimize conditions that may interfere with the proposed testing. The inspection will evaluate the type of structure, floor layout, chemical and product contents of the building, and physical conditions of the building. This information, along with information on sources of potential indoor air contamination, will be identified on a building inventory form. If products are identified that may interfere with the SVI sampling, these contents may require removal at least 48-hours prior to completing the sampling.

4.2 Sub-Slab Vapor Sample Collection

At each SVI sampling location, Benchmark personnel will drill a ¼-inch diameter hole through the concrete slab using a hand-held hammer drill. SSV samples will be collected in the following manner:

- The SSV sample tubing will be sealed to the surface with permagum grout, melted beeswax, putty, or other non-VOC containing and non-shrinking products for temporary installation;
- The integrity of the surface seal of the sub-slab sampling point will be assessed using tracer gas (e.g. helium) per the Soil Vapor Sample Collection Field Operative Procedure (FOP) in Appendix F.
- Purge approximately one to three volumes (i.e., the volume of the sample tube) prior to collecting the samples to ensure samples collected are representative;
- SSV sample canisters will be equipped with a 24-hour regulator to allow the sample to be collected over an approximate 24-hour period; and,

- Samples will be collected into laboratory provided sampling canisters and regulators (e.g., Summa® canisters) and analyzed by EPA Method TO-15.

Holes in the concrete slab will be filled and sealed after completion of the sampling event.

4.3 Indoor Air and Outdoor Air Sample Locations

Concurrent with the SSV samples, IA and OA samples will be collected. IA samples will be collected adjacent to each SSV location. One (1) OA will also be collected from an outdoor upwind location of the facility, as determined on the day of field activities. IA and OA sample canisters will also be equipped with a 24-hour regulator to allow the sample to be collected over the same approximate 24-hour period as the SSV samples.

4.4 SVI Assessment Report

Upon completion of the SVI investigation, the analytical results will be completed to the appropriate NYSDEC SVI Decision Matrices to determine if an ASD system is required. A SVI Assessment Report will be prepared and submitted to NYSDEC/NYSDOH for review. The report will include:

- a summary of the activities completed;
- tables and figures summarizing the analytical results and identifying the SVI investigation locations;
- laboratory report and field form from the samples; and
- recommendation and conclusion regarding SVI.

5.0 OPERATION & MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the ASD system, if necessary, for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the ASD system;
- Will be updated periodically to reflect changes in site conditions or the manner in which the ASD system are operated and maintained.

Further detail regarding the Operation and Maintenance of the ASD system will be provided in Appendix D - Operation and Maintenance Manual, if it is deemed necessary and the mechanical components of the ASD system are installed. A copy of the Operation and Maintenance Manual, along with the complete SMP, will be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Operation and Maintenance of the Active Sub-slab Depressurization System

The following sections provide a description of the operations and maintenance of the ASD system. Cut-sheets and as-built drawings for the ASD will be provided in Appendix D - Operations and Maintenance Manual, if needed.

5.2.1 System Start-Up and Testing

All ASD system components will be visually inspected by a qualified person to ensure proper installation. With the depressurization system operating, smoke tubes may be used to check for leaks through floor joints and at suction points. Any leaks will be identified, noted, and repaired prior to continuing with testing and confirmation.

A field test will be conducted to confirm the negative pressure created beneath the slab. One-quarter inch diameter holes will be drilled through the concrete slab and into the sub-slab to measure vacuum in the subsurface using a digital manometer or comparable instrument

at the test locations. If adequate depressurization is not occurring the following procedures will be enacted:

- All testing procedures will be repeated to ensure proper testing protocol; and
- Client and NYSDEC personnel will be informed of inadequate vacuum results.

Troubleshooting of the system will then be completed, including the following:

- Confirmation of fan operation;
- Inspection of and sealing of all major entry routes and penetrations (if necessary);
- Location of potential sub-slab barriers; and,
- Inspection of the HVAC system and determination whether the HVAC system has a negative effect on the performance of the ASD system.

Upon completion of troubleshooting as described above, if re-testing sub-slab test points indicates insufficient communication the following measures will be considered:

- Adjustment of the HVAC system; and/or,
- Installation of additional suction points to enhance sub-slab vacuum.

The system testing described above will be conducted if, in the course of the ASD system lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.2.2 Routine System Operation and Maintenance

The Magnahelic Gauges installed on the system stack pipes will be observed for vacuum readings. These reading will be compared to the system start-up measurements. If there is change in the vacuum readings of 40% or more from start-up, confirmation testing will be performed on the particular suction pit and/or system where the difference was noted and the trouble shooting procedures will be followed as discussed in Section 5.2.1.

5.2.3 Non-Routine Operation and Maintenance

In the event that the system is not working properly (i.e., loss of vacuum), the 4G Sentinel auto-dialer or equivalent will contact designated personnel with repeat contacts made until the alarm condition is acknowledged. The following protocol should be followed:

- The building owner/operator and head maintenance person should be contacted immediately;
- The building owner/operator should apprise the NYSDEC of the system failure;
- The date and time should be recorded;
- The warning device should be identified (e.g., Gauge 1, 2, etc.)
- The fans should be inspected to confirm operation; if a circuit breaker was tripped causing the fan to cease operation, the circuit breaker should be reset;
- System components should be visually inspected for signs of damage or dysfunction;

If the system failure is not remedied, the building owner should contact a qualified engineer or other person with experience in ASD systems to inspect the system and take the necessary measures to place the system back in service. The NYSDEC will be apprised of the system failure and what measures that will be taken to place the system back in service.

5.2.4 System Monitoring Devices and Alarms

The ASD system has warning devices to indicate that the system is not operating properly. Continuous remote monitoring of the ASD system will be done using a 4G Sentinel auto-dialer (or equivalent), which provides a website-based platform to monitor vacuum measurements and transmit alarm notifications via email and/or voice-based messaging if the vacuum falls below user-prescribed levels. A battery backup provides continued monitoring/notification in case of a power failure. The 4-20 mA scalable output signal from each of the magnehelic gauges will be tied to the auto-dialer, which will be converted to vacuum in inches of water column to facilitate website monitoring. A list of designated personnel will be contacted in the event of an alarm condition (e.g., vacuum drops below 50% of normal conditions, indicative of fan failure or extraction piping obstruction/break) with repeat contacts made until the alarm condition is acknowledged.

Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

The Site is considered to have a very low vulnerability related to climatic conditions. The ASD system is potentially vulnerable to an electrical outage; however, the auto dialer has a battery backup and will notify the responsible party to alert them to loss of electrical power, so that the system can be restarted once electrical service is restored.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance, and monitoring events will be recorded on the appropriate site management forms provided in Appendix G. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 3 and summarized in the Periodic Review Report.

Table 3: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Periodic Review Report	**Annually,** or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;

- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in

accordance with the requirements found at this link **http://www.dec.ny.gov/chemical/62440.html**.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix C -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment, and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific Decision Document;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and
    - The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] for the site."

In addition, every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

8.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC. *DER-10 – Technical Guidance for Site Investigation and Remediation*.

NYSDEC, 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1*. June 1998 (April 2000 addendum).

NYSDOH. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October 2006 (and subsequent updates).

Benchmark Environmental Engineering and Science, PLLC. *Remedial Investigation/Interim Remedial Measures/Alternative Analysis Report, 1155 Main Street Site, Buffalo, New York, BCP Site No. C915341*. September 2019.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

SITE MANAGEMENT PLAN
1155 MAIN STREET SITE
BUFFALO, NEW YORK

PARAMETERS [1]	Class GA GWQS[2]	MW-1			MW-2			MW-3			MW-4			Blind Dup [4]	BD [6]	Field Blank	Equipment Blank
		3/26/2019 [5]	4/10/2019	5/22/2019	3/26/2019	4/10/2019	5/22/2019	3/26/2019	4/10/2019	5/22/2019	3/26/2019	4/10/2019	5/22/2019	3/26/2019	4/10/2109	3/26/2019	3/26/2019
Volatile Organic Compounds (VOCs) - ug/L																	
Acetone	**50**	ND	ND	ND	7.5	4.3 J	3.5 J	ND	ND	ND	1.7 J	ND	ND	8.2	ND	--	--
Tetrachloroethene	**5**	**7.9**	4.8	4.5	0.57	0.72	0.22 J	4.6	1.6	0.22 J	ND	ND	ND	0.62	4.9	--	--
Total Tentatively Identified Compounds (TICs)	**--**	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND		--	--
Semivolatile Organic Compounds (SVOCs) - ug/L																	
Caprolactam	**--**	ND	NT	NT	8.2 J	NT	NT	ND	NT	NT	ND	NT	NT	8 J	NT	--	--
Fluorene	**50**	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	0.02 J	NT	--	--
Phenanthrene	**50**	ND	NT	NT	0.06 J	NT	NT	ND	NT	NT	ND	NT	NT	0.05 J	NT	--	--
Total TICs	**--**	ND	NT	NT	34.96 J	NT	NT	38.2 J	NT	NT	34.03 J	NT	NT	34.4 J	NT	--	--
1,4 Dioxane - ng/l																	
1,4 Dioxane	**350**	< 32.6	NT	NT	< 31.4	NT	NT	--	NT	NT	< 32.6	NT	NT	< 32.0	NT	--	--
Perfluorinated Alkyl Acids - ng/L																	
Perfluorobutanoic acid (PFBA)	**--**	8.58	NT	NT	1.74 J	NT	NT	--	NT	NT	6.28	NT	NT	1.91	NT	< 0.347	< 0.357
Perfluoropentanoic acid (PFPeA)	**--**	8.66	NT	NT	< 0.413	NT	NT	--	NT	NT	< 0.407	NT	NT	< 0.406	NT	< 0.431	< 0.444
Perfluorobutanesulfonic acid (PFBS)	**--**	2.6	NT	NT	< 0.338	NT	NT	--	NT	NT	1.16 J	NT	NT	< 0.332	NT	< 0.353	< 0.364
Perfluorohexanoic acid (PFHxA)	**--**	6.72	NT	NT	< 0.438	NT	NT	--	NT	NT	< 0.432	NT	NT	< 0.430	NT	< 0.457	< 0.471
Perfluoroheptanoic acid (PFHpA)	**--**	3.53	NT	NT	< 0.331	NT	NT	--	NT	NT	< 0.326	NT	NT	< 0.325	NT	< 0.346	< 0.356
Perfluorohexanesulfonic acid (PFHxS)	**--**	3.16	NT	NT	< 0.388	NT	NT	--	NT	NT	< 0.382	NT	NT	< 0.381	NT	< 0.405	< 0.418
Perfluorooctanoic acid (PFOA)	**--**	5	NT	NT	0.409	NT	NT	--	NT	NT	< 0.404	NT	NT	< 0.402	NT	< 0.428	< 0.441
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2FTS)	**--**	< 0.173	NT	NT	0.85 J	NT	NT	--	NT	NT	0.404 J	NT	NT	< 0.170	NT	< 0.180	< 0.186
Total PFOA and PFOS	**70**	5.00	NT	NT	0.41	NT	NT	--	NT	NT	0	NT	NT	0	NT	0	0
Total PFAS	**500**	38.25	NT	NT	2.59	NT	NT	--	NT	NT	7.84	NT	NT	1.91	NT	0	0
Polychlorinated Biphenyls - ug/L																	
Total PCBs	**0.09**	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	--	--
Total Metals - ug/L [3]																	
Aluminum	--	1,080	NT	NT	262	NT	NT	539	NT	NT	958	NT	NT	300	NT	--	--
Antimony	**3**	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	--	--
Arsenic	**25**	1.12	NT	NT	4.12	NT	NT	0.63	NT	NT	2.46	NT	NT	4.06	NT	--	--
Barium	**1000**	180.5	NT	NT	137.4	NT	NT	169.9	NT	NT	103.5	NT	NT	134.1	NT	--	--
Cadmium	**5**	0.13 J	NT	NT	ND	NT	NT	0.19	NT	NT	ND	NT	NT	ND	NT	--	--
Calcium	**--**	226,000	NT	NT	116,000	NT	NT	346,000	NT	NT	155,000	NT	NT	116,000	NT	--	--
Chromium	**50**	2.29	NT	NT	0.34 J	NT	NT	1.15	NT	NT	2.48	NT	NT	0.58 J	NT	--	--
Cobalt	**--**	2.29	NT	NT	0.92	NT	NT	4.11	NT	NT	1.47	NT	NT	0.95	NT	--	--
Copper	**200**	6.6	NT	NT	0.71	NT	NT	3.33	NT	NT	2.79	NT	NT	0.6	NT	--	--
Iron	**300**	**2290 J**	NT	NT	**746**	NT	NT	**921**	NT	NT	**2,350**	NT	NT	**747**	NT	--	--
Lead	**25**	6.52	NT	NT	0.95 J	NT	NT	2.45	NT	NT	2.88	NT	NT	0.96	NT	--	--
Magnesium	**35000**	**67,900**	NT	NT	**63,800**	NT	NT	**87,000**	NT	NT	**58,300**	NT	NT	**63,600**	NT	--	--
Manganese	**300**	216.8	NT	NT	73.58	NT	NT	**369.3**	NT	NT	185.6	NT	NT	73.17	NT	--	--
Nickel	**100**	5.2	NT	NT	2.02	NT	NT	8.64	NT	NT	3.72	NT	NT	2.01	NT	--	--
Potassium	**--**	10900 J	NT	NT	2,850	NT	NT	9,370	NT	NT	2,700	NT	NT	2820	NT	--	--
Selenium	**10**	5.24	NT	NT	ND	NT	NT	7.64	NT	NT	ND	NT	NT	ND	NT	--	--
Silver	**50**	0.75	NT	NT	0.66	NT	NT	0.41	NT	NT	0.35 J	NT	NT	0.5	NT	--	--
Sodium	**20000**	**350,000**	NT	NT	**33,000**	NT	NT	**146,000**	NT	NT	**49,700**	NT	NT	**32,800**	NT	--	--
Thallium	**0.5**	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	--	--
Vanadium	**--**	3 J	NT	NT	ND	NT	NT	1.79 J	NT	NT	3.08 J	NT	NT	ND	NT	--	--
Zinc	**2000**	32.78	NT	NT	ND	NT	NT	32.64	NT	NT	10.1	NT	NT	ND	NT	--	--
Pesticides - ug/L																	
Aldrin	**ND**	ND	NT	NT	**0.004 J**	NT	NT	ND	NT	NT	ND	NT	NT	**0.003 J**	NT	--	--
Herbicides - ug/L																	
	50	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	NT	ND	NT	--	--

Notes:

1. Only parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards.
3. Sample results were reported by the laboratory in mg/L and converted to ug/L for comparisons to GWQSs.
4. Blind Dup was collected at MW-2.
5. MS/MSD was collected at MW-1.
6. BD (Duplicate) sample collected from MW-1

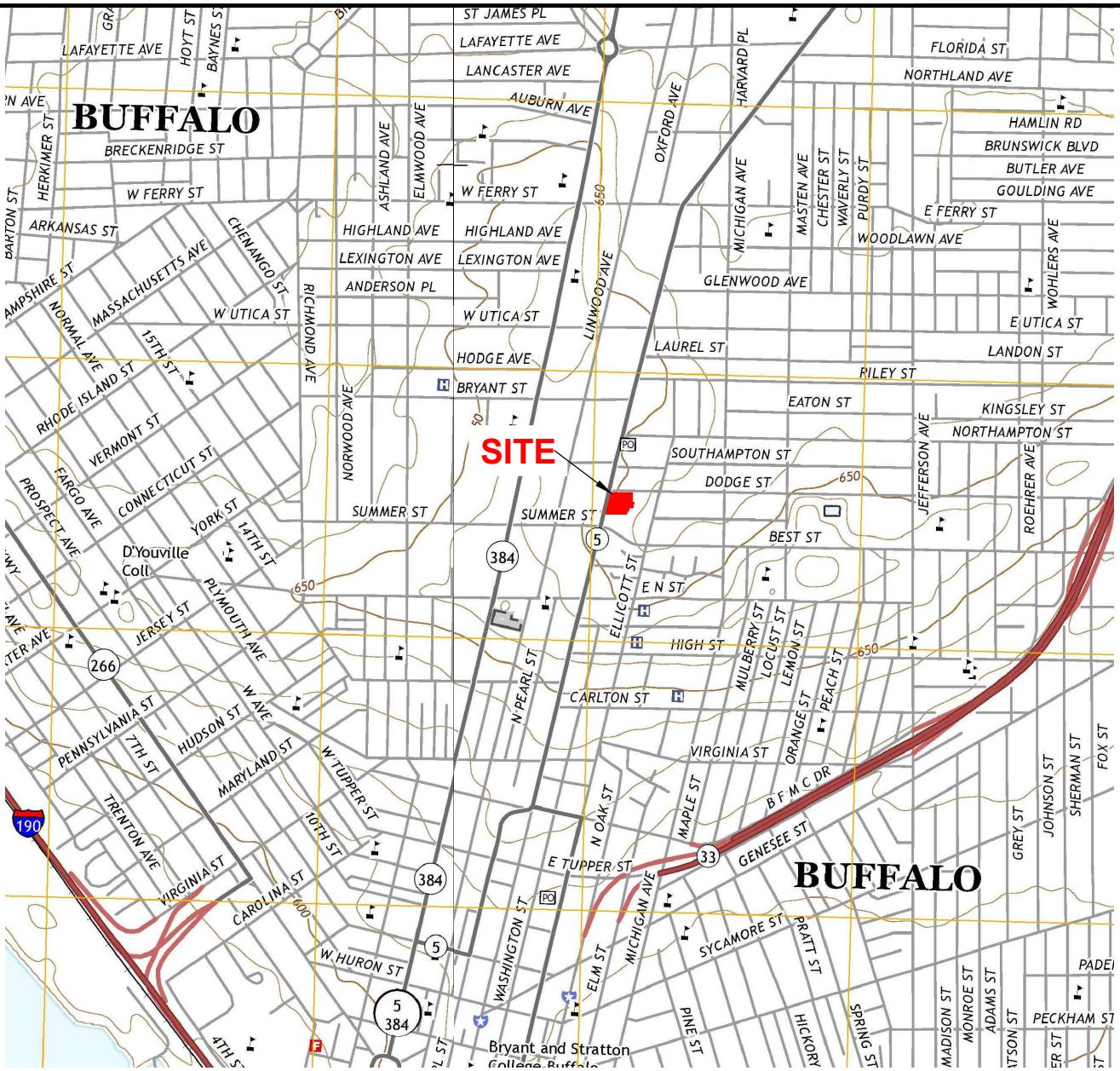
Qualifiers:

"--" = Sample not analyzed for parameter or no GWQS available for the parameter.
J = Estimated Value - Below calibration range
P = The RPD betweeen the results for the two columns exceeds the method-specified criteria.

