## Walia, Jaspal (DEC)

**From:** Joe Fiacco <Joe.Fiacco@erm.com>
**Sent:** Thursday, December 27, 2018 1:44 PM
**To:** Walia, Jaspal (DEC); Doroski, Melissa A (HEALTH)
**Cc:** Evanoff, Stephen; Michael Nigro; Alice Sandzen
**Subject:** Residential Vapor Intrusion Work Plan - Leica Site in Cheektowaga
**Attachments:** Cheektowaga VI Eval Work Plan_27-Dec-2018.pdf; 3_ERM SOP for Sub-Slab Sampling.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

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Jaspal and Melissa,
Attached is the Residential Vapor Intrusion Work Plan for the Leica site in Cheektowaga. This Work Plan was prepared in response to your request for a residential vapor intrusion assessment made during our meeting at the site on September 18th. We plan to complete the residential sampling during the current heating season, pending access approval from homeowners.

Melissa, as was discussed with Alice Sandzen of ERM, we have attached ERM's Standard Operating Procedure for sub-slab soil vapor sampling. The vacuum shut in test method referenced in the Work Plan is described in more detail on page 3 of this SOP. ERM would like to schedule an in-person meeting to review the Work Plan with you in more detail. Please advise on possible meeting dates in January that would work with your schedule.

Jaspal, we are envisioning traveling to Albany to meet with Melissa in person, as it is our understanding that she will be the lead technical person for the residential vapor intrusion assessment. We are hopeful that you will be able to participate either in person or via WebEx.

We look forward to discussing the Work Plan with you in more detail.
Joe

Joe Fiacco

Senior Partner

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27 December 2018

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

Reference: 0484448

Subject:

***Work Plan for Residential Vapor Intrusion Evaluation***
Former Leica, Inc. Facility
Town of Cheektowaga
Erie County, New York
Inactive Hazardous Waste Disposal Site
No. 915156

Dear Mr. Jaspal Walia,

At the request of the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), ERM Consulting and Engineering, Inc. (ERM) has prepared this Work Plan for Residential Vapor Intrusion (VI) Evaluation on behalf of Leica Microsystems (Leica, Inc.). The Work Plan is to support an assessment of the potential for off-Site VI adjacent to the former Leica, Inc. facility at 203 Eggert Road in the Town of Cheektowaga, Erie County, New York (the Site; Figure 1).

This VI Work Plan includes sampling of soil vapor, sub-slab soil vapor, indoor air, outdoor ambient air, and water that may be present within sumps to evaluate the potential for VI of Site-related contaminants into nearby residential structures. ERM intends to conduct the residential VI investigation during the current heating season (i.e., between November 2018 and March 2019).

## 1 Groundwater Conditions and Prior VI Evaluations

Previous environmental investigations have shown that volatile organic compounds (VOCs) of potential concern are present in the southeastern portion of the Site, sometimes referred to as Area C. Available data indicate that the primary VOCs of potential concern in this area are trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC). A groundwater pumping system, installed in MW-11A (Figure 2), provides hydraulic control of the groundwater plume. Within the off-Site portion of the plume, groundwater data collected in 2017 suggest a noticeable decrease in VOC concentrations in MW-26A, with non-detectable concentrations in MW-25/25A, MW-26, MW-27/27A, MW-28A, and MW-29/29A (Figure 2). At MW-28 (Figure 2), cDCE and VC were detected at concentrations of 8 to 12 µg/L and 5.9 to 12 µg/L, respectively, consistent with historical concentrations in this well. The 2017 groundwater sampling results are summarized in the Annual Status Report for 2017 (Energy Solutions 2018).



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In March 2009, VI evaluations were performed in residential structures located southeast of, and adjacent to, the Site at 30 & 34 Rowan Road (Figure 2; Energy Solutions 2009). Between February and April 2010, additional VI evaluations were performed further to the southeast at 130 & 134 Preston Road (Figure 2; Energy Solutions 2010). Prior VI evaluations were performed in accordance with work plans approved by NYSDEC. Data collected from indoor air, ambient air, and sub-slab vapor samples were compared to the NYSDOH 2006 guidance and decision matrices; no further action was required at these properties.

## 2 VI Evaluation Field Work

This VI evaluation is designed to determine if VOCs of potential concern are present in soil gas along the southern Site boundary and to evaluate the potential for VI in up to 15 residential structures (Figure 2). Soil vapor and outdoor air samples will be collected along the southern Site boundary; sub-slab soil vapor, indoor air, outdoor air, and sump-water samples will be collected at up to 15 properties (pending access agreements) near MW-28.

The residential structures at 130 and 134 Preston Road were previously evaluated for VI in 2010 (Energy Solutions 2010). At that time, VOC concentrations in groundwater in MW-26 and MW-26A, which are located in close proximity to these properties, were higher than at present (Figure 2). Given that no further action was required following the 2010 VI evaluation and VOC concentrations have subsequently decreased in nearby groundwater, no further evaluation of the potential for VI at 130 and 134 Preston Road is proposed at this time.

The field work described in this Work Plan has been designed in accordance with applicable guidance from the NYSDOH (2006). Field data and relevant observations will be recorded in a bound, dedicated field notebook, on appropriate sampling forms, and/or with color photographs.

Final sample locations will be measured using global positioning system (GPS) equipment.

### *2.1 Pre-Sampling Inspection and Preparations*

#### 2.1.1 Access Agreements

Prior to initiating sampling, ERM, in consultation with NYSDEC and the NYSDOH, will contact property owners and/or occupants to obtain access to their properties, if possible. Access will be confirmed prior to the start of sampling through the use of an access agreement signed by both Danaher and the property owner.