BOLD = Result exceeds Class GA GWQS.

FIGURES

FIGURE 1



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.: 0481-019-001

DATE: AUGUST 2019

DRAFTED BY: CCB/RFL

SITE LOCATION AND VICINITY MAP

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK
PREPARED FOR
MAIN & DODGE LLC

LEGEND:

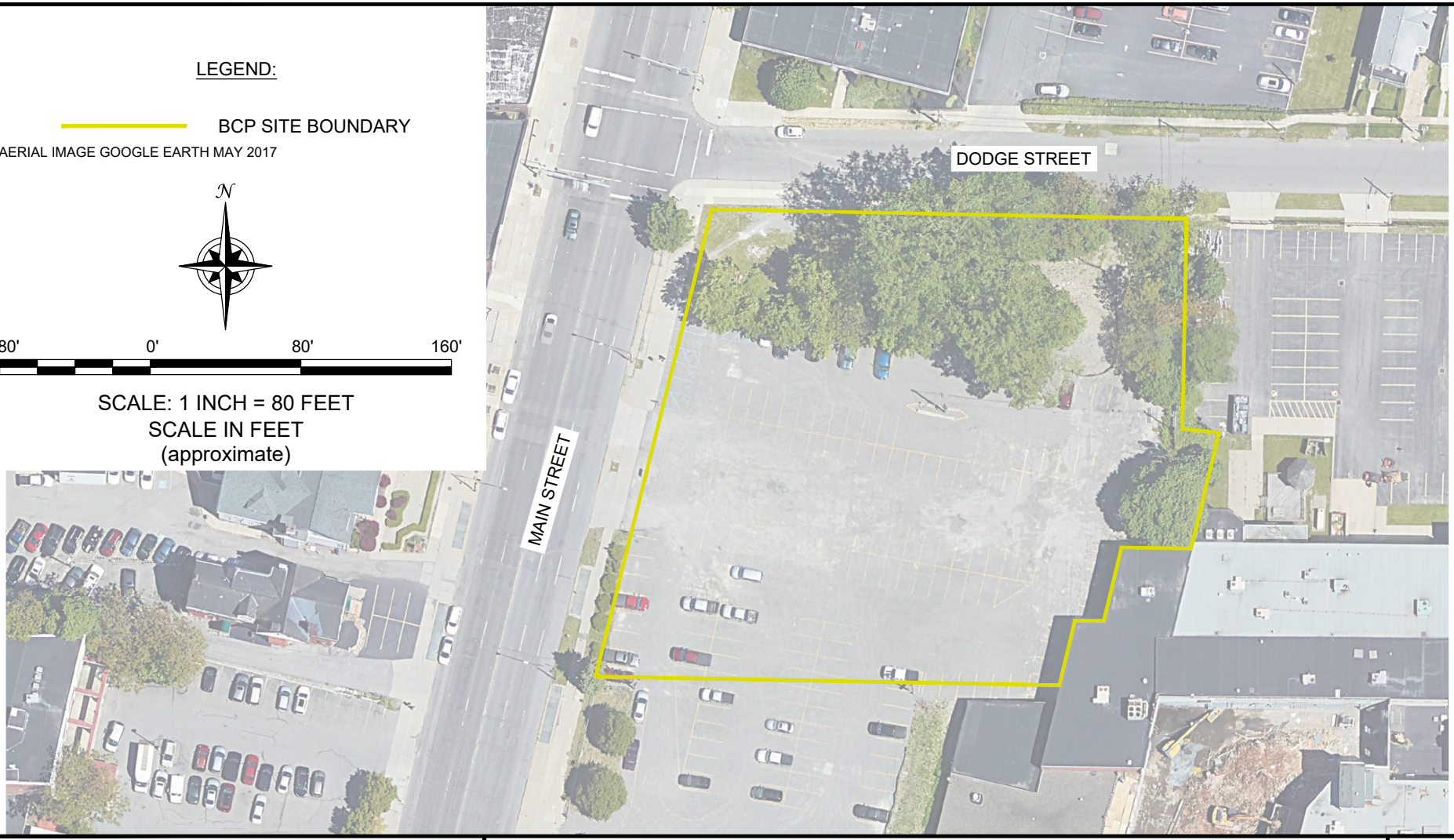
BCP SITE BOUNDARY

AERIAL IMAGE GOOGLE EARTH MAY 2017

N

80' 0' 80' 160'

SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.: 0481-019-001

DATE: AUGUST 2019

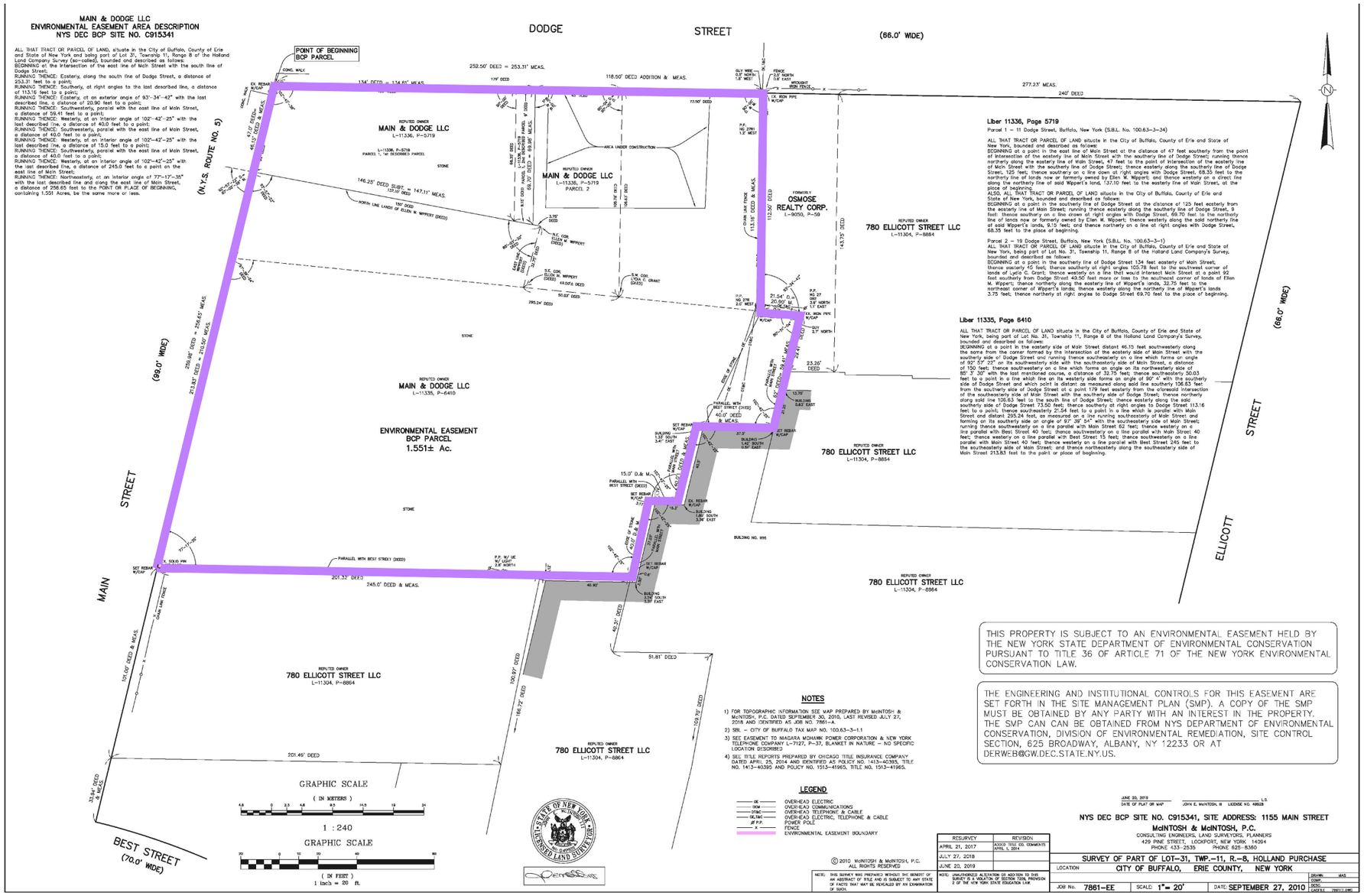
DRAFTED BY: CCB/RFL

SITE PLAN (AERIAL)

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK
PREPARED FOR
MAIN & DODGE LLC

FIGURE 2



60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)

N

LEGEND:

ENVIRONMENTAL EASEMENT BOUNDARY

DATE: AUGUST 2019
DRAFTED BY: RFL

TAX MAP & INSTITUTIONAL CONTROL BOUNDARY

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK

PREPARED FOR
MAIN & DODGE LLC

IN ASSOCIATION WITH
TURNKEY ENVIRONMENTAL RESTORATION, LLC
BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0481-019-001

FIGURE 3

F:\CAD\TurnKey\Cedarland Development Group\1115 Main Street\10-SMP\Figure 4; Groundwater Isopotential and GW Exceedance MapSMP.dwg, 8/14/2019 4:45:07 PM

LEGEND:

- BCP SITE BOUNDARY
- MW-1 58.5 — RI MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (MARCH 2019)
- 60 — GROUNDWATER CONTOUR LINE
- GROUNDWATER FLOW DIRECTION

MW-4	
Fe	2,350
Mg	58,300
Na	49,700

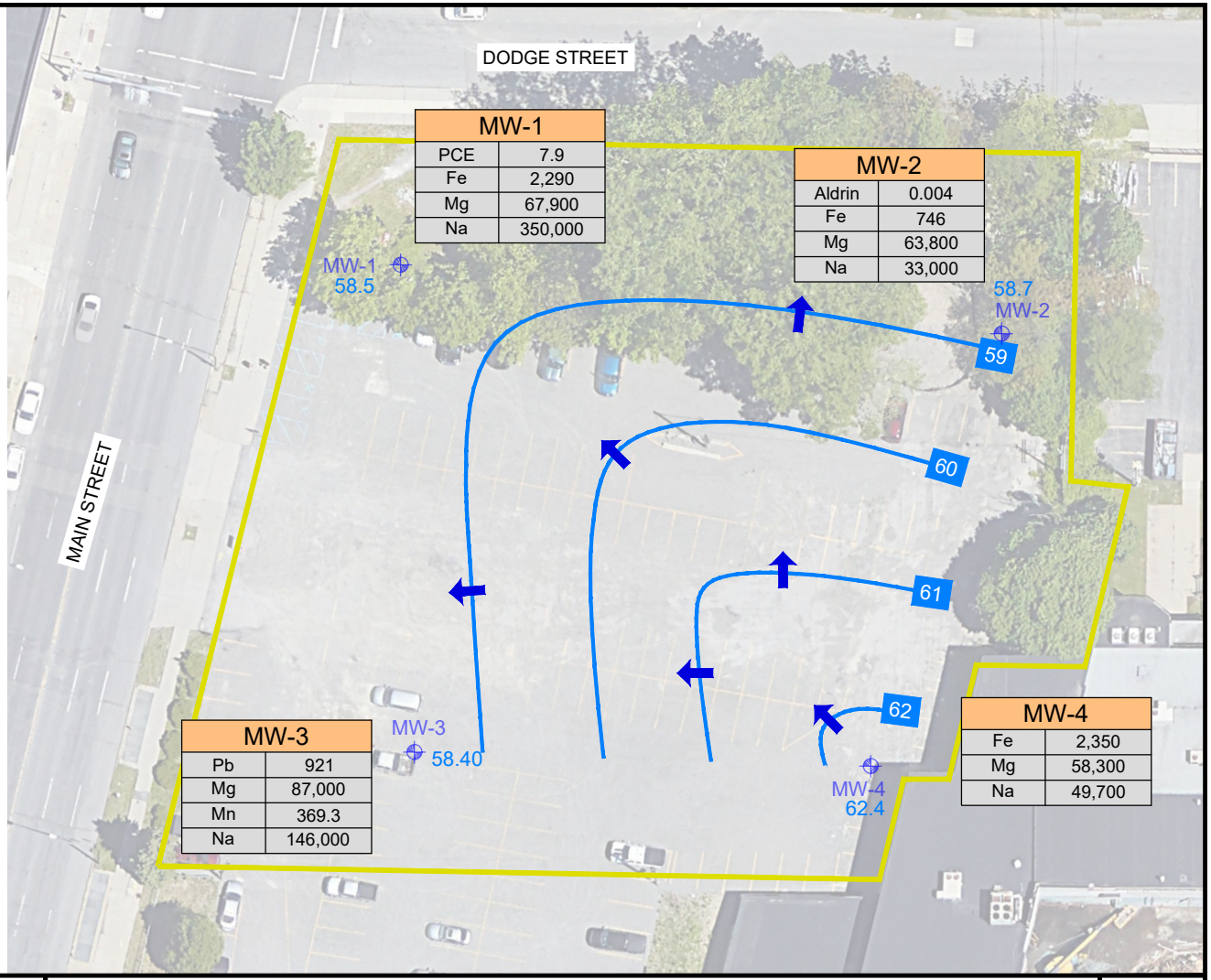
CONCENTRATION (ug/L)

NOTE:
1. GROUNDWATER ELEVATION MEASUREMENTS AND ANALYTICAL DATA BASED ON SAMPLING COMPLETED ON MARCH 26, 2019.
2. DEFINITIONS
   - Fe = Iron
   - Mg = Magnesium
   - Mn = Manganese
   - Na = Sodium
   - Pb = Lead
   - PCE = Perchloroethylene
   - ug/L = micrograms per liter

N

60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.: 0481-019-001

DATE: AUGUST 2019

DRAFTED BY: RFL

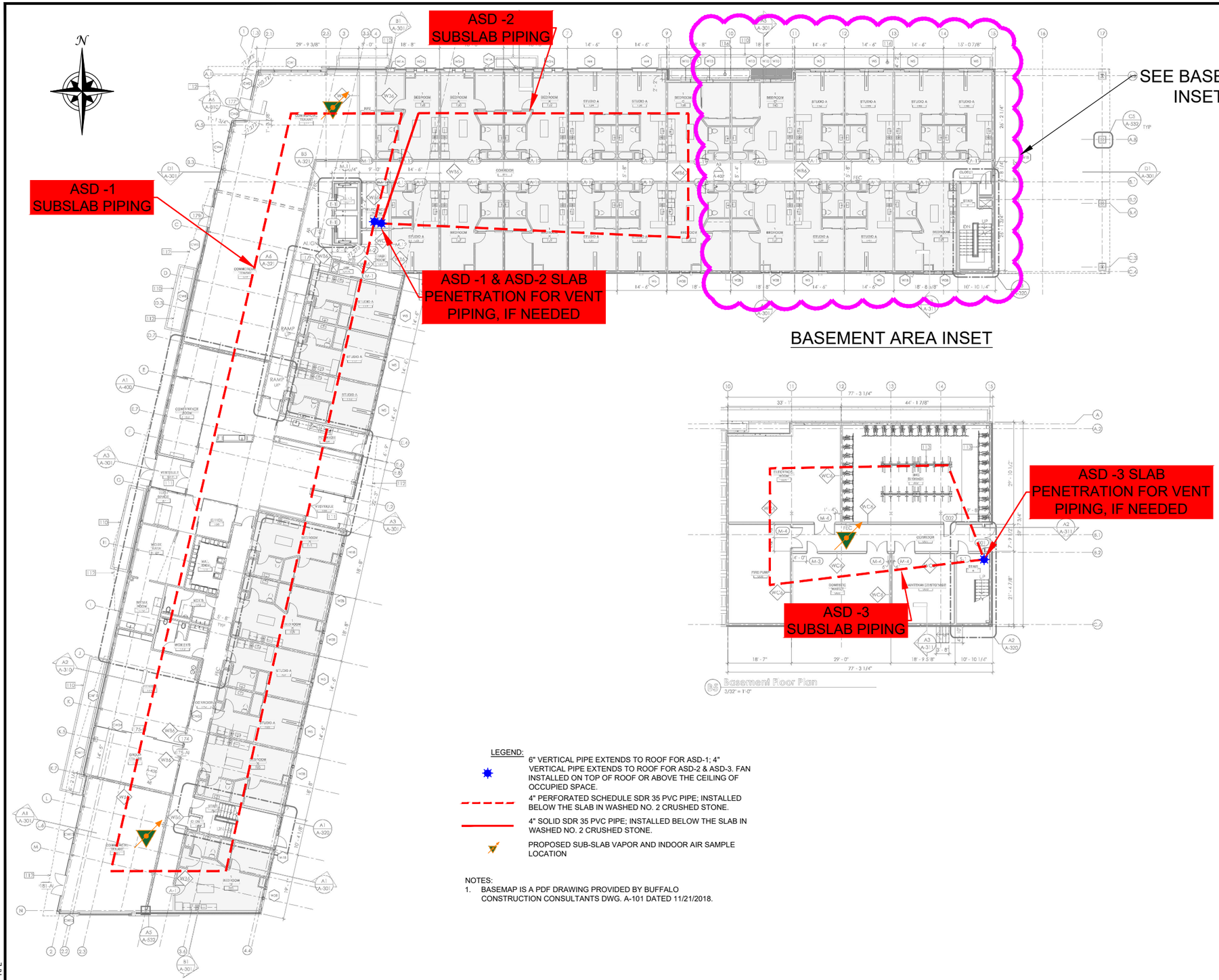
GROUNDWATER ISOPOTENTIAL AND GROUNDWATER EXCEEDANCES MAP

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK
PREPARED FOR
MAIN & DODGE, LLC

FIGURE 4

F:\CAD\TurnKey\Cedarland Development Group\1115 Main Street\10-SMP\Figure 5; ASD Design SMP.dwg, 8/14/2019 4:46:35 PM



LEGEND:

- 6" VERTICAL PIPE EXTENDS TO ROOF FOR ASD-1; 4" VERTICAL PIPE EXTENDS TO ROOF FOR ASD-2 & ASD-3. FAN INSTALLED ON TOP OF ROOF OR ABOVE THE CEILING OF OCCUPIED SPACE.
- 4" PERFORATED SCHEDULE SDR 35 PVC PIPE; INSTALLED BELOW THE SLAB IN WASHED NO. 2 CRUSHED STONE.
- 4" SOLID SDR 35 PVC PIPE; INSTALLED BELOW THE SLAB IN WASHED NO. 2 CRUSHED STONE.
- PROPOSED SUB-SLAB VAPOR AND INDOOR AIR SAMPLE LOCATION

NOTES:
1. BASEMAP IS A PDF DRAWING PROVIDED BY BUFFALO CONSTRUCTION CONSULTANTS DWG. A-101 DATED 11/21/2018.

DATE: AUGUST 2019
DRAFTED BY: RFL

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

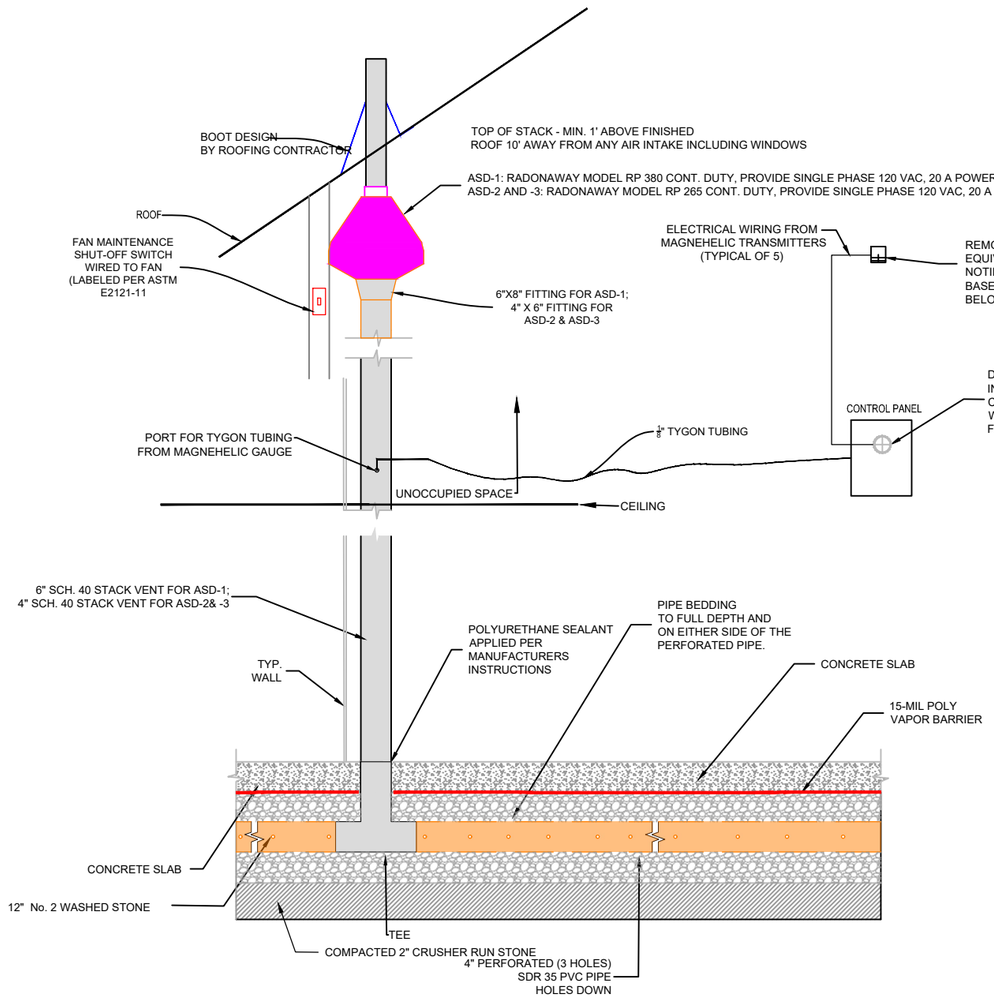
JOB NO.: 0481-019-001

ACTIVE SUBSLAB DEPRESSURIZATION SYSTEM

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK
PREPARED FOR
MAIN & DODGE LLC

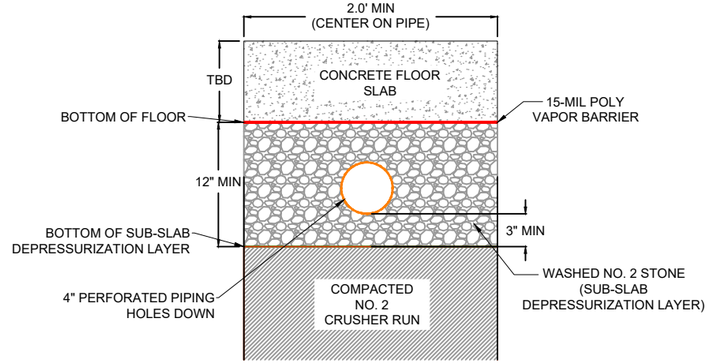
FIGURE 5



SECTION VIEW (TYP):

NOTE:
1. STUB STACK VENT RISER 1 FOOT MINIMUM ABOVE CONCRETE FLOOR SLAB AND TEMPORARILY CAP PENDING EVALUATION OF SVI DATA. PERMANENTLY CAP IF NO SVI CONCERNS OR EXTEND RISER AS SHOWN IF ACTIVE SUBSLAB DEPRESSURIZATION IS REQUIRED.

SUB-SLAB TRENCH AND PIPING DETAIL
NTS



NOTE:
1. STRUCTURAL STABILITY OF AGGREGATE, PIPING, AND CONCRETE FLOOR SYSTEM DETERMINED BY OTHERS.

DATE: AUGUST 2019
DRAFTED BY: RFL

F:\CAD\TurnKey\Cedarland Development Group\1115 Main Street\10-SMP\Figure 6; ASD Design Details.dwg, 8/14/2019 4:48:24 PM

SUBSLAB DEPRESSURIZATION SYSTEM DETAILS

SITE MANAGEMENT PLAN

BCP SITE NO. C915341
1155 MAIN STREET SITE
BUFFALO, NEW YORK
PREPARED FOR
MAIN & DODGE LLC

FIGURE 6

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0481-019-001

APPENDIX A

LIST OF SITE CONTACTS

SITE MANAGEMENT PLAN

1155 MAIN STREET SITE

Appendix A

List of Site Contacts

Name	Phone/Email Address
Site Owner and Remedial Party – Main & Dodge LLC	716-217-9105 fdagher@cedarlanddev.com
Qualified Environmental Professional Thomas H. Forbes, P.E.	716-856-0599 tforbes@benchmarkturnkey.com
NYSDEC DER Project Manager	716-851-7220
NYSDEC Regional HW Engineer	716-851-7070
NYSDEC Site Control	518-402-9543
NYSDOH Bureau of Environmental Exposure Investigation	518-402-7860 beei@health.ny.gov

APPENDIX B

RESPONSIBILITIES OF OWNER & REMEDIAL PARTY

C-1: RESPONSIBILITIES

The responsibilities for implementing the Site Management Plan ("SMP") for the 1155 Main Street Site (the "site"), number C915341, are solely on the site owner(s) , as defined below. The owner(s) is/are currently listed as:

Main & Dodge LLC (the "owner")

50 Lakefront Boulevard, Suite 105

Buffalo, New York

Dr. Fadi Dagher

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

Main & Dodge LLC

50 Lakefront Boulevard, Suite 105

Buffalo, New York

Dr. Fadi Dagher

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

C-2: SITE OWNER'S RESPONSIBILITIES:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon

the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.

6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and (ii) coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.4 of the SMP. A 60-Day Advance Notification Form and Instructions are found at **http://www.dec.ny.gov/chemical/76250.html**.

8) The RP remains ultimately responsible for maintaining the engineering controls.

9) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

.

10) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

C-3: REMEDIAL PARTY RESPONSIBILITIES

1) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

2) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

3) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

4) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at **http://www.dec.ny.gov/chemical/76250.html**.

5) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.

6) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 4 or Appendix D (Operation , Monitoring and Maintenance Manual) of the SMP.

7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX C

ENVIRONMENTAL EASEMENT

MICHAEL P. KEARNS, ERIE COUNTY CLERK
REF:

DATE:11/18/2019
TIME:2:17:55 PM
RECEIPT: 19194741 - DUPLICATE -

BOND SCHOENECK & KING
ACCOUNT #: 8973

DUPLICATE RECEIPT

ITEM - 01 785
RECD: 11/18/2019 2:22:48 PM
FILE: 2019253746 BK/PG D 11352/8703
Deed Sequence: TT2019008388
MAIN &DODGE LLC

Recording Fees		90.00
TP584		10.00
Subtotal	100.00	

TOTAL DUE	$100.00
PAID TOTAL	$100.00
PAID CHECK	$90.00
Check #570:	90.00
PAID ESCROW	$10.00

REC BY: Kristin
COUNTY RECORDER

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 15th day of November, 2019 between Owner(s) Main & Dodge LLC, having an office at 50 Lakefront Boulevard, Suite 103, Buffalo New York 14202, (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 1155 Main Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel numbers: Section 100.63 Block 3 Lot 1.1 (f/k/a Lots 1, 33 and 34), being the same as that property conveyed to Grantor by deeds dated October 9, 2018 and October 29, 2018 and recorded in the Erie County Clerk's Office in Liber and Page 11335/6410 and 11336/5719, respectively. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.551 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 27, 2010 and last revised June 20, 2019 prepared by John E. McIntosh, III of McIntosh & McIntosh, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C915341-01-19, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C915341
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and

communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Main & Dodge LLC:

By: _____

Print Name: Fadi Dagher, M.D

Title: Authorized Representative Date: 11/1/19

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Erie)

On the 1st day of November in the year 2019, before me, the undersigned, personally appeared Fadi Dagher, MD, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public ~~State of New York~~

STEVEN J. RICCA
Notary Public, State of New York
Qualified in Erie County
My Commission Expires September 11, 2021

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 15th day of November in the year 2017, before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 20 20

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Buffalo, County of Erie and State of New York, being part of Lot 31, Township 11, Range 8 of the Holland Land Company Survey (so-called), bounded and described as follows:

BEGINNING at the intersection of the east line of Main Street (99.0 feet wide) and the south line of Dodge Street (66.0 feet wide);

RUNNING THENCE: Easterly, along the south line of Dodge Street, a distance of 253.31 feet to a point;

RUNNING THENCE: Southerly, at right angles to the last described line, a distance of 113.16 feet to a point;

RUNNING THENCE: Easterly, at an exterior angle of 93°-34'-42" with the last described line, a distance of 20.90 feet to a point;

RUNNING THENCE: Southwesterly, at an interior angle of 80°-51'-04" with the last described line and parallel with the east line of Main Street, a distance of 59.41 feet to a point;

RUNNING THENCE: Westerly, at an interior angle of 102°-42'-25" with the last described line, a distance of 40.0 feet to a point;

RUNNING THENCE: Southwesterly, at an exterior angle of 102°-42'-25" with the last described line and parallel with the east line of Main Street, a distance of 40.0 feet to a point;

RUNNING THENCE: Westerly, at an interior angle of 102°-42'-25" with the last described line, a distance of 15.0 feet to a point;

RUNNING THENCE: Southwesterly, at an exterior angle of 102°-42'-25" with the last described line and parallel with the east line of Main Street, a distance of 40.0 feet to a point;

RUNNING TEHNCE: Westerly, at an interior angle of 102°-42'-25" with the last described line, a distance of 245.0 feet to a point on the east line of Main Street;

RUNNING THENCE: Northeasterly, along the east line of Main Street, a distance of 256.65 feet to the

POINT OR PLACE OF BEGINNING, containing 1.551 Acres, be the same more or less.

TP-584.2 (10/96)

Recording Office Time Stamp

FILED
NOV 18 2019
ERIE COUNTY
CLERK'S OFFICE

Real Estate Transfer Tax Return For Public Utility Companies' and Governmental Agencies' Easements and Licenses

This form may only be used by public utility companies regulated by the Public Service Commission and governmental agencies for the recording of easements and licenses where the consideration for the grant of such easement or license is $500.00 or less.

Name of grantee (public utility company or governmental agency)
New York State Department of Environmental Conservation

Federal employer identification number *(if applicable)* 14-6013200

Address of grantee
625 Broadway, Albany, New York 12233-7023

Name and telephone number of person to contact

Name(s) of Grantor Of Easement or License	Address of Property	Consideration Given For Easement or License
1. Main & Dodge, LLC	1155 Main Street, Buffalo, NY Tax Lot 100.63-3-1.1	- 0 -
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

If more than fifteen conveyances are to be recorded, attach a schedule of such other conveyances.