ERM will provide NYSDEC and NYSDOH with at least five business days prior notice before mobilizing to the property to conduct sampling, absent an agreement otherwise with NYSDEC and NYSDOH.

#### 2.1.2 Pre-Sampling Building Inspection

Prior to conducting VI sampling, a pre-sampling building inspection will be performed to assess building construction, the presence of a basement or crawl space, and inventory products or chemicals used and/or stored on the property, consistent with the NYSDOH's VI guidance (NYSDOH 2006). During the inspection, ERM will complete a NYSDOH VI building questionnaire. For multi-family residences, each portion of the building will be evaluated and sampled separately. ERM will evaluate and identify appropriate and accessible sampling locations for both indoor air samples and

co-located sub-slab vapor samples. This initial building survey will be used to determine property-specific conditions that may affect the design and/or results of the sampling program. Preliminary information regarding building condition and contents will be used to specify equipment needs for soil vapor sampling and to begin identification of possible background factors that could influence assessment activities.

#### 2.1.3 Subsurface Utility Evaluation

A private utility location contractor will scan, identify, locate, and mark potential subsurface utilities in the vicinity of all subsurface sampling locations. To the extent practicable, soil gas samples will be collected at least 10 feet away from underground utilities and indoor air samples will be collected in areas not subject to drafts from overhead heating, ventilation, or air conditioning equipment.

ERM or subcontractor will contact Dig Safely New York prior to conducting intrusive activities to comply with local regulations.

### *2.2 Sample Collection*

The following environmental and building factors that may affect VI will be evaluated during sample collection:

- Soil conditions (color, texture, composition, moisture)
- Surface confining conditions (frost, pavement, etc.)
- Underground conduits/basement penetrations
- Weather conditions
- Operation of heating, ventilation, and air conditioning equipment
- Foundation type
- Foundation integrity
- Presence of a sump
- Differential pressure

Co-located and concurrent sub-slab vapor and indoor air samples will be collected from the lowest level of the building over a 24-hour sampling period, as described below.

#### 2.2.1 On-Site Soil Vapor Sampling

ERM will collect four on-Site soil vapor samples at the locations shown on Figure 2. The actual location of these samples is approximate and subject to modification in the field based on subsurface utility locations and approval from Site personnel.

An ERM geologist or subcontractor will advance a 4-inch diameter borehole to a depth of up to 3 feet below ground surface (bgs) using a hand auger. Soil vapor samples will be collected a minimum of 1 foot above groundwater. If the groundwater table is shallower than 2 feet, then a soil vapor sample will not be collected. A 6-inch soil vapor probe (sampling screen) attached to dedicated Nylaflow® tubing will be lowered into the open borehole and positioned at the bottom of each borehole. The borehole will be backfilled with clean, coarse sand or glass beads to a minimum of 6 inches above the soil vapor probe. The remainder of the annular space, above the sand pack to the ground surface, will be filled with granular bentonite and immediately hydrated using potable water. A

minimum period of 24 hours will be allowed to pass before the samples are collected, to allow for bentonite hydration.

Prior to collection of each soil vapor sample, a minimum of three volumes will be purged from the probe and tubing using a syringe or vacuum pump at a rate not exceeding 0.2 liters per minute. The evacuated vapor will be discharged into a Tedlar® bag to not adversely impact indoor air. A calibrated photoionization detector (PID) fitted with an 11.7 electron volt (eV) lamp will be used to screen soil vapor for VOCs through either the probe tubing or Tedlar bag. A leak check will be conducted to evaluate if the surface seal is adequate (see Section 2.2.4).

Soil vapor samples will be collected in laboratory-provided 2.7-liter or 6-liter SUMMA® canisters with a calibrated flow controller. SUMMA® canisters will be batch certified clean by the project laboratory. The SUMMA® canisters will be connected to the dedicated sample tubing with a Swagelok®-type fitting. The SUMMA® canisters will be retrieved approximately 24 hours after initiation of sample collection.

The vacuum on the SUMMA® canister flow controller will be recorded at the start and completion of the sampling period. Following the sampling event, the canister's valve will be closed and the Swagelok®-type nut will be placed over the inlet and secured. The vacuum will be recorded on the chain of custody to demonstrate that the seal on the canister is not compromised during transit.

After the samples are collected, the sample tubing will be pulled from the boreholes and the borehole will be backfilled with topsoil to the ground surface.

### 2.2.2 Off-Site Sub-Slab Sampling in Buildings with a Concrete Floor Slab

Off-Site sub-slab sampling will occur concurrently with off-Site indoor air sampling activities as described in Section 2.2.5. An electric hammer drill will be used at each sub-slab sampling location to drill a 1.5-inch diameter hole approximately 1.75 inches into the concrete slab to install a drilling guide and secure cover. The borehole will be further advanced using a 5/8-inch drill bit to approximately 1 inch beneath the base of the slab to create adequate space for collecting a vapor sample. A stainless-steel vapor pin® will be installed into the borehole and sealed with a silicone sheath. A minimum period of 2 hours will be allowed to pass before the samples are collected, to allow for re-equilibration with the surrounding soil.

Prior to collecting sub-slab soil vapor samples, a length of dedicated Nylaflow® tubing will be connected to the vapor pin® tip for connection to the canister. A minimum of three volumes will be purged from the probe and tubing using a syringe or vacuum pump at a rate not exceeding 0.2 liters per minute. A calibrated PID fitted with an 11.7 eV lamp will be used to screen the soil beneath the slab for VOCs through either the vapor pin tubing or Tedlar® bag. A leak check will be conducted to assess the integrity of the vapor pin® seals (see Section 2.2.4).

Sub-slab soil vapor samples will be collected in laboratory-provided 2.7-liter or 6-liter SUMMA® canisters with a calibrated flow controller. SUMMA® canisters will be batch certified clean by the project laboratory. The SUMMA® canisters will be connected to the dedicated sample tubing with a Swagelok®-type fitting. The SUMMA® canisters will be retrieved approximately 24 hours after initiation of sample collection.

The vacuum on the SUMMA® canister flow controller will be recorded at the start and completion of the sampling period. Following the sampling event, the canister's valve will be closed and the Swagelok®-type nut will be placed over the inlet and secured. The vacuum will be recorded on the chain of custody to demonstrate that the seal on the canister is not compromised during transit. The vapor pins will be left in place until such time that the NYSDEC determines that no additional sampling is required. A flush-mounted stainless steel cover will be placed over the vapor pin® in the interim. After that determination has been made, ERM will coordinate with the property owner or occupant to remove the vapor pins from the concrete slab and seal the boreholes with a non-shrinking concrete grout or epoxy, flush with the pre-existing surface.

Differential pressure readings will be collected after the completion of soil gas sampling. The purpose of the differential pressure testing is to evaluate if the building is negatively or positively pressurized or neutral compared to the subsurface. Using a digital micromanometer (capable of reading to at least 0.001 inches water column (in. wc), differential pressure will be measured at each soil gas sampling location. Differential pressure will be recorded at each sampling location. Readings will be collected following approximately 1 minute of equilibration. If there is reading variability, the maximum readings will be recorded.

### 2.2.3 Off-Site Soil Vapor Sampling in Buildings with an Earthen Floor

If a building does not have a concrete slab (e.g., a crawl space instead of a concrete basement or a basement with an earthen floor), ERM will collect soil vapor samples, if possible. Soil vapor samples will be collected at a depth of approximately 3 feet bgs and a minimum of 1 foot above groundwater. If the groundwater table is shallower than 2 feet, then a soil vapor sample will not be collected. Stainless steel rods or an electric hammer drill will be advanced to the sampling depth. A 6-inch soil vapor probe (sampling screen) attached to dedicated Nylaflow® tubing will be lowered into the open borehole and positioned at the bottom of each borehole. The borehole will be backfilled with clean, coarse sand or glass beads to a minimum of 6 inches above the soil vapor probe. The remainder of the annular space, above the sand pack to the ground surface, will be filled with granular bentonite and immediately hydrated using potable water. A minimum period of 24 hours will be allowed to pass before the samples are collected, to allow for bentonite hydration.

In the case of structures with a crawlspace, air samples may be collected in lieu of soil gas samples if the crawlspace is inaccessible for soil gas sample point installation. Crawlspace sampling will follow the same methods for indoor air sample collection, as discussed in Section 2.2.6. If the crawlspace air canister cannot be placed far enough into the crawlspace to enable collection of a representative sample, then Teflon® or Teflon®-lined tubing may be used to help extend the sampling point into the crawlspace.

The purging volumes, collection procedures, and SUMMA® canister handling will be conducted using the same methodology described in Section 2.2.1 above.

The soil vapor probe will be left in place until such time that the NYSDEC determines that no additional sampling is required. A flush-mounted stainless steel cover or safety cone will be placed over the soil vapor probe in the interim. After that determination has been made, ERM will coordinate with the property owner or occupant to remove the sample tubing from the boreholes and the borehole will be backfilled with topsoil to the ground surface.

### 2.2.4 Leak Check and Shut-In Test

To demonstrate that representative soil vapor samples are being collected (Sections 2.2.1 through 2.2.3), quality control testing will be conducted. Two tests will be performed with the first demonstrating that the surface seal is intact and prevents short circuiting of indoor air downward into the sampling point, and the second demonstrating that the sampling train from the soil vapor sampling point to the sampling canister does not leak.

For sub-slab vapor pins®, an initial leak check is performed by placing a dam (a polyvinyl chloride [PVC] coupling or similar) around the point and filling it with spring water. The water will be monitored for 5 minutes to check for leaks in the seal between the concrete floor and the vapor pin®. If leaks are observed based on water draining inside the water dam, the sampling point will be extracted and reset. If necessary the point will be moved to a new location. The leak check will be repeated until the seal is determined to be adequate.

For all installations, either a leak check will be performed via a helium test, or pending NYSDOH approval, a vacuum shut-in test will be performed in lieu of the helium test.

If a leak check is performed via a helium test, the procedure will be as follows:

- A plastic shroud will be placed over the sample point with the tubing directed outside the shroud;
- The shroud will be filled with helium to a minimum of approximately 10 percent helium gas content, as measured by a field helium meter (Dielectric MGD-2002 or similar);
- Soil vapor will be purged from the point using a syringe or vacuum pump and discharged into a tedlar bag;
- The soil vapor within the Tedlar® bag will be measured for helium using a field helium meter;
- If helium is detected at a concentration less than or equal to 5 percent of the minimum concentration measured in the shroud, then the soil vapor point passes the helium leak test.

Pending approval, a vacuum shut-in test may be performed instead of the helium test to demonstrate that the sampling train (i.e., Nylaflow® tubing connecting the sampling port to the SUMMA® canister) does not leak. A shut-in test will be performed by generating a vacuum inside the sample tubing while keeping the sampling port and the SUMMA® canister closed. A vacuum of approximately 10 in wc will be generated using a plastic syringe. The vacuum will be monitored using the vacuum gauge on the flow controller or a separate in-line gauge, as applicable, for 1 minute. If vacuum is maintained, then the sampling train is deemed adequate and sampling can begin. If vacuum is lost, then tubing connections will be tightened or altered and the shut-in test will be repeated until the vacuum is maintained. After the shut-in test is completed, the sampling train should not be altered or moved. Laboratory-specific procedures should be followed for the shut-in test (also known as a vacuum leak check by some laboratories) to accommodate any lab-specific flow controller configurations.