Signature of Grantee

I certify that the grantee is a public utility regulated by the Public Service Commission or is a governmental agency and the grantee of the easements and/or licenses above; that it is true to the best knowledge of the grantee that the granting of each such easement and/or license is exempt from Real Estate Transfer Tax Imposed by Article 31 of the Tax Law by reason that each such conveyance is for a consideration of five hundred dollars or less and/or the conveyance is being made to a governmental agency.

New York State Department of Environmental Conservation
Name of grantee

Signature of partner, officer of corporation, governmental official, etc.

NYSDEC Attorney
Title

AFFIDAVIT OF SERVICE BY CERTIFIED MAIL

STATE OF NEW YORK)
COUNTY OF ERIE) SS:
CITY OF BUFFALO)

STEVEN J. RICCA, being duly sworn, deposes and says:

That deponent is not a party to the action, and is over the age of 18.

That on the 19th day of November, 2019, deponent served a true copy of the Environmental Easement and accompanying Notice of Environmental Easement on the persons whose name and address appear on the attached Schedule "A" by depositing a true copy of same enclosed in a postpaid properly addressed wrapper in an official postal depository at 200 DELAWARE AVENUE, BUFFALO, NEW YORK, under the care and custody of the United States Post Office Department within the State of New York.

Steven J. Ricca

Sworn to before me this 19th day of November, 2019.

NOTARY PUBLIC

TINA S. HOVEY
Notary Public, State of New York
Qual. in Erie Co. No. 01HO5001409
Commission Expires Sept. 8, 2022

SCHEDULE A

Hon. Byron W. Brown
Mayor
City of Buffalo
65 Niagara Square Room 201
Buffalo, NY 14202

APPENDIX D

O&M MANUAL(S)

APPENDIX E

QUALITY ASSURANCE PLAN

QUALITY ASSURANCE PROJECT PLAN

1155 MAIN STREET SITE
BUFFALO, NEW YORK
BCP SITE NO. C915341

August 2019 0481-019-001

Prepared for:

Main & Dodge LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

In Association With:

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0635

QUALITY ASSURANCE PROJECT PLAN (QAPP)

1155 Main Street Site

Table of Contents

Table of Contents

LIST OF TABLES

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is an appendix to the Site Management Plan (SMP), which is required as an element of the remedial program at the 1155 Main Street Site (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP), administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreements (BCA) Index # C915341-01-19, Site C915341, which was executed in February 2019.

1.1 Site Location and Description

The Site, addressed as 1155 Main Street, consists of one (1) approximate ±1.55-acre parcel (SBL 100.63-3-1.1) located along Main Street, in the City of Buffalo, Erie County, New York. The Site was vacant and used for parking at the start of the RI and IRM activities and consisted of asphalt and crushed stone cover, with vegetated/soil cover areas along the northern property line.

The Site is bound by Main Street to the west, vacant and former manufacturing use to the east, a parking lot to the south, and Dodge Street to the north. Land use surrounding the Site includes commercial and residential to the north, south, east and west. The Site has a long history of being utilized for various residential and commercial uses since the late 1800s including a gasoline station, an auto service station, used auto sales, and motels.

Previous environmental investigations completed at the Site have identified elevated levels of semi-volatile organic compounds (SVOCs) and metals at concentrations exceeding NYSDEC Part 375 Residential, Commercial and Industrial Soil Cleanup Objectives (SCOs).

Based on previous investigations, the remedial investigation (RI), and Interim Remedial Measures (IRM) completed under the BCP, the Site was remediated to achieve the Part 375 Unrestricted Soil Cleanup Objectives (USCOs). However, due to the detection of tetrachloroethene (PCE) in one (1) on-site downgradient monitoring well, NYSDEC/NYSDOH is requiring a soil vapor intrusion (SVI) investigation be completed after the Site building is construction and operational in Summer/Fall 2020 to determine if vapor intrusion is a concern.

1.2 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented post-remedial activities. The QAPP will assure the accuracy and precision of data collection during post-remedial Site redevelopment and data interpretation. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).This document may be modified for subsequent phases of investigative work, as necessary.

The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when;
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations);
- A document that can be used by the Project Manager's and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data;
- A plan to document and track project data and results; and,
- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

QA refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (e.g., verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The following section provides a generic organization for sampling activities, including roles, responsibilities, and required qualifications of these organizations.

2.1 NYSDEC and NYSDOH

It is the responsibility of the New York State Department of Environmental Conservation (NYSDEC), in conjunction with the New York State Department of Health, to review the project documents for completeness and conformance with the site-specific cleanup objectives and to make a decision to accept or reject these documents based on this review. The NYSDEC also has the responsibility and authority to review and approve all QA documentation collected during brownfield cleanup construction and to confirm that the QA Plan was followed.

2.2 Property Owner

The property owner (Owner), or holder of the certificate of completion (COC) will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup activities either directly or through their designated environmental consultant and/or legal counsel. The Owner will also have the authority to select Contractor(s) to assist them in fulfilling these responsibilities. The Owner is responsible for implementing the project and has the authority to commit the resources necessary to meet project objectives and requirements.

2.3 Project Manager

The Project Manager has the responsibility for ensuring that the project meets the overall project objectives, reports directly to the Owner, coordinates with the NYSDEC/NYSDOH Project Coordinators, and is responsible for technical and project oversight. The PM will:

- Define project objectives and develop a detailed work plan schedule.
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.

- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Review and approve all deliverables before their submission to NYSDEC.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Ultimately be responsible for the preparation and quality of interim and final reports.
- Represent the project team at meetings.

2.4 Field Team Leader:

The Field Team Leader (FTL) has the responsibility for implementation of specific project tasks identified at the Site, and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The FTL reports directly to the Project Manager. The FTL will:

- Define daily develop work activities.
- Orient field staff concerning the project's special considerations.
- Monitor and direct subcontractor personnel.
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP.

2.5 Quality Assurance (QA) Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and policies, and NYSDEC requirements. Specific function and duties include:

- Performing QA audits on various phases of the field operations.
- Reviewing and approving QA plans and procedures.
- Providing QA technical assistance to project staff.
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations.
- Responsible for assuring third party data review of all sample results from the analytical laboratory.

2.6 Laboratory Responsibilities

Any environmental laboratory utilized for sample analysis for this Site must be an independent, NY State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified facility approved to perform the analyses prescribed herein.

- *Laboratory Director:*

  The Laboratory Director is a technical advisor and is responsible for summarizing and reporting overall unit performance. Responsibilities of the TestAmerica Laboratory Director include:

  - Provide technical, operational, and administrative leadership.
  - Allocation and management of personnel and equipment resources.
  - Quality performance of the facility.
  - Certification and accreditation activities.
  - Blind and reference sample analysis.

- *Quality Assurance Manager (QA Manager):*

  The QA Manager has the overall responsibility for data after it leaves the laboratory. The QA Manager will be independent of the laboratory but will communicate data issues through the Laboratory Director. In addition, the QA Manager will:

  - Oversee laboratory QA.
  - Oversee QA/QC documentation.
  - Conduct detailed data review.
  - Determine whether to implement laboratory corrective actions, if required.
  - Define appropriate laboratory QA procedures.
  - Prepare laboratory SOPs.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport soil, groundwater and air samples.
- Field data collection.
- Record keeping.
- Data management.
- Chain-of-custody procedures.
- Precision, accuracy, completeness, representativeness, for sample analysis and data management under EPA analytical methods.

3.1 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.
- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix.

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

4.0 SAMPLE CUSTODY PROCEDURES

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1 Field Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1.1 Sample Storage

Samples are stored in secure limited-access areas. Sample parameter lists, holding times and sample container requirements are summarized on Table 1.

4.1.2 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession.
- It is in someone's view after being in his or her physical possession.
- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.
- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample.
- The laboratory COC.
- Sample labels or tags are attached to each sample container.
- Sample custody seals.
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample storage log (same as the laboratory COC).
- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

4.1.3 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

5.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

5.1 Field Instrument Calibration

Quantitative field data to be obtained during soil vapor intrusion sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

5.2 Preventative Maintenance

Each piece of field equipment is checked according to its routine maintenance schedule and before field activities begin. Field equipment that may be used at the Site includes:

- Photoionization detector (PID)
- Helium Detector

Field personnel will report all equipment maintenance and/or replacement needs to the Project QA Officer and will record the information on the daily field record.

6.0 DATA VALIDATION AND REPORTING

All data generated through field activities, or by the laboratory operation shall be reduced and validated (as required in the SMP) before reported.

6.1 Data Usability Evaluation

If requested by the NYSDEC, data evaluation will be performed by a third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program*, National Functional Guidelines for Inorganic Data Review.*

6.1.1 Procedures Used to Evaluate Field Data Usability

The performance of all field activities, calibration checks on all field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the responsibility of the Field Team Leader.

6.1.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program*, National Functional Guidelines for Inorganic Data Review.* The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third-party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.2 Data Reporting

6.2.1 Field Data Reporting

All field documents will be accounted for when they are completed. Accountable documents include items such as field notebooks, sample logs, field data records, photographs, data packages, computer disks, and reports.

6.2.2 Laboratory Data Reporting

Analytical data will be summarized in tabular format with such information as sample identification, sample matrix description, parameters analyzed and their corresponding detected concentrations, and the detection limit. Analytical results will be incorporated into reports as data tables, maps showing sampling locations and analytical results, and supporting text.

7.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out of quality control performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should be implemented only after approval by the Project Manager, or his/her designee. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in an additional memorandum.

7.1 Field Corrective Action

If errors in field procedures are discovered during the observation or review of field activities by the Project QA Officer or his/her designee, corrective action will be initiated. Nonconformance to the QA/QC requirements of the field operating procedures will be identified by field audits or immediately by project staff who know or suspect that a procedure is not being performed in accordance with the requirements. The Project QA Officer or his designee will be informed immediately upon discovery of all deficiencies. Timely action will be taken if corrective action is necessary.

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Work Plan, etc.) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. In general, the Project Manager and QA Officer may identify the need for corrective action. The Project Manager will approve the corrective measure that will be implemented by the field team. It will be the responsibility of the Project Manager to ensure that corrective action has been implemented.

If the corrective action will supplement the existing sampling using existing and approved procedures in the QAPP, corrective action approved by the Project Manager will be documented. If the corrective actions result in less samples (or analytical fractions), alternate locations, etc., which may result in non-achievement of project QA objectives, it will be necessary that all levels of project management, including the NYSDEC Project Coordinator, concur with the proposed action.

Corrective actions will be implemented and documented in the project field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the NYSDEC Project Coordinator.

If at any time a corrective action issue is identified which directly impacts project data quality objectives, the NYSDEC Project Coordinator will be notified immediately.

7.2 Laboratory Corrective Action

Corrective actions may be initiated if the quality assurance goals are not achieved. The initial step in a corrective action is to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous result. If no error in laboratory procedures or sample collection and handling procedures can be identified, then the Project Manager will assess whether reanalysis or resampling is required or whether any protocol should be modified for future sampling events.

7.3 Data Validation & Assessment Corrective Action

The need for corrective action may be identified during the data validation or assessment processes. Potential types of corrective action may include resampling by the field team, or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the QA objectives (e.g., the holding time for samples is not exceeded, etc.). If the data validator identifies a corrective action situation, the Project Manager will be responsible for approving the corrective action implementation. All required corrective actions will be documented by the laboratory Quality Assurance Coordinator.

TABLE

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 1

SAMPLE CONTAINER, VOLUME, PRESERVATION & HOLDING TIME REQUIREMENTS

SITE MANAGEMENT PLAN

1155 Main Street Site
Buffalo, New York

Matrix	Parameter [1]	Method	Container Type	Minimum Volume	Preservation (Cool to 2-4 °C for all samples)	Holding Time from Sample Date
Air	VOCs	TO-15	Summa	6 liter	none	Analyze within 14 days of sample collection

References:

1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Acronyms:

VOCs = Volatile Organic Compounds

APPENDIX F

FIELD OPERATING PROCEDURES

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Soil Vapor Sample Collection Procedures

FOP 004.5

SOIL VAPOR SAMPLE COLLECTION PROCEDURE

BACKGROUND

In October 2006, the New York State Department of Health (NYSDOH) finalized their vapor intrusion guidance document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York." (www.health.state.ny.us/nysdoh/gas/svi_guidance/), which has been guiding NYSDOH and New York State Department of Environmental Conservation (NYSDEC) decisions concerning the need for subslab vapor mitigation at sites undergoing investigation, cleanup and monitoring under formal NY Sate remedial programs (e.g., Brownfield Cleanup Program sites, Inactive Hazardous Waste Site Remediation Program sites, etc.). The guidance presents two soil vapor/indoor air matrices to assist in interpreting subslab and ambient air data (i.e., "Matrix 1" and "Matrix 2"). As of June 2007, six compounds have been assigned to these two matrices as follows:

Volatile Chemical	Soil Vapor / Indoor Air Matrix
Carbon tetrachloride	Matrix 1
1,1-Dichloroethene	Matrix 2
cis-1,2-Dichloroethene	Matrix 2
Tetrachloroethene	Matrix 2
1,1,1-Trichloroethane	Matrix 2
Trichloroethene	Matrix 1
Vinyl chloride	Matrix 1

Additional matrices will be developed when a chemical's toxicological properties, background concentrations, or analytical capabilities suggest that major revisions are needed. Both matrices are attached as Figures 1 and 2.

PURPOSE

The procedures presented herein delineate the scope of additional investigation at a building on the project site to determine if volatile organic compounds (VOCs) detected in groundwater and/or soil near the building are intruding into the building airspace or have the potential, in sufficient concentrations, to adversely impact indoor air quality. The soil vapor, subslab vapor, and ambient air monitoring procedures follow the NYSDOH Final Soil Vapor Intrusion Guidance (October 2006) as well as USEPA Methods TO-14 and TO-15, for volatile organic compounds (VOCs) using Summa passive canisters.

SURVEYS AND PRE-SAMPLING BUILDING PREPARATION (IF REQUIRED)

If required, a pre-sampling inspection should be performed prior to each sampling event to identify and minimize conditions that may interfere with the proposed testing. The inspection should evaluate the type of structure, floor layout, airflows, and physical conditions of the building(s) being studied. This information, along with information on sources of potential indoor air contamination, should be identified on a building inventory form. An example of the building inventory form is attached. Items to be included in the building inventory include the following:

- Construction characteristics, including foundation cracks and utility penetrations or other openings that may serve as preferential pathways for vapor intrusion;
- Presence of an attached garage;
- Recent renovations or maintenance to the building (e.g., fresh paint, new carpet or furniture);
- Mechanical equipment that can affect pressure gradients (e.g., heating systems, clothes dryers or exhaust fans);

- Use or storage of petroleum products (e.g., fuel containers, gasoline operated equipment and unvented kerosene heaters); and
- Recent use of petroleum-based finishes or products containing volatile chemicals.

Each room on the floor of the building being tested and on lower floors, if possible, should be inspected. This is important because even products stored in another area of a building can affect the air of the room being tested.

The presence and description of odors (e.g., solvent, moldy) and portable vapor monitoring equipment readings (e.g., PIDs, ppb RAE, Jerome Mercury Vapor Analyzer, etc.) should be noted and used to help evaluate potential sources. This includes taking readings near products stored or used in the building.

Potential interference from products or activities releasing volatile chemicals may need to be controlled. Removing the source from the indoor environment prior to testing is the most effective means of reducing interference. Ensuring that containers are tightly sealed may be acceptable. When testing for volatile organic compounds, containers should be tested with portable vapor monitoring equipment to determine whether compounds are leaking. The inability to eliminate potential interference may be justification for not testing, especially when testing for similar compounds at low levels. The investigator should consider the possibility that chemicals may adsorb onto porous materials and may take time to dissipate.

In some cases, the goal of the testing is to evaluate the impact from products used or stored in the building (e.g., pesticide misapplications, school renovation projects). If the goal of the testing is to determine whether products are an indoor volatile chemical contaminant source, the removing these sources does not apply.

Once interfering conditions are corrected (if applicable), ventilation may be needed prior to sampling to eliminate residual contamination in the indoor air. If ventilation is appropriate, it should be completed 24 hours or more prior to the scheduled sampling time. Where applicable, ventilation can be accomplished by operating the building's HVAC system to maximize outside air intake. Opening windows and doors, and operating exhaust fans may also help or may be needed if the building has no HVAC system.

Air samples are sometimes designed to represent typical exposure in a mechanically ventilated building and the operation of HVAC systems during sampling should be noted on the building inventory form (see attached sample). In general, the building's HVAC system should be operating under normal conditions. Unnecessary building ventilation should be avoided within 24 hours prior to and during sampling. During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time.