### 2.2.5 Off-Site Sump Sampling

In residential basements where sumps are present, a sample of sump water will be collected following completion of sub-slab and indoor air sampling. Sump-water samples will be collected in laboratory-supplied containers and transported under chain of custody to a state-certified laboratory

for analysis of VOCs. The sump samples will be collected using either a peristaltic pump and polyethylene tubing or will be collected directly from the sump into laboratory-supplied containers.

### 2.2.6 Off-Site Indoor Air Sampling

Indoor air samples will be collected from the basement of each residential structure in close proximity to the sub-slab vapor sampling location. Indoor air samples will be collected over the same 24 hour period as the soil vapor samples. If a basement is not present, an indoor air sample will be collected from the first floor within the residential structure in close proximity to the soil vapor sampling location.

Each indoor-air sample will be collected in a laboratory-provided 2.7-liter or 6-liter SUMMA® canister with a calibrated flow controller. SUMMA® canisters used for collecting indoor air samples will be batch certified clean by the project laboratory. Indoor air samples will be collected with the sample inlet of the canister positioned approximately 3 to 5 feet above the floor surface, to represent the "breathing zone." SUMMA® canisters will be retrieved approximately 24 hours after initiation of sample collection. A calibrated PID fitted with an 11.7 eV lamp will be used to screen for VOCs at each sample location.

The vacuum on the SUMMA® canister flow controller will be recorded at the start and completion of the sampling period. Following the sampling event, the canister's valve will be closed and the Swagelok®-type nut will be placed over the inlet and secured. The vacuum will be recorded on the chain of custody to demonstrate that the seal on the canister is not compromised during transit.

### 2.2.7 On- and Off-Site Outdoor Ambient Air Sampling

Outdoor ambient air samples will be collected over the same 24-hour period from a location upwind of the soil vapor and indoor air sampling locations. The location will be determined based on weather conditions the day of the sampling event; if the direction of wind cannot be determined by the sampler, a publicly-available weather service will be used. It is anticipated that one sample will be collected in association with the on-Site soil-vapor sampling and one sample will be collected in association with the off-Site indoor-air sampling event.

Each outdoor-air sample will be collected in a laboratory-certified clean 2.7-liter or 6-liter SUMMA® canister with a calibrated flow controller. SUMMA® canisters used for collecting outdoor ambient air samples will be batch certified clean by the project laboratory. Outdoor ambient air samples will be collected with the sample inlet of the canister positioned approximately 3 to 5 feet above the ground surface. To the extent practical, air samples will be collected away from buildings (10 to 15 feet) and away from wind obstructions, such as trees. Sampling locations may need to be adjusted to ensure security of the canister during the sampling event. During the sampling period as well as at the time of sample retrieval, noticeable changes in the the sampling area, such as changes to the condition or location of objects in proximity to the canisters, will be noted on the air sampling data sheet. SUMMA® canisters will be retrieved approximately 24 hours after initiation of sample collection. A calibrated PID fitted with an 11.7 eV lamp will be used to screen for VOCs at each sample location.

The vacuum on the SUMMA® canister flow controller will be recorded at the start and completion of the sampling period. Following the sampling event, the canister's valve will be closed and the Swagelok®-type nut will be placed over the inlet and secured. The vacuum will be recorded on the chain of custody to demonstrate that the seal on the canister is not compromised during transit.

### *2.3 Quality Assurance/Quality Control Sampling*

Duplicate samples will be collected, noted on sampling data sheets, and submitted to the laboratory as blind duplicates for quality assurance (QA) and quality control (QC) purposes. One duplicate sump-water sample will be submitted per every 20 samples. One blind duplicate sample will be collected per every 20 samples of each environmental medium. All sampling equipment will be dedicated to each sampling location, so no equipment blanks are necessary. Sump-water samples will be accompanied by a trip blank of laboratory-supplied water.

## 3 Sample Analyses

The laboratory analyses will be performed by a NYSDOH-approved environmental laboratory using analytical methods consistent with the NYSDEC's Analytical Services Protocol. Laboratory analytical reports will contain Analytical Services Protocol Category B and electronic data deliverables (EDDs) to facilitate data validation and usability review.

All soil vapor, indoor air, and outdoor ambient air samples will be analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method TO-15. The following VOCs will be compared to the NYSDOH's current VI Decision Matrices:

- Carbon Tetrachloride
- 1,1-DCE
- cis-1,2-DCE
- Tetrachloroethene
- 1,1,1-trichloroethane
- TCE
- Vinyl chloride

Sump water samples and trip blanks will be analyzed for VOCs by USEPA Method 8260C.

### *3.1 Data Validation and Data Usability*

Laboratory analytical data will be validated by a third-party data validator and will be submitted to NYSDEC and NYSDOH in an appropriately formatted EDD. ERM will prepare a Data Usability Summary Report consistent with the NYSDEC guidance contained in Department of Environmental Remediation (DER)-10 Appendix 2B. The results will be presented in an Electronic Data Summary consistent with the requirements of DER-10 Section 3.13.

## 4 Reporting

Transmittal letters communicating sampling results will be prepared for each property owner following the NYSDOH guidance (2006). Tenants will be copied on transmittal letters with the homeowner's permission. The transmittal letters will be submitted to NYSDOH for review and approval prior to distribution. Additionally, the collective dataset generated from implementation of this work plan will be compiled, interpreted, and incorporated into a report that will be submitted to the NYSDEC and NYSDOH.

Yours sincerely,

Joe Fiacco
Partner-in-Charge

Michael Nigro, P.G.
Project Manager

cc:
Stephen Evanoff, Leica, Inc.
Melissa Doroski, NYSDOH

## 5 References

Energy Solutions. *Vapor Intrusion Sampling results, 30 and 34 Rowan Road Leica, Inc. Site; Erie County, Cheektowaga, NY Inactive Hazardous Waste Disposal Site No. 915156.* Energy Solutions Ref. No. 31129-057, May 2009.

Energy Solutions. *Vapor Intrusion Sampling Results, 130 and 134 Preston Road Leica, Inc. Site; Erie County, Cheektowaga, New York Inactive Hazardous Waste Disposal Site No. 915156*. Energy Solutions Ref No. 31129-073, June 2010.

Energy Solutions. *Annual Status Report for 2017 Leica, Inc. Site; Erie County, Cheektowaga, New York Inactive Hazardous Waste Disposal Site No. 915156 (Final)*. Energy Solutions Ref. No. 137015-117, June 2018.

NYSDEC. *DER-10: Technical Guidance for Site Investigation and Remediation*. Albany: NYSDEC Division of Environmental Remediation, May 2010.

NYSDOH, 2006. *Guidance for evaluating soil vapor intrusion in the State of New York (Final)*. Albany: New York State Department of Health, Center for Environmental Health, Bureau of Environmental Exposure Investigation, October 2006 (latest amendment May 2017).