Depending upon the goal of the indoor air sampling, some situations may warrant deviation from the above protocol regarding building ventilation. In such cases, building conditions and sampling efforts should be understood and noted within the framework and scope of the investigation.

To avoid potential interferences and dilution effects, every effort should be made to avoid the following for 24 hours prior to sampling:

- Opening any windows, fireplace dampers, openings or vents;
- Operating ventilation fans unless special arrangements are made;
- Smoking in the building;
- Painting;
- Using a wood stove, fireplace or other auxiliary heating equipment (e.g., kerosene heater);
- Operating or storing automobile in an attached garage;

- Allowing containers of gasoline or oil to remain within the house or garage area, except for fuel oil tanks;
- Cleaning, waxing or polishing furniture, floors or other woodwork with petroleum- or oil-based products;
- Using air fresheners, scented candles or odor eliminators;
- Engaging in any hobbies that use materials containing volatile chemicals;
- Using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;
- Lawn mowing, paving with asphalt, or snow blowing;
- Applying pesticides; and
- Using building repair or maintenance products, such as caulk or roofing tar.

PRODUCT INVENTORY (IF REQUIRED)

If required, the primary objective of the product inventory is to identify potential air sampling interference by characterizing the occurrence and use of chemicals and products throughout the building, keeping in mind the goal of the investigation and site-specific contaminants of concern. For example, it is not necessary to provide detailed information for each individual container of like items. However, it is necessary to indicate that "20 bottles of perfume" or
"12 cans of latex paint" were present with containers in good condition. This information is used to help formulate an indoor environment profile.

An inventory should be provided for each room on the floor of the building being tested and on lower floors, if possible. This is important because even products stored in another area of a building can affect the air of the room being tested.

The presence and description of odors (e.g., solvent, moldy) and portable vapor monitoring equipment readings (e.g., PIDs, ppb RAE, Jerome Mercury Vapor Analyzer, etc.) should be noted and used to help evaluate potential sources. This includes taking readings near

products stored or used in the building. Products in buildings should be inventoried every time air is tested to provide an accurate assessment of the potential contribution of volatile chemicals. If available, chemical ingredients of interest (e.g., analyte list) should be recorded for each product. If the ingredients are not listed on the label, record the product's exact and full name, and the manufacturer's name, address and telephone number, if available. In some cases, Material Safety Data Sheets (MSDS) may be useful for identifying confounding sources of volatile chemicals in air. Adequately documented photographs of the products and their labeled ingredients can supplement the inventory and facilitate recording the information.

SAMPLE LOCATIONS

The following are types of samples that are collected to investigate the soil vapor intrusion pathway:

- Subsurface vapor samples:
  - *Soil vapor* samples (i.e., soil vapor samples not beneath the foundation or slab of a building) and
  - *Sub-slab vapor* samples (i.e., soil vapor samples immediately beneath the foundation or slab of a building);
- Indoor air samples; and
- Outdoor air samples.

The types of samples that should be collected depend upon the specific objective(s) of the sampling, as described below.

- Soil vapor
  Soil vapor samples are collected to determine whether this environmental medium is contaminated, characterize the nature and extent of contamination, and identify possible sources of the contamination. Soil vapor sampling results are used when evaluating the following:
  - The potential for *current* human exposures;

- The potential for *future* human exposures (e.g., should a building be constructed); and
- The effectiveness of measures implemented to remediate contaminated subsurface vapors.

- Sub-slab vapor

  Sub-slab vapor samples are collected to characterize the nature and extent of soil vapor contamination immediately beneath a building with a basement foundation and/or a slab-on-grade. Sub-slab vapor sampling results are used when evaluating the following:
  - *Current* human exposures;
  - The potential for *future* human exposures (e.g., if the structural integrity of the building changes or the use of the building changes); and
  - Site-specific attenuation factors (i.e., the ratio of indoor air to sub-slab vapor concentrations).

  Sub-slab vapor samples are collected after soil vapor characterization and/or other environmental sampling (e.g., soil and groundwater characterization) indicate a need. Subslab samples are typically collected concurrently with indoor and outdoor air samples. However, outside of the heating season, sub-slab vapor samples may be collected independently depending on the sampling objective (e.g., characterize the extent of subsurface vapor contamination outside of the heating season to develop a more comprehensive, focused investigation plan for the heating season).

- Indoor air

  Indoor air samples are collected to characterize exposures to air within a building, including those with earthen floors and crawlspaces. Indoor air sampling results are used when evaluating the following:
  - *Current* human exposures;
  - The potential for *future* exposures (e.g., if a currently vacant building should become occupied); and
  - Site-specific attenuation factors (e.g., the ratio of indoor air to sub-slab vapor concentrations).

Indoor air samples are collected after subsurface vapor characterization and other environmental sampling (e.g., soil and groundwater characterization) indicate a need. When indoor air samples are collected, concurrent sub-slab vapor and outdoor air samples are collected to evaluate the indoor air results appropriately. However, indoor air and outdoor air samples, without sub-slab vapor samples, may be collected when confirming the effectiveness of a mitigation system.

In addition, site-specific situations may warrant collecting indoor air samples prior to characterizing subsurface vapors and/or without concurrent sub-slab sampling due to a need to examine immediate inhalation hazards. Examples of such situations may include, but are not limited to, the following:

- In response to a spill event when there is a need to qualitatively and/or quantitatively characterize the contamination;
- If high readings are obtained in a building when screening with field equipment (e.g., a photoionization detector (PID), an organic vapor analyzer, or an explosimeter) and the source is unknown;
- If significant odors are present and the source needs to be characterized; or
- If groundwater beneath the building is contaminated, the building is prone to groundwater intrusion or flooding (e.g., sump pit overflows), and subsurface vapor sampling is not feasible.

- Outdoor air

  Outdoor air samples are collected to characterize site-specific background outdoor air conditions. These samples must be collected simultaneously with indoor air samples. They may also be collected concurrently with soil vapor samples. Outdoor air sampling results are primarily used when evaluating the extent to which outdoor sources may be influencing indoor air quality. They may also be used in the evaluation of soil vapor results (i.e., to identify potential outdoor air interferences associated with the infiltration of outdoor air into the sampling apparatus while the soil vapor sample was collected).

SOIL VAPOR SAMPLE COLLECTION PROCEDURES

Soil vapor probe installations (see Figure 3 attached) may be permanent, semi-permanent, or temporary. In general, permanent installations are preferred for data consistency reasons. Soil implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

- Soil vapor probes should be installed using direct push technology or, if necessary to attain the desired depth, using an auger;
- Porous backfill material (e.g., glass beads or coarse sand) should be used to create a sampling zone 1 to 2 feet in length;
- Soil vapor probes should be fitted with inert tubing (e.g., polyethylene, stainless steel, or Teflon®) of the appropriate size (typically 1/8 inch to 1/4 inch diameter) and of laboratory or food grade quality to the surface;
- Soil vapor probes should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material;
- For multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones; and
- For permanent installations, a protective casing should be set around the top of the probe tubing and grouted in place to the top of bentonite to minimize infiltration of water or outdoor air, as well as to prevent accidental damage.

Soil vapor samples should be collected in the same manner at all locations to minimize possible discrepancies. The following procedures should be included in any sampling protocol:

- At least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of

the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;

- Flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling;

- The target final field vacuum after 24 hours will be approximately -5 inches of mercury. Samples with a final field vacuum of greater than -10 inches of mercury, or equal to zero, will be flagged (usability of data will depend on sample volume and reporting limits that can be achieved).

- Samples must be collected, using conventional sampling methods, in an appropriate container — one which meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), meets the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and is certified clean by the laboratory;

- Sample size depends upon the volume of sample required to achieve minimum reporting limit requirements; and

- A tracer gas (e.g., helium, butane, or sulfur hexafluoride) must be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring) (discussed later in this procedure). Once verified, continued use of the tracer gas may be reconsidered.

When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;

- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north);

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) should be noted for the past 24 to 48 hours; and

- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

The field sampling team must maintain a sample log sheet summarizing the following:

- Sample identification,
- Date and time of sample collection,
- Sampling depth,
- Identity of samplers,
- Sampling methods and devices,
- Purge volumes,
- Volume of soil vapor extracted,
- If canisters used, the vacuum before and after samples collected,
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- Chain of custody protocols and records used to track samples from sampling point to analysis.

SUB-SLAB VAPOR SAMPLE COLLECTION PROCEDURES

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

Sub-slab vapor probe installations (see Figure 4 attached) may be permanent, semi-permanent, or temporary. Sub-slab implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

- Permanent recessed probes must be constructed with brass or stainless steel tubing and fittings;
- Temporary probes must be constructed with polyethylene or Teflon® tubing of laboratory or food grade quality;
- Tubing should not extend further than 2 inches into the sub-slab material;
- Coarse sand or glass beads should be added to cover about 1 inch of the probe tip for permanent installations; and
- The soil vapor probe should be sealed to the surface with permagum grout, melted beeswax, putty or other non-VOC-containing and non-shrinking products for temporary installations or cement for permanent installations.

Sub-slab vapor samples should be collected in the following manner:

- After installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;
- Flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling;
- The target final field vacuum after 24 hours will be approximately -5 inches of mercury. Samples with a final field vacuum of greater than -10 inches of mercury, or equal to zero, will be flagged (usability of data will depend on sample volume and reporting limits that can be achieved).
- Samples must be collected, using conventional sampling methods, in an appropriate container — one which meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), meets the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and is certified clean by the laboratory;

- Sample size depends upon the volume of sample required to achieve minimum reporting limit requirements [Section 2.9 of the Guidance], the flow rate, and the sampling duration; and
- Ideally, samples should be collected over the same period of time as concurrent indoor and outdoor air samples.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results:

- If sampling within a commercial or industrial building, uses of volatile chemicals in commercial or industrial processes and/or during building maintenance, should be identified;
- The use of heating or air conditioning systems during sampling should be noted;
- Floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), and any other pertinent information should be completed;
- If possible, photographs should accompany floor plan sketches;
- Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), compass orientation (north), footings that create separate foundation sections, and paved areas;
- Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) should be reported;
- Smoke tubes or other devices should be used to confirm pressure relationships and air flow patterns, especially between floor levels and between suspected contaminant sources and other areas; and
- Any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppb RAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

The field sampling team must maintain a sample log sheet summarizing the following:

- Sample identification,

- Date and time of sample collection,
- Sampling depth,
- Identity of samplers,
- Sampling methods and devices,
- Soil vapor purge volumes,
- Volume of soil vapor extracted,
- If canisters used, the vacuum before and after samples collected,
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- Chain of custody protocols and records used to track samples from sampling point to analysis.

The following describes the subslab air sampling procedure:

1. Canisters will be supplied by the laboratory that will be conducting the analysis.

2. Sampling will take place in accordance with the project work plan sufficiently spaced to allow locations to be modified, if necessary.

3. The number of Summa canisters required as well as the flow rate of the constant differential low volume flow controllers will be supplied by the laboratory in accordance with the project work plan.

4. The sampling program will consist of concurrently collecting and analyzing one sub-slab vapor sample and one indoor ambient air sample (discussed in the next section). Sample locations should be selected based on the likelihood for potential continuous human occupancy during the workday (i.e., due to the size of the areas and available infrastructure), and to account for the possibility of varying foundation depths in different areas of the building. In addition, sample locations typically are based upon the results of a subsurface investigation (i.e., soil gas survey or boring advancement) conducted prior to air sample collection activities. Canisters are typically placed in areas where the highest concentrations of soil gas were observed. Indoor air sample locations preferably should be selected near the middle of the sampled room, well away from the edges where dilution is more likely to occur.

5. Collect at least one outdoor ambient air sample from a location on the building roof or designated background area of the site positioned away from building ventilation system equipment on the highest portion of the building roof or site. See the Outdoor Ambient Air Sampling Procedure section in this procedure.

6. Field personnel should assure conservative sampling conditions prior to and throughout the sampling event. The building should be closed (windows and doors shut) and existing building ventilation systems should be turned off 12 to 24 hours before the air sampling is scheduled to begin as well as during sample collection. Any air-handling units that may induce large pressure gradients (i.e., exhaust fans, HVAC units etc.) should also be turned off.

7. Any activity being conducted by current building tenants involving volatile organic compounds, such as the use of lacquer thinner and cleaning solvents, prior to and/or during air sampling activities should be noted in the Project Field Book. These activities have the potential to bias the analytical results.

8. At each location, drill an approximately ¾-inch diameter hole through the concrete slab (typically 6-8 inches thick) using a hand-held hammer drill.

9. Measure and record the concrete thickness in the Project Field Book.

10. Insert polyethylene or Teflon® tubing of laboratory or food grade quality into the drilled hole and no further than 2 inches into the subslab material.

11. Seal the tubing with an appropriately sized volatile organic compound-free stopper (i.e., permagum grout, melted beeswax, putty, or other non-VOC-containing and non-shrinking product) into the concrete core hole and secure in-place making sure the fit is very snug. Supplement any visible gaps between the stopper and concrete slab with a VOC-free sealant, such as beeswax or bentonite slurry.

12. Run the tubing assembly through a shroud (plastic pail, cardboard box, or garbage bag) creating a tight seal with the surface making sure not to disturb the seal around the tubing penetration.

13. Enrich the atmosphere of the shroud with helium. Measure and record the helium concentration within the shroud.

14. Purge approximately 1 to 3 tubing volumes (i.e., the volume of the sample probe and tube) using a hand pump (or similar approved device) to ensure the collection of a representative sample.

15. Flow rates for both purging and sample collection must not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling.

16. Use a portable monitoring device to analyze a sample of soil vapor for the tracer **prior to and after** sampling for the compounds of concern. Note that the tracer gas samples can be collected via syringe, Tedlar bag etc. They need not be collected in Summa® canisters or minicans.

17. If concentrations greater than 10% of tracer gas are observed either prior to and/or after sampling, the probe seal should be enhanced to reduce the infiltration of outdoor air. Following enhancement of the seal, repeat steps 14 through 17 above until purged concentrations are less than 10% of the tracer gas within the shroud.

18. Following tubing purge and adequate seal integrity testing via helium tracer gas, immediately attach a 6-liter Summa Canister fitted with a 24-hour regulator (or approved other duration) to the opposite end of the tubing. Concurrent with each subslab sample location, prepare an indoor ambient air sample by staging a second Summa Canister on a ladder (approximately 2 to 5-feet above the floor) adjacent to the sub-slab sample location.

19. All Summa Canister valves should remain closed until all subslab borings are complete and all of the canisters in their respective positions.

20. Open the valves to all of the canisters for the required collection period (i.e., 24-hours). Record initial canister pressure on the Air Canister Field Record form.

21. Following sample collection and prior to closing canister valve, record final canister pressure on the Air Canister Field Record form. Close canister valve.

22. Collect all Summa Canisters and ship, under chain-of-custody command to an approved analytical laboratory for VOC analysis in accordance with USEPA Method TO-14 or TO-15.

23. Repair all concrete openings with a cement patch.

24. Analytical results submitted by the laboratory should be reported as concentrations of each VOC at each location, typically in parts per billion by volume (ppbv).

INDOOR AIR SAMPLE COLLECTION PROCEDURES

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. If possible, prior to collecting indoor samples, a pre-sampling inspection, discussed earlier in this procedure, should be performed to evaluate the physical layout and conditions of the building being investigated, to identify conditions that may affect or interfere with the proposed sampling, and to prepare the building for sampling.

In general, indoor air samples should be collected in the following manner:

- Sampling duration should reflect the exposure scenario being evaluated without compromising the detection limit or sample collection flow rate (e.g., an 8 hour sample from a workplace with a single shift versus a 24 hour sample from a workplace with multiple shifts). To ensure that air is representative of the locations sampled and to avoid undue influence from sampling personnel, samples should be collected for at least 1 hour. If the goal of the sampling is to represent average concentrations over longer periods, then longer duration sampling periods may be appropriate. Typically, 24 hour samples are collected from residential settings;

- Personnel should avoid lingering in the immediate area of the sampling device while samples are being collected;

- Sample flow rates must conform to the specifications in the sample collection method and, if possible, should be consistent with the flow rates for concurrent outdoor air and sub-slab samples;

- The target final field vacuum after 24 hours will be approximately -5 inches of mercury. Samples with a final field vacuum of greater than -10 inches of mercury, or equal to zero, will be flagged (usability of data will depend on sample volume and reporting limits that can be achieved); and

- Samples must be collected, using conventional sampling methods, in an appropriate container — one which meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), meets the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and is certified clean by the laboratory.