# FIGURES

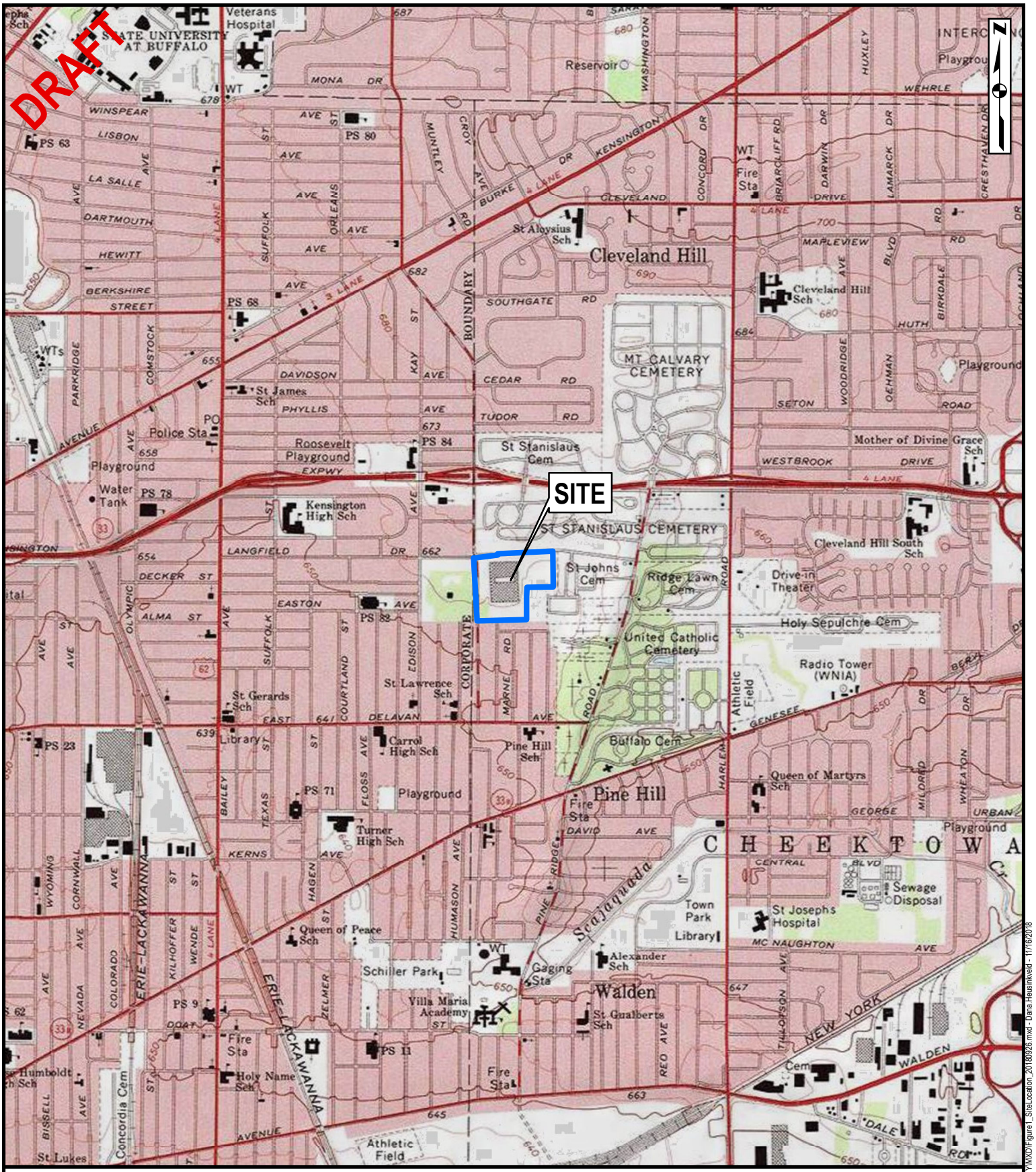


**Figure 1:** Site Location
Former Leica, Inc. Facility
203 Eggert Road
Cheektowaga, New York

**SOURCE:** USGS scanned topographic quad maps provided by National Geographic Society (© 2018).

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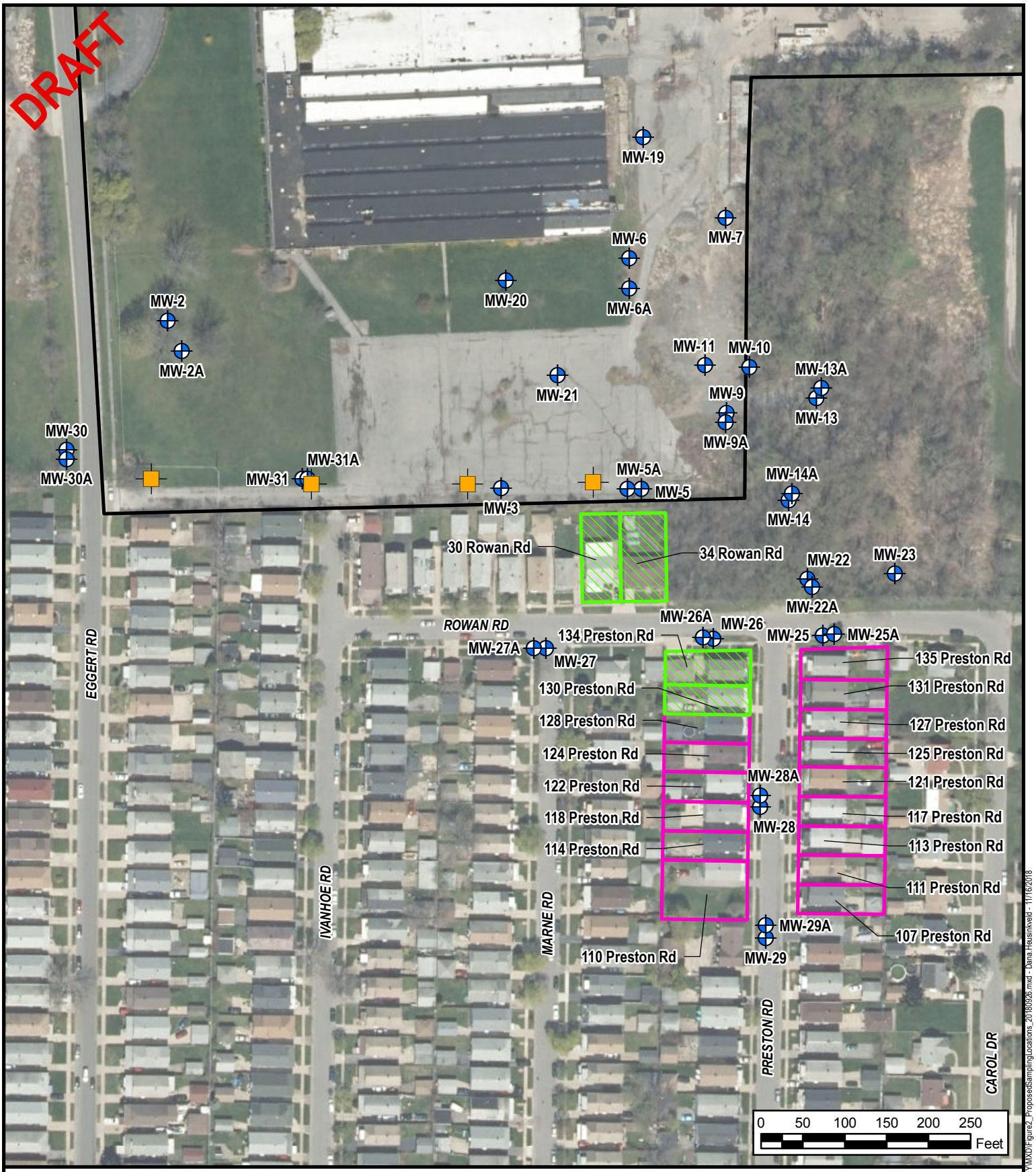


**Legend**

- Proposed Exterior Soil Vapor Sample Locations
- Monitoring Well Location
- Site Property Boundary
- Proposed Vapor Intrusion Sampling Location
- Vapor Intrusion Sampling Complete

**Figure 2:** Proposed On-site and Off-site Sampling Locations
Former Leica, Inc. Facility
203 Eggert Road
Cheektowaga, New York

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**SOURCE:** ESRI World imagery. Reproduced under license with ArcGIS 10.5

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| | STANDARD OPERATING PROCEDURE | |
|---|---|---|
| ERM | SOP #: | 3 |
| | Title: | Sub-Slab Soil Gas Point Installation, Purging & Leak Checks, and Sampling |
| | Page: | 1 of 6 |
| | | |

## SCOPE

This procedure provides guidance on sub-slab soil gas point installation, purging, and leak testing, and sampling in accordance with good and safe industry practice.

## SOURCES

Cox Colvin & Associates, Inc. 2016. *Vapor Pin Standard Operating Procedure Installation and Extraction of the Vapor Pin®.* 9 September.

Cox Colvin & Associates, Inc. 2016. *Vapor Pin Standard Operating Procedure Leak Testing Vapor Pin® Via Mechanical Means.* 29 March.

## PROCEDURE

### *Installation of Sub-Slab Soil Gas Points*

A. In advance of installation activities, provide the required notification that public utilities are demarcated in the vicinity of the investigation area. Use a private subsurface utility locating service to confirm the location is clear of underground utilities or structures if possible.

B. For flush mount installations, use a hand-held hammer drill to advance a 1 ½ inch diameter drill bit at least 1 ¾ inches into the slab. Use a wet/dry vacuum at the surface to control and clean up concrete dust.