At sites with tetrachloroethene contamination, passive air monitors that are specifically analyzed for tetrachloroethene (i.e., "perc badges") are commonly used to collect indoor and outdoor air samples. If site characterization activities indicate that degradation products of tetrachloroethene also represent a vapor intrusion concern, perc badges may be used to indicate the likelihood of vapor intrusion (i.e., by using tetrachloroethene as a surrogate) followed, as needed, by more comprehensive sampling and laboratory analyses to quantify both tetrachloroethene and its degradation products. Perc badge samples ideally should be collected over a twenty-four hour period, but for no less than eight hours.

The following actions should be taken to document conditions during indoor air sampling and ultimately to aid in the interpretation of the sampling results:

- A product inventory survey must be completed (discussed earlier);

- The use of heating or air conditioning systems during sampling should be noted;

- Floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system supply and return registers, compass orientation (north), and any other pertinent information should be completed;

- If possible, photographs should accompany floor plan sketches;

- Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), compass orientation (north), footings that create separate foundation sections, and paved areas;

- Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) should be reported;

- Smoke tubes or other devices should be used to confirm pressure relationships and air flow patterns, especially between floor levels and between suspected contaminant sources and other areas; and

- Any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppb RAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

The field sampling team must maintain a sample log sheet summarizing the following:

- Sample identification,
- Date and time of sample collection,
- Sampling height,
- Identity of samplers,
- Sampling methods and devices,
- Depending upon the method, volume of air sampled,
- If canisters used, the vacuum before and after samples collected,

- Chain of custody protocols and records used to track samples from sampling point to analysis.

The following describes the indoor air sampling procedure:

1. Canisters will be supplied by the laboratory that will be conducting the analysis.

2. Sampling will take place in accordance with the project work plan sufficiently spaced to allow locations to be modified, if necessary.

3. The number of Summa canisters required as well as the flow rate of the constant differential low volume flow controllers will be supplied by the laboratory in accordance with the project work plan. Indoor air sampling typically requires the continuous collection of samples over a 24-hour period.

4. The sampling program will consist of concurrently collecting and analyzing one sub-slab vapor sample and one indoor ambient air sample. Sample locations should be selected based on the likelihood for potential continuous human occupancy during the workday (i.e., due to the size of the areas and available infrastructure), and to account for the possibility of varying foundation depths in different areas of the building. In addition, sample locations typically are based upon the results of a subsurface investigation (i.e., soil gas survey or boring advancement) conducted prior to air sample collection activities. Canisters are typically placed in areas where the highest concentrations of soil gas were observed. Indoor air sample locations preferably should be selected near the middle of the sampled room, well away from the edges where dilution is more likely to occur.

5. Collect at least one outdoor ambient air sample from a location on the building roof or designated background area of the site positioned away from building ventilation system equipment on the highest portion of the building roof or site. See the Outdoor Ambient Air Sampling Procedure presented in this procedure.

6. Field personnel should assure conservative sampling conditions prior to and throughout the sampling event. The building should be closed (windows and doors shut) and existing building ventilation systems should be turned off 12 to 24 hours before the air sampling is scheduled to begin as well as during sample collection. Any air-handling units that may induce large pressure gradients (i.e., exhaust fans, HVAC units etc.) should also be turned off.

7. Any activity being conducted by current building tenants involving volatile organic compounds, such as the use of lacquer thinner and cleaning solvents, prior to and/or during air sampling activities should be noted in the Project Field Book. These activities have the potential to bias the analytical results.

8. Concurrent with each subslab sample location, prepare an indoor ambient air sample by staging a second Summa Canister on a ladder (approximately 2 to 5-feet above the floor) adjacent to the sub-slab sample location.

9. All Summa Canister valves should remain closed until all subslab borings are complete and all of the canisters in their respective positions.

10. Open the valves to all of the canisters for the required collection period (i.e., 24-hours). Record initial canister pressure on the Air Canister Field Record form.

11. Following sample collection and prior to closing canister valve, record final canister pressure on the Air Canister Field Record form. Close canister valve.

12. Collect all Summa Canisters and ship, under chain-of-custody command to an approved analytical laboratory for VOC analysis in accordance with USEPA Method TO-14 or TO-15.

13. Analytical results submitted by the laboratory should be reported as concentrations of each VOC at each location, typically in parts per billion by volume (ppbv).

OUTDOOR AIR SAMPLE COLLECTION PROCEDURES

Outdoor air samples must be collected simultaneously with indoor air samples and may be collected concurrently with subsurface vapor samples. Outdoor air samples must be collected in the same manner as indoor samples.

The following actions should be taken to document conditions during outdoor air sampling and ultimately to aid in the interpretation of the sampling results:

- Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), the location of potential interferences (e.g., gasoline stations, factories, lawn movers, etc.), compass orientation (north), footings that create separate foundation sections, and paved areas;

- Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

- Any pertinent observations, such as odors, readings from field instrumentation, and significant activities in the vicinity (e.g., operation of heavy equipment or dry cleaners) should be recorded.

The following describes the outdoor air sampling procedure:

1. Canisters will be supplied by the laboratory that will be conducting the analysis.

2. Sampling will take place in accordance with the project work plan sufficiently spaced to allow locations to be modified, if necessary.

3. The number of Summa canisters required as well as the flow rate of the constant differential low volume flow controllers will be supplied by the laboratory in accordance with the project work plan.

4. Sample locations typically are collected upwind of the facility.

5. Collect at least one outdoor ambient air sample from a location on the building roof or designated background area of the site positioned away from building ventilation system equipment on the highest portion of the building roof or site. Place canisters on the ground or step ladder, with a clear plastic sheet beneath to prevent contamination. Locate the sampling inlet approximately 18-inches above the ground surface.

6. Sample collection should take place on warm, dry days. If rain or high humidity conditions develop during sampling, the sampling event should be suspended. Temperature, barometric pressure, and wind speed should be monitored during the sampling event, for use in analysis of the results.

7. The combination of sampling location, height, and meteorological conditions will assure that sampling will measure VOCs at their highest concentrations.

8. All Summa Canister valves should remain closed until all subslab borings are complete and all of the indoor and outdoor canisters in their respective positions.

9. Open the valves to all of the canisters for the required collection period (i.e., 24-hours). Record initial canister pressure on the Air Canister Field Record form.

10. Following sample collection and prior to closing canister valve, record final canister pressure on the Air Canister Field Record form. Close canister valve.

11. Collect all Summa Canisters and ship, under chain-of-custody command to an approved analytical laboratory for VOC analysis in accordance with USEPA Method TO-14 or TO-15.

12. Air samples will be analyzed by Gas Chromatography/Mass Spectroscopy (GC/MS) in accordance with EPA Method TO-14 or TO-15.

13. Analytical results will be reported as concentrations of each VOC at each location during each sampling event, typically in parts per billion by volume (ppbv).

TRACER GAS

When collecting soil vapor samples as part of a vapor intrusion evaluation, a tracer gas serves as a quality assurance/quality control device to verify the integrity of the soil vapor probe seal. Without the use of a tracer, there is no way to verify that a soil vapor sample has not been diluted by surface air.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically, sulfur hexafluoride (SF6) or helium are used as tracers because they are readily available, have low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as a tracer in some situations. The protocol for using a tracer gas is straightforward: simply enrich the atmosphere in the immediate vicinity of the area where the probe intersects the ground surface with the tracer gas, and measure a vapor sample from the probe for the presence of high concentrations (> 10%) of the tracer. A cardboard box, a plastic pail, or even a garbage bag can serve to keep the tracer gas in contact with the probe during the testing.

There are two basic approaches to testing for the tracer gas:

- Include the tracer gas in the list of target analytes reported by the laboratory; or

- Use a portable monitoring device to analyze a sample of soil vapor for the tracer prior to and after sampling for the compounds of concern. (Note that the tracer gas samples can be collected via syringe, Tedlar bag etc. They need not be collected in Summa® canisters or minicans.)

The advantage of the second approach is that the real time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection. Figure 5 (attached) depicts common methods for using tracer gas. In each of the examples, a, b and c, the tracer gas is released in the enclosure prior to initially purging the sample point. Care should be taken to avoid excessive purging prior to sample collection. Care should also be taken to prevent pressure build-up in the enclosure during introduction of the tracer gas. Inspection of the installed sample probe, specifically noting the integrity of the surface seal and the porosity of the soil in which the probe is installed, will help to determine the tracer gas setup. Figure 5(a) may be most effective at preventing tracer gas infiltration; however, it may not be required in some situations depending on site-specific conditions. Figures 5(b) and 5(c) may be sufficient for probes installed in tight soils with well-constructed surface seals. In all cases, the same tracer gas application should be used for all probes at any given site.

Because minor leakage around the probe seal should not materially affect the usability of the soil vapor sampling results, the mere presence of the tracer gas in the sample should not be a cause for alarm. Consequently, portable field monitoring devices with detection limits in the low ppm range are more than adequate for screening samples for the tracer. If high concentrations (> 10%) of tracer gas are observed in a sample, the probe seal should be enhanced to reduce the infiltration of ambient air.

During the initial stages of a soil vapor sampling program, tracer gas samples should be collected at each of the sampling probes. If the results of the initial samples indicate that the probe seals are adequate, the project manager can consider reducing the number of locations at which tracer gas samples are employed. At a minimum, at least 10% of the subsequent samples should be supported with tracer gas analyses. When using permanent soil vapor probes as part of a long-term monitoring program, annual testing of the probe integrity is recommended.

QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Extreme care should be taken during all aspects of sample collection to ensure that sampling error is minimized and high quality data are obtained. The sampling team members should avoid actions (e.g., fueling vehicles, using permanent marking pens, and wearing freshly dry-cleaned clothing or personal fragrances), which can cause sample interference in the field. Appropriate QA/QC protocols must be followed for sample collection and laboratory analysis, such as use of certified clean sample devices, meeting sample holding times and temperatures, sample accession, chain of custody, etc. Samples should be delivered to the analytical laboratory as soon as possible after collection. In addition, laboratory accession procedures must be followed including field documentation (sample collection information and locations), chain of custody, field blanks, field sample duplicates, and laboratory duplicates, as appropriate.

Some methods require collecting samples in duplicate (e.g., indoor air sampling using passive sampling devices for tetrachloroethene) to assess errors. Duplicate and/or split samples should be collected in accordance with the requirements of the sampling and analytical methods being implemented.

For certain regulatory programs, a Data Usability Summary Report (DUSR) may be required to determine whether or not the data, as presented, meets the site or project specific criteria for data quality and data use. This requirement may dictate the level of QC and the category of data deliverable to request from the laboratory. Guidance on preparing a DUSR is available by contacting the NYSDEC's Division of Environmental Remediation.

New York State Public Health Law requires laboratories analyzing environmental samples collected from within New York State to have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix

combinations. If ELAP certification is not currently required for an analyte (e.g., trichloroethene), the analysis should be performed by a laboratory that has ELAP certification for similar compounds in air and uses analytical methods with detection limits similar to background (e.g., tetrachloroethene via EPA Method TO-15).

The work plan must state that all samples that will be used to make decisions on appropriate actions to address exposures and environmental contamination will be analyzed by an ELAP-certified laboratory. If known, the name of the laboratory should also be provided. Similarly, the name of the laboratory that was used must be included in the report of the sampling results. For samples collected and tested in the field for screening purposes by using field testing technology, the qualifications of the field technician must be documented in the work plan.

The target final field vacuum of any sample canister after 24 hours will be approximately -5 inches of mercury. Samples with a final field vacuum of greater than -10 inches of mercury, or equal to zero, will be flagged (usability of data will depend on sample volume and reporting limits that can be achieved).

DECISION MATRICES (FIGURES 1 AND 2)

The considerations in assigning a chemical to a matrix include the following:

- Human health risks, including such factors as a chemical's ability to cause cancer, reproductive, developmental, liver, kidney, nervous system, immune system or other effects, in animals and humans and the doses that may cause those effects;
- The data gaps in its toxicological database;
- Background concentrations of volatile chemicals in indoor air [Section 3.2.4]; and
- Analytical capabilities currently available.

To use the matrices accurately as a tool in the decision-making process, the following must be noted:

- The matrices are generic. As such, it may be necessary to modify recommended actions to accommodate building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or site-specific conditions (e.g., proximity of building to identified subsurface contamination) for the protection of public health. Additionally, actions more conservative than those specified within the matrix may be implemented at any time. For example, the decision to implement more conservative actions may be based on a comparison of the costs associated with resampling or monitoring to the costs associated with installation and monitoring of a mitigation system.

- Indoor air concentrations detected in samples collected from the building's basement or, if the building has a slab-on-grade foundation, from the building's lowest occupied living space should be used.

- Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude the need to investigate possible sources of vapor contamination, nor does it preclude the need to remediate contaminated soil vapors or the source of soil vapor contamination.

- When current exposures are attributed to sources other than vapor intrusion, the agencies must be provided 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 and to support assessment and follow-up by the agencies.

RECOMMENDED ACTIONS

Actions recommended in the matrix are based on the relationship between sub-slab vapor concentrations and corresponding indoor air concentrations. They are intended to address both potential and current human exposures and include the following:

- *No further action*
  When the volatile chemical is not detected in the indoor air sample and the concentration detected in the corresponding sub-slab vapor sample is not expected to substantially affect indoor air quality.

- *Take reasonable and practical actions to identify source(s) and reduce exposures*
  The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile chemical-containing products in places where people do not spend much time, such as a garage or shed).

- *Monitor*
  Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed to determine whether existing building conditions (e.g., positive pressure HVAC systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined on a site-specific and building specific basis, taking into account applicable environmental data and building operating conditions.

- *Mitigate*
  Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion. Methods to mitigate exposures related to soil vapor intrusion are described in Section 4 of the Guidance.

TIME OF YEAR

Sub-slab vapor samples and, unless there is an immediate need for sampling, indoor air samples are typically collected during the heating season because soil vapor intrusion is more likely to occur when a building's heating system is in operation and air is being drawn into

the building. In general, heating systems are expected to be operating routinely from November 15th to March 31st throughout the state. However, this timeframe may vary depending on factors, such as the location of the site (e.g., upstate versus downstate) and the weather conditions for a particular year.

A vapor intrusion investigation may also be conducted outside of the heating season. However, the results may not be used to rule out exposures. For example, results indicating "no further action" or "monitoring required" must be verified during the heating season to ensure these actions are protective during the heating season as well.

SAMPLING ROUNDS

Investigating a soil vapor intrusion pathway usually requires more than one round of subsurface vapor, indoor air, and/or outdoor air sampling, for reasons such as the following:

- To characterize the nature and extent of subsurface vapor contamination (similar to the delineation of groundwater contamination) and to address corresponding exposure concerns;

- To evaluate fluctuations in concentrations due to
  - Different weather conditions (e.g., seasonal effects),
  - Changes in building conditions (e.g., various operating conditions of a building's HVAC system),
  - Changes in source strength, or
  - Vapor migration or contaminant biodegradation processes (particularly when degradation products may be more toxic than the parent compounds); or
- To confirm sampling results or the effectiveness of mitigation or remedial systems.

Overall, successive rounds of sampling are conducted until the following questions can be answered:

- Are subsurface vapors contaminated? If so, what are the nature and extent of contamination? What is/are the source(s) of the contamination?
- What are the current and potential exposures to contaminated subsurface vapors?
- What actions, if any, are needed to prevent or mitigate exposures and to remediate subsurface vapor contamination?

Toward this end, multiple rounds of sampling may be required to characterize the nature and extent of subsurface vapor contamination such that

- Both potential and current exposures are adequately addressed;
- Measures can be designed to remediate subsurface vapor contamination, either directly (e.g., SVE system) or indirectly (e.g., soil excavation or groundwater remediation), given that monitoring and mitigation are considered temporary measures implemented to address exposures related to vapor intrusion until contaminated environmental media are remediated; and
- The effectiveness of remedial measures can be monitored and confirmed (e.g., endpoint sampling).

ATTACHMENTS

Figure 1 *Soil Vapor/Indoor Air Matrix 1*
Figure 2 *Soil Vapor/Indoor Air Matrix 2*
Figure 3 *Schematics of a permanent soil vapor probe and permanent nested soil vapor probes*
Figure 4 *Schematic of a sub-slab vapor probe*
Figure 5 *Schematics of tracer gas applications*

Air Canister Field Record

Indoor Air Quality Questionnaire and Building Inventory

REFERENCES

New York State Department of Health, *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, February 2005.

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

Office of Solid Waste and Emergency Response (OSWER). *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*. November 2002.

United States Environmental Protection Agency. *EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*. 1988

- Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). Pp. 15-1 through 15-62.