C. Through the center of the 1 ½ inch hole, use a 5/8-inch diameter drill bit to drill the smaller hole through the remaining thickness of the slab (using the vapor pin® drilling guide to direct and center the drill is recommended). The drill bit may drop into the subsurface material a small amount once it breaks through the bottom of the slab.

D. Note: If the sub-slab sampling point is temporary (i.e., one use only) or a flush mounted point is not necessary, field personnel can drill the 5/8-inch diameter hole through the slab from the surface and skip the 1 ½ inch countersink hole.

E. Remove the drill bit, brush the hole with a bottle brush, and remove loose cuttings from the floor surface with the wet/dry vacuum.

F. Assemble the vapor pin® by placing a silicone sleeve around the vapor pin®.

G. Place the lower end (i.e., the end without the barb fitting) of the vapor pin® assembly into the drilled hole. Place the small hole located on the installation/extraction tool over the vapor pin®, to protect the barb fitting, and tap the vapor pin® into place using a dead blow hammer. Make sure the installation/extraction tool is appropriately aligned with the vapor pin® to avoid damaging or bending the barb fitting.

H. During installation, the silicone sleeve will form a slight bulge between the slab and the vapor pin® shoulder. The pin is installed once the silicone sleeve is fully hammered into the slab.

I. Place the protective rubber cap on the vapor pin® to prevent vapor loss prior to sampling.

J. For flush mount installations, cover the vapor pin® with a flush mount cover, either using the plastic or stainless-steel cover when not in use.

K. Allow a minimum of two hours for the sub-slab soil gas conditions to equilibrate prior to sampling. A longer equilibration time may be required by some regulatory agencies.

***Water Dam Test***

A. The sub-slab soil vapor point installation integrity will be checked via a water dam. Water dam tests should be performed immediately after sample installation so that an installation can be adjusted as soon as possible if found to be leaking. Water dam test should also be repeated immediately prior to sampling and also every time a sample is collected.

B. For a flush-mount installation, pour distilled water directly into the 1 ½-inch hole. For surface installations, seal a PVC coupling around the sampling port, using a VOC-free clay, playdoh or bentonite and pour water into the coupling. Water in either configuration should not extend above the top of the vapor pin.

C. Observe the water level for five minutes. The water level may drop slightly due to absorption into the concrete, but if there is a sudden drop in the water level, or other indication of water entering the sub-slab, the point installation is not tight and cannot be used for sampling. Remove the distilled water from the coupling or hole, and relocate the sample location.

D. Repeat installation and water dam test until successful.

E. Record results of water dam test on field sampling form.

F. Following a successful test immediately prior to sampling, it is recommended that water be left in the 1 ½ inch hole or in the PVC coupling during sampling to further observe water loss.

***Sample Purging***

A. After sub-slab soil gas conditions equilibrate, remove the protective cap and connect the sample Teflon or Nylaflow® tubing to the barb fitting of the vapor pin® with a small section of Teflon-lined tygon. If it is necessary to use silicone tubing, place the Teflon®

tubing as close to the vapor pin® as possible to minimize contact between soil gas and the silicone tubing.

B. Use a vacuum pump or plastic syringe to remove approximately three times the volume of the sample tubing plus concrete hole and push air into a clean tedlar bag. Vapor should be collected at a rate of approximately 200 mL/min. It may be necessary to collect a small amount more than three-purge volumes to have enough volume in the tedlar bag to collect field screening data.

C. If using a plastic syringe, note if there is resistance or difficulty pulling back on the syringe plunger. If using the vacuum pump, note if the tedlar bag easily fills. If the sampling point is having difficulty pulling vapor, it may be blocked or set in a tight subsurface material and may need to be adjusted.

D. Record purge volume information on the soil gas sampling form.

E. Field screen the vapor in the tedlar bag for oxygen, carbon dioxide, and methane concentrations using a landfill gas meter and record values on the sampling field form

F. Field screen the vapors in the tedlar bag for concentrations of total volatile organic compound (VOCs) using a PID and record values on a sampling field form.

***Shut-In Test***

A. The shut-in test is performed by generating a vacuum inside the sample tubing while keeping the sampling port and the sampling canister closed. This test should be repeated prior to every sample collected. If the laboratory specifies a particular method for the shut-in test on their equipment, please refer to that method.

B. Remove the brass cap from the canister intake and attach the pre-calibrated flow controller (typically 200 mL/min flow controller).

C. Connect tubing from the sub-slab vapor pin® through a two-way valve and then through a "T" fitting. One end of the "T" fitting should connect to tubing to the flow controller on the SUMMA ® canister. Both the vapor point two-way valve and the canister should remain closed.

D. Connect the other end of the "T" fitting to another two-way valve and either a plastic syringe or a vacuum pump. Open the two-way valve between the syringe/pump and the "T" fitting.

E. Pull back on the syringe or turn on the pump and generate ~100 inches of water (~7 inches of mercury) as shown on the vacuum gauge of the SUMMA® canister. The vacuum gauge should register vacuum even when the canister is closed because it is on upstream side of the SUMMA ® canister on/off valve. If the laboratory set-up is different, consult with the laboratory to obtain a separate additional vacuum gauge.

F. Shut the two-way valve to the syringe/pump and monitor the vacuum in the closed tubing for 1 minute.

G. If vacuum is maintained for the observed period, then the sampling train is deemed adequate and sampling can begin. If vacuum is lost during the observation period, the tubing connections should be tightened or altered until there is no observable loss in vacuum during the test.

H. After the shut-in test is validated, the sampling train should not be altered.

I. Record information from the shut-in test on the sampling field form.

***Sub-Slab Soil Gas Sampling***

A. Once all leak tests are complete, make sure the two-way valve to the pump/syringe is closed and open the two-way valve between the sample tubing and the soil vapor point.