- Method TO-17, Determination of Volatile Organic Compounds in Ambient Air using Active Sampling on Sorbent Tubes. Pp. 17-1 through 17-49.

- Compendium of Methods for the Determination of Air Pollutants in Indoor Air, EPA/600/4-90-010.

FIGURE 1

Soil Vapor/Indoor Air Matrix 1
October 2006

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)			
	< 0.25	0.25 to < 1	1 to < 5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to < 50	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to < 250	9. MONITOR	10. MONITOR / MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

No further action:
Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub-slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures.

Take reasonable and practical actions to identify source(s) and reduce exposures:
The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile organic compound-containing products in places where people do not spend much time, such as a garage or outdoor shed). Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:
Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed 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 on a site-specific and building-specific basis, 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:
Mitigation is needed 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.

MONITOR / MITIGATE:
Monitoring or mitigation may be recommended after considering the magnitude of sub-slab vapor and indoor air concentrations along with building- and site-specific conditions.

See additional notes on page 2.

MATRIX 1 Page 1 of 2

ADDITIONAL NOTES FOR MATRIX 1

This matrix summarizes the minimum 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 building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, resampling 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. Additionally, actions more protective of public health than those specified within the matrix 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 is usually undertaken for reasons other than public health (e.g., seeking community acceptance, reducing excessive costs, etc.).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of vapor contamination, nor does it preclude remediating contaminated soil vapors 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 0.25 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples, a minimum reporting limit of 5 micrograms per cubic meter is recommended for buildings with full slab foundations, and 1 microgram per cubic meter for buildings with less than a full slab foundation.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur 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 may 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 the identified source of the volatile chemicals, the environmental remediation program, and site-specific and building-specific conditions. For example, to the extent that all site data and site conditions demonstrate that soil vapor intrusion is not occurring and that the potential for soil vapor intrusion to occur is not likely, the soil vapor intrusion investigation would be considered complete. In general, if indoor exposures represent a concern due to indoor sources, then the State will provide guidance to the property owner and/or tenant on ways to reduce their exposure. If indoor exposures represent a concern due to outdoor sources, then the NYSDEC will decide who is responsible for further investigation and any necessary remediation. Depending upon the outdoor source, this responsibility may or may not fall upon the party conducting the soil vapor intrusion investigation.

MATRIX 1 Page 2 of 2

FIGURE 2

Soil Vapor/Indoor Air Matrix 2

October 2006

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)			
	< 3	3 to < 30	30 to < 100	100 and above
< 100	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
100 to < 1,000	5. MONITOR	6. MONITOR / MITIGATE	7. MITIGATE	8. MITIGATE
1,000 and above	9. MITIGATE	10. MITIGATE	11. MITIGATE	12. MITIGATE

No further action:
Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub-slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures.

Take reasonable and practical actions to identify source(s) and reduce exposures:
The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile organic compound-containing products in places where people do not spend much time, such as a garage or outdoor shed). Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:
Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed 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 on a site-specific and building-specific basis, 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:
Mitigation is needed 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.

MONITOR / MITIGATE:
Monitoring or mitigation may be recommended after considering the magnitude of sub-slab vapor and indoor air concentrations along with building- and site-specific conditions.

See additional notes on page 2.

MATRIX 2 Page 1 of 2

ADDITIONAL NOTES FOR MATRIX 2

This matrix summarizes the minimum 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 building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, resampling 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. Additionally, actions more protective of public health than those specified within the matrix 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 is usually undertaken for reasons other than public health (e.g., seeking community acceptance, reducing excessive costs, etc.).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of vapor contamination, nor does it preclude remediating contaminated soil vapors 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 3 micrograms per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples, a minimum reporting limit of 5 micrograms per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur 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 may 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 the identified source of the volatile chemicals, the environmental remediation program, and site-specific and building-specific conditions. For example, to the extent that all site data and site conditions demonstrate that soil vapor intrusion is not occurring and that the potential for soil vapor intrusion to occur is not likely, the soil vapor intrusion investigation would be considered complete. In general, if indoor exposures represent a concern due to indoor sources, then the State will provide guidance to the property owner and/or tenant on ways to reduce their exposure. If indoor exposures represent a concern due to outdoor sources, then the NYSDEC will decide who is responsible for further investigation and any necessary remediation. Depending upon the outdoor source, this responsibility may or may not fall upon the party conducting the soil vapor intrusion investigation.

MATRIX 2 Page 2 of 2

FIGURE 3

Schematics of a permanent soil vapor probe and permanent nested soil vapor probes

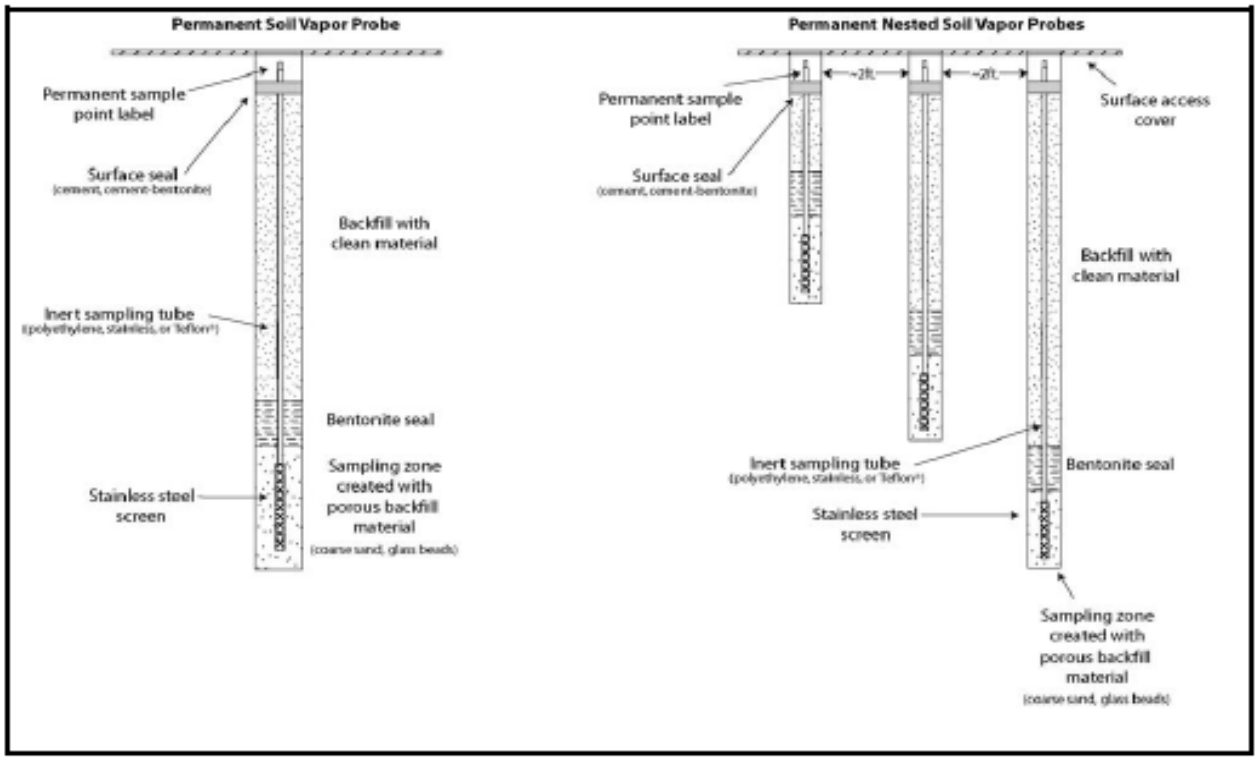
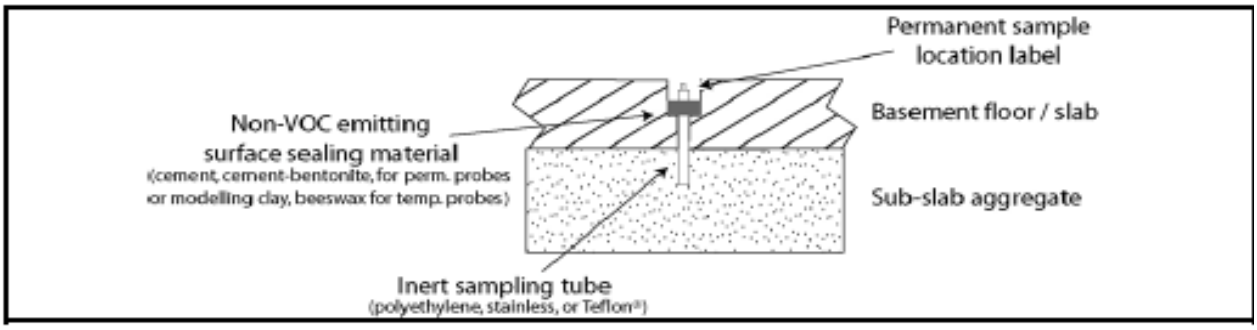


FIGURE 4

Schematic of a sub-slab vapor probe



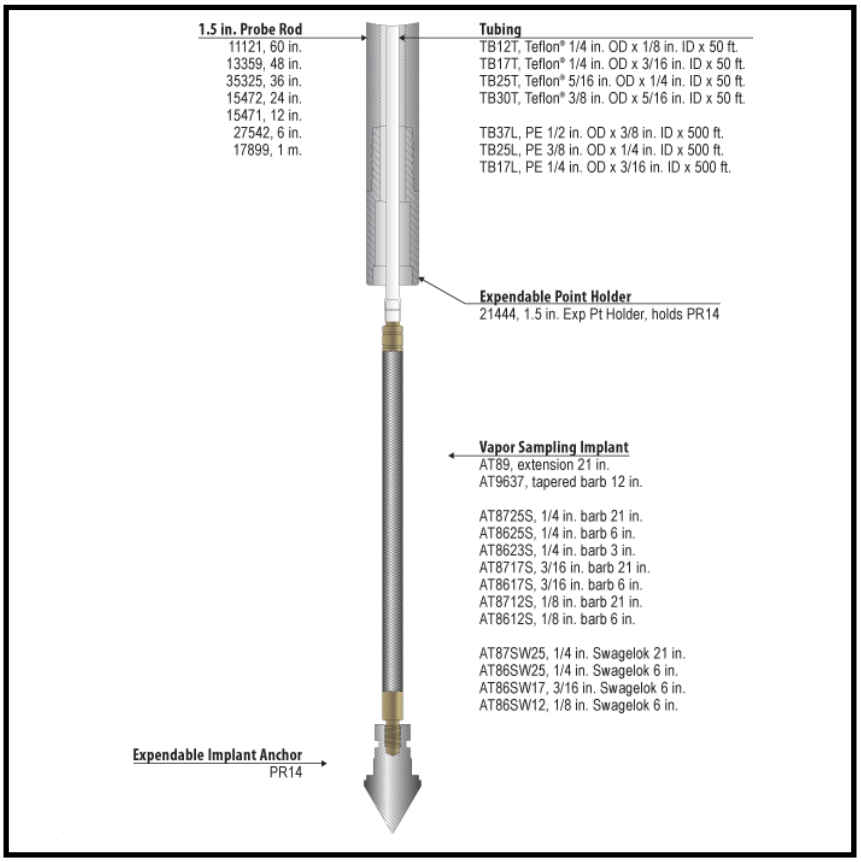
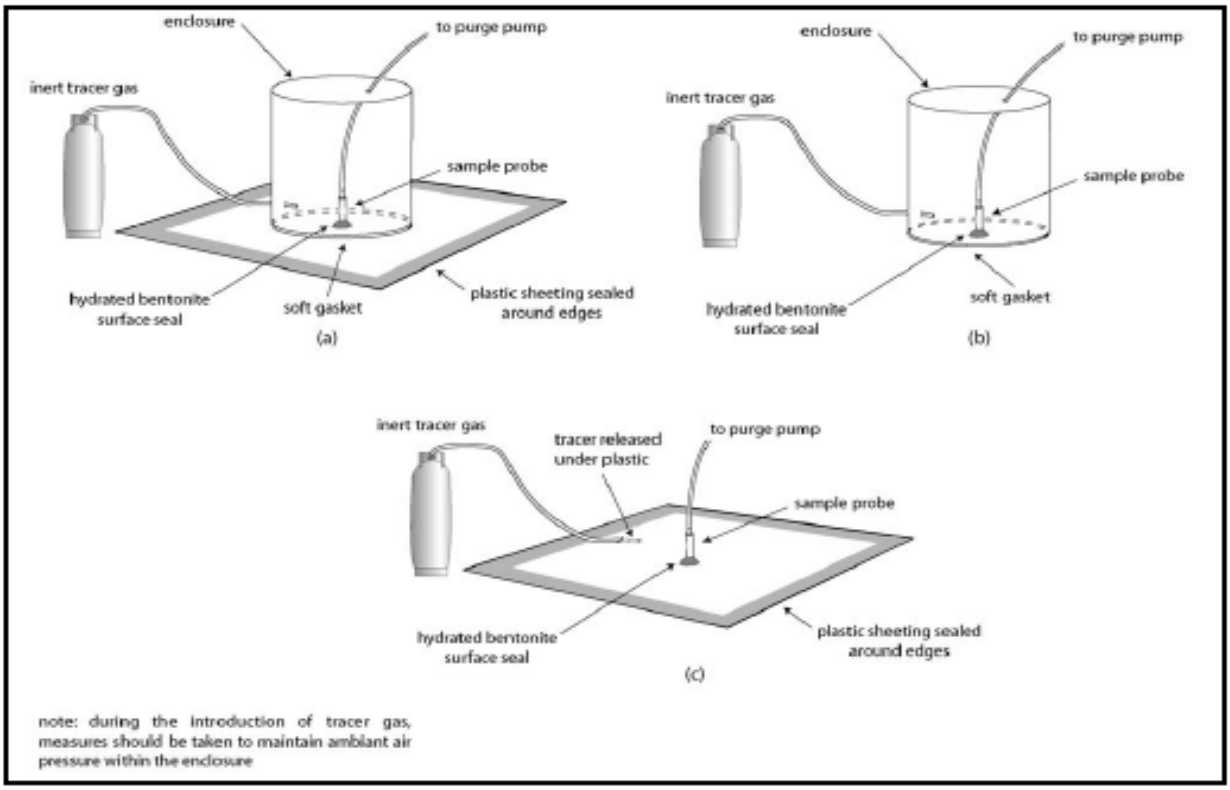


FIGURE 5

Schematics of tracer gas applications



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

AIR CANISTER FIELD RECORD

PROJECT INFORMATION:

Project:
Job No:
Location:
Field Staff:
Client:

SAMPLE I.D.:

Size of Canister:
Canister Serial No.:
Flow Controller No.:
Sample Date(s):
Shipping Date:
Sample Type: ☐ Indoor Air ☐ Outdoor Air
☐ Subslab, complete section below ☐ Soil Gas
Soil Gas Probe Depth:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:
Ambient Air Temp. - P.M.:
Wind Direction:
Wind Speed:
Precipitation:

FIELD SAMPLING INFORMATION:

READING	TIME	VACUUM (inches Hg) or PRESSURE (psig)	DATE	INITIALS
Lab Vacuum (on tag)				
Field Vacuum Check [1]				
Initial Field Vacuum [2]				
Final Field Vacuum [3]				
Duration of Sample Collection				

LABORATORY CANISTER PRESSURIZATION:

Initial Vacuum (inches Hg and psia)		
Final Pressure (psia)		
Pressurization Gas		

SUBSLAB SHROUD:

Shroud Helium Concentration:
Calculated tubing volume: x 3 =
Purged Tubing Volume Concentration:
Is the purged volume concentration less than or equal to 10% in shroud?
☐ YES, continue sampling
☐ NO, improve surface seal and retest

COMPOSITE TIME (hours)	FLOW RATE RANGE (ml/min)
15 Min.	316 - 333
0.5 Hours	158 - 166.7
1	79.2 - 83.3
2	39.6 - 41.7
4	19.8 - 20.8
6	13.2 - 13.9
8	9.9 - 10.4
10	7.92 - 8.3
12	6.6 - 6.9
24	3.5 - 4.0

NOTES:

1 Vacuum measured using portable vacuum gauge (provided by Lab)
2 Vacuum measured by canister gauge upon opening valve
3 Vacuum measured by canister gauge prior to closing valve

Signed:

SOIL VAPOR SAMPLE COLLECTION PROCEDURE

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

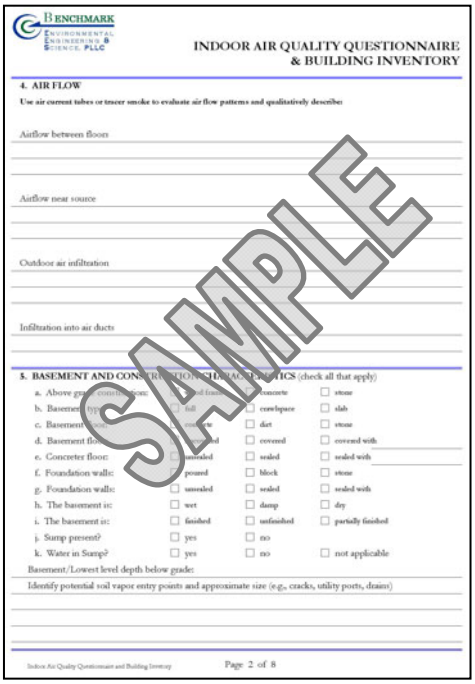
Project Name: Project No.
Project Location: Client:
Preparer's Name: Date/Time:
Preparer's Affiliation: Phone No:
Purpose of Investigation:

1. OCCUPANT:
Interviewed: yes no
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: yes no
Last Name:
Address:
County:
Home Phone:

3. BUILDING CHARACTERISTICS
Type of Building: (check appropriate response)
☐ Residential ☐ Commercial/Multi-use
☐ Industrial ☐ Other:
If the property is residential: (check appropriate response)
☐ 1-Family ☐ 3-Family
☐ Raised Ranch ☐ Split Level ☐ Colonial
☐ Cape ☐ Contemporary ☐ Mobile Home
☐ Duplex ☐ Apartment House ☐ Townhouse/Condo
☐ 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)? yes no If yes, how many?
Other Characteristics:
Number of floors Building age
Is the building insulated? yes no How air tight? tight average not tight

Indoor Air Quality Questionnaire and Building Inventory Page 1 of 8



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

4. AIR FLOW
Use air current tubes or tracer smoke to evaluate air flow patterns and qualitatively describe:

Airflow between floors

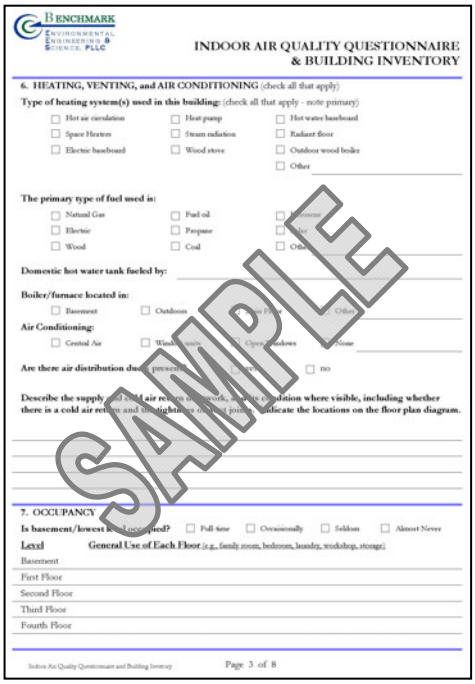
Airflow near source

Outdoor air infiltration

Infiltration into air ducts

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (check all that apply)
a. Above grade construction: ☐ wood ☐ concrete ☐ stone
b. Basement type: ☐ full ☐ crawlspace ☐ slab
c. Basement walls: ☐ poured ☐ dirt ☐ stone
d. Basement floor: ☐ concrete ☐ covered ☐ covered with
e. Concrete floor: ☐ unsealed ☐ sealed ☐ sealed with
f. Foundation walls: ☐ poured ☐ block ☐ stone
g. Foundation walls: ☐ unsealed ☐ sealed ☐ sealed with
h. The basement is: ☐ wet ☐ damp ☐ dry
i. The basement is: ☐ finished ☐ unfinished ☐ partially finished
j. Sump present? ☐ yes ☐ no
k. Water in Sump? ☐ yes ☐ no ☐ not applicable
Basement/Lowest level depth below grade:
Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Indoor Air Quality Questionnaire and Building Inventory Page 2 of 8



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

6. HEATING, VENTING, and AIR CONDITIONING (check all that apply)
Type of heating system(s) used in this building: (check 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 ☐ Other
☐ Wood ☐ Coal ☐ Other

Domestic hot water tank fueled by:

Boiler/furnace located in:
☐ Basement ☐ Outdoors ☐ Other

Air Conditioning:
☐ Central Air ☐ Window units ☐ Open Windows ☐ None

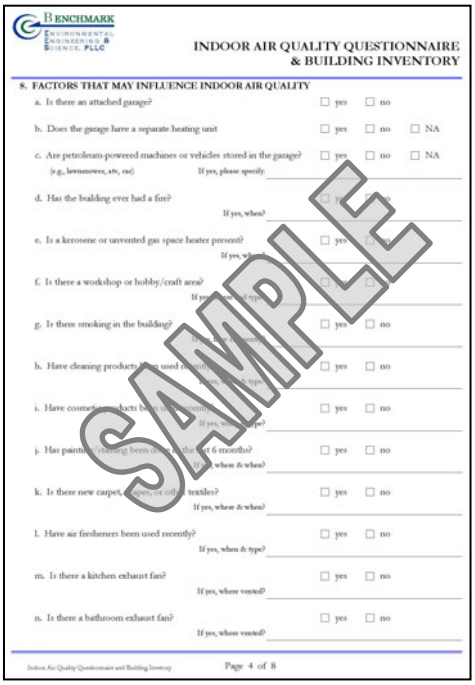
Are there air distribution ducts present? ☐ yes ☐ no

Describe the supply and return air registers, wood or 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., family room, bedroom, laundry, workshop, storage)
Basement	
First Floor	
Second Floor	
Third Floor	
Fourth Floor	

Indoor Air Quality Questionnaire and Building Inventory Page 3 of 8

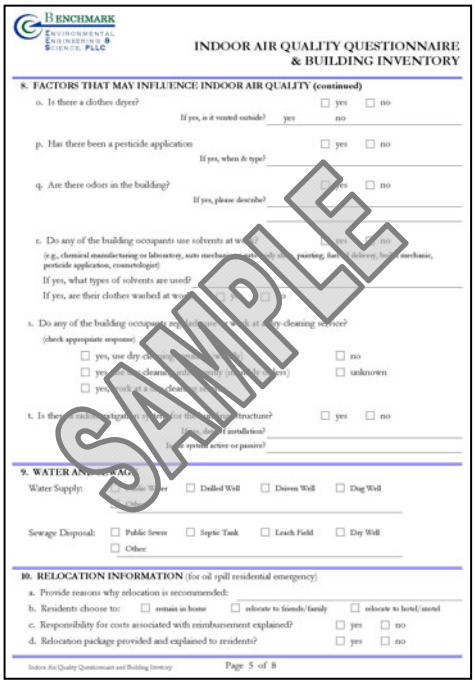


BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY
a. Is there an attached garage? ☐ yes ☐ no
b. Does the garage have a separate heating unit ☐ yes ☐ no ☐ NA
c. Are petroleum-powered machines or vehicles stored in the garage? ☐ yes ☐ no ☐ NA
(e.g., lawnmower, atv, car) If yes, please specify:
d. Has the building ever had a fire? ☐ yes ☐ no
If yes, when?
e. Is a kerosene or unvented gas space heater present? ☐ yes ☐ no
If yes, where?
f. Is there a workshop or hobby/craft area? ☐ yes ☐ no
If yes, please describe type:
g. Is there smoking in the building? ☐ yes ☐ no
If yes, please describe:
h. Have cleaning products been used recently? ☐ yes ☐ no
If yes, when & type?
i. Have cosmetic products been used recently? ☐ yes ☐ no
If yes, when & type?
j. Has painting/staining been done in the last 6 months? ☐ yes ☐ no
If yes, what & when?
k. Is there new carpet, drapes, or other textiles? ☐ yes ☐ no
If yes, when & where?
l. Have air fresheners been used recently? ☐ yes ☐ no
If yes, when & type?
m. Is there a kitchen exhaust fan? ☐ yes ☐ no
If yes, where vented?
n. Is there a bathroom exhaust fan? ☐ yes ☐ no
If yes, where vented?

Indoor Air Quality Questionnaire and Building Inventory Page 4 of 8


BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY (continued)

o. Is there a clothes dryer? ☐ yes ☐ no
If yes, is it vented outside? yes no

p. Has there been a pesticide application ☐ yes ☐ no
If yes, when & type?

q. Are there odors in the building? ☐ yes ☐ no
If yes, please describe)

r. Do any of the building occupants use solvents at w ☐ yes ☐ no
(e.g., chemical manufacturing or laboratory, auto mechanic painting, fuel delivery, boiler mechanic, pesticide application, cosmetologist)
If yes, what types of solvents are used?
If yes, are their clothes washed at wo

s. Do any of the building occupants re ork at a dry-cleaning service?
(check appropriate response)
☐ yes, use dry-c ☐ no
☐ ye leaning ☐ unknown
☐ ye ork at a dry-cleaning

t. Is there tacle ructure? ☐ yes ☐ no
installation?
system active or passive?

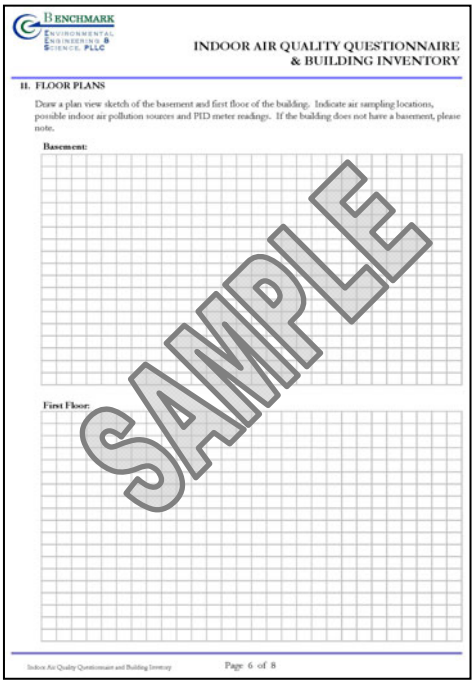
9. WATER AND SEWAGE
Water Supply: ☐ Drilled Well ☐ Dug Well

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? ☐ yes ☐ no
d. Relocation package provided and explained to residents? ☐ yes ☐ no

Indoor Air Quality Questionnaire and Building Inventory Page 5 of 8

SAMPLE


BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

11. FLOOR PLANS

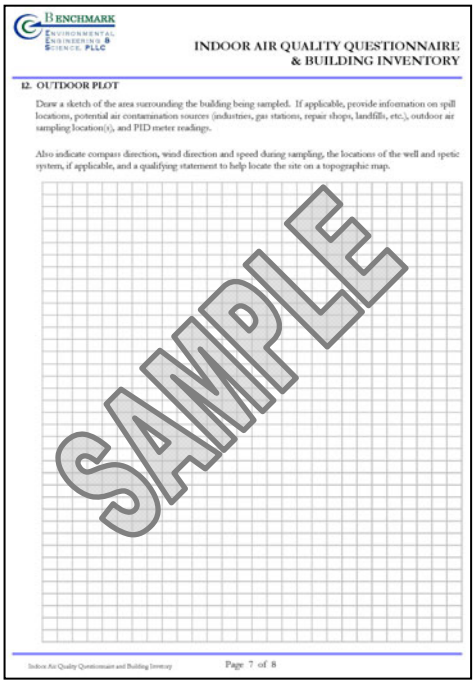
Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:

First Floor:

Indoor Air Quality Questionnaire and Building Inventory Page 6 of 8

SAMPLE


BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

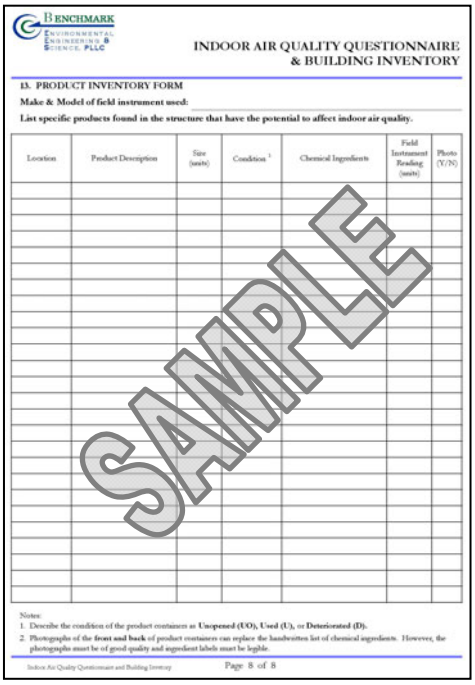
12. OUTDOOR PLOT

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 spetic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

Indoor Air Quality Questionnaire and Building Inventory Page 7 of 8

SAMPLE


BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INDOOR AIR QUALITY QUESTIONNAIRE & BUILDING INVENTORY

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used:

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

Location	Product Description	Size (units)	Condition [1]	Chemical Ingredients	Field Instrument Reading (units)	Photo (Y/N)

Notes:
1. Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D).**
2. 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.

Indoor Air Quality Questionnaire and Building Inventory Page 8 of 8

SAMPLE

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

Active Subslab Depressurization Pre-Design Testing Procedure

FOP 083.0

ACTIVE SUBSLAB DEPRESSURIZATION PRE-DESIGN TESTING PROCEDURE

BACKGROUND

The New York State Department of Health (NYSDOH) has published a draft document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York." (www.health.state.ny.us/nysdoh/gas/svi_guidance/). As of February 2005, this document has been guiding NYSDOH and New York State Department of Environmental Conservation (NYSDEC) decisions concerning the need for subslab vapor mitigation at sites undergoing investigation, cleanup and monitoring under formal NY Sate remedial programs (e.g., Brownfield Cleanup Program sites, Inactive Hazardous Waste Site Remediation Program sites, etc.).

PURPOSE

This guideline presents a general description of the method for determining the number of extraction points, location and placement of these points, and the desirable sub-slab capture configuration. Extraction points are used to depressurize the subsoil in order to capture sub-slab vapors from the underlying sub-soil. This information can be used in evaluating the effectiveness of the final sub-slab depressurization and vapor capture designs.

BUILDING PREPARATION

Prior to performing the pre-design testing procedure, the building's slab should be inspected for any cracks or deformations that may compromise the sub-slab vacuum seal. A pre-testing inspection should be performed for each test location. The inspection should evaluate the type of structure, floor layout, airflows and physical conditions of the building(s) being studied.

FOP 083.0

ACTIVE SUBSLAB DEPRESSURIZATION PRE-DESIGN TESTING PROCEDURE

PROCEDURE

1. Perform a building inspection. Seal any foundation/slab cracks, utility penetrations, and other openings that may serve as a vacuum break during the testing procedure. Turn off any equipment that may affect pressure gradients within the testing area.

2. Identify a minimum of one (1) location for the placement of simulated vacuum extraction point (TEST).

3. From the center of each TEST location, use a 100-foot tape and piece of chalk to draw concentric circled/arcs at distances of 5, 10, 15, 20, 30, 40, and 50 feet (measurement points (MP)).

4. Drill a 5 inch slab core at the TEST location. Remove as much sub-slab bedding material at the TEST location through the core hole as possible, optimally one cubic foot.

5. Insert vacuum inducing testing apparatus into 5 inch core hole at the TEST location, ensuring proper sealing.

6. Drill ¾ inch holes at each measurement point (MP) at the marked distances from the center TEST location. Pack modeling in each measurement point floor penetration.

7. Initiate simulated vacuum at the extraction point/ TEST location.

8. With all other negative pressure reading locations remaining sealed, remove the modeling clay from the each MP individually, and record the resultant.

9. Reseal the 10 foot reading location with modeling clay and repeat the pressure reading at each subsequent negative pressure reading location. Ensure that all locations not being read are sealed with modeling clay.

10. Record all pertinent field data in the Project Field Book.

11. Reseal all floor penetrations.

FOP 083.0

ACTIVE SUBSLAB DEPRESSURIZATION PRE-DESIGN TESTING PROCEDURE

REQUIRED EQUIPMENT

- Personal protective equipment (PPE) (if applicable)
- 100 foot tape measure
- Chalk
- 4 ½ inch Husqvarna core drill
- ¾ inch Hilti hammer drill
- Sufficient modeling clay
- Concrete sealant
- Vacuum inducing apparatus (patent pending)
- Micro-manometer
- Camera
- Cell phone
- Field forms
- Project Field Book

REFERENCES

New York State Department of Health, *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, February 2005.

APPENDIX G

SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**