B. Record the canister ID# and flow controller ID# on the field sampling form as well as on appropriate initial sampling information on sampling labels.

C. Avoid all activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, running vehicles, etc.).

D. Record weather information including temperature, barometric pressure, relative humidity, wind speed, and wind direction at the beginning of the sampling event. Field personnel should record substantial changes to these conditions that may have occurred 24 to 48 hours prior to sampling as relevant. The information may be measured with onsite equipment or obtained from a local weather station via a weather application.

E. Open SUMMA® canister valve ~ ½ turn, and record the time and initial canister pressure from the gauge on the field sampling form. (Note: if initial canister vacuum is significantly less than vacuum recorded by the laboratory, stop sampling and use backup sampling canister. The sampling train shut-in test will need to be repeated. If desired, initial canister vacuums can be checked using a separate vacuum gauge before sampling starts to avoid this issue during sampling).

F. A T-fitting or laboratory provided duplicate flow controller set up may be used to connect the intake of two canisters for a duplicate sample.

G. Photograph the canister and sample port set-up to document site conditions.

H. Close the canister when the vacuum in the canister reaches ~0 in Hg. Residual vacuum is not required in the 1.0-liter sampling canisters because the full sampling period (i.e., ~5 minutes and 200 ml/min) will be actively monitored by field personnel (i.e., a witnessed sample). If residual vacuum remains in the 1.0-liter sampling canisters, it cannot exceed 15 inches of mercury (in Hg) or laboratory reporting limits will be affected. Residual vacuum, if any, will be confirmed and recorded by the laboratory

after receipt of the canisters. If the laboratory requires a minimum residual vacuum, close the canister at the laboratory required vacuum level.

I. Record the final vacuum pressure and time on the field sampling form.

J. Remove the flow controller from the canister and replace the protective brass cap on the canister intake.

K. Complete sample labels and tags attached to the canister as directed by the laboratory and complete the required information on the chain-of-custody (COC).

L. Place the COC and all sampling equipment in packaging provided by the laboratory and deliver to the laboratory by the sampler or via delivery service.

M. Following sampling, collect a differential pressure readings between the sub-slab soil gas and the inside of the structure using a digital micro-manometer capable of reading at least to 0.001 inches of water column (in. wc).

***Vapor Pin® Extraction***

A. If vapor pins® are being removed following sampling, remove the protective plastic cap and flush mounted cover (if applicable), and thread the installation/extraction tool onto the barrel of the Vapor Pin®. Turn the tool clockwise continuously until the tool extracts the vapor pin® from the hole like a wine cork. Do not pull up using the extraction tool.

B. Fill the void with hydraulic cement and smooth with a trowel or putty knife.

**Equipment and Materials List**

- Personal protective equipment would generally include protective footwear, long sleeve shirt, pants, disposable nitrile gloves, and eye protection (head and hearing protection may also be necessary);
- Field sampling sheet;
- Hand-held hammer drill with 1 ½-inch and 5/8-inch diameter bits;
- Bottle brush;
- wet/dry vacuum;
- Vapor pin® and related materials (drilling guide, silicone sleeve, protective rubber cap, installation/extraction tool, optional stainless steel or plastic flush-mounted cover);
- Dead blow hammer or mallet;
- One liter Summa® canisters (or as needed/available from laboratory to meet sampling objectives);

- Sample flow controllers (pre-set to 200 mL/min);
- T-fittings or duplicate flow controller set-ups for duplicates as necessary;
- PVC coupling;
- Distilled water;
- Modeling clay (non-VOC), playdoh, bentonite or similar (note: playdoh or other water-soluble clays may absorb water if left in place for longer than 1 hour);
- Paper towels;
- PID (parts per million, 10.6 electron volts (eV) or 11.7 eV bulb depending on contaminants, with calibration sheet and materials);
- Landfill gas meter;
- ¼-inch diameter Teflon® tubing, Teflon-lined tygon, silicone tubing, and tool to cut tubing;
- Vacuum pump with flow meter/gauge or handheld plastic syringe (60 mL);
- Two-way valves and "T" fitting;
- Helium Shroud Test supplies (optional; helium canister and flow controller, clear plastic shroud, helium meter, tubing, weighted hose or something to seal plastic shroud to ground surface);
- Materials as needed to follow specific laboratory shut-in tests if different than method described in SOP;
- Micro-manometer (capable of reading to 0.001 in. wc);
- Hydraulic cement;
- Trowel or putty knife to smooth cement;
- Camera for photos of sampling set-ups;
- Decontamination supplies; and
- COC and packaging materials to send to the lab.

## Walia, Jaspal (DEC)

**From:** Michael Nigro <Michael.Nigro@erm.com>
**Sent:** Friday, February 15, 2019 2:09 PM
**To:** Alice Sandzen; Joe Fiacco; Catherine Regan; Pat Kornick; Doroski, Melissa A (HEALTH); Bethoney, Charlotte M (HEALTH); Walia, Jaspal (DEC)
**Cc:** Stephen.Evanoff@danaher.com
**Subject:** RE: Leica Site - Residential VI Evaluation
**Attachments:** Cheektowaga Residential VI Data Evaluation_2-15-2019.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

*ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.*

All,

Thank you for taking the time last week to discuss the Leica Site Vapor Intrusion (VI) Work Plan. As discussed, ERM evaluated historical VI and groundwater data relating to the residences below and summarized the findings in the attached slide deck.

- 130 and 134 Preston Road; and
- 30 and 34 Rowan Road.

Please let us know if you would like to schedule a call to discuss the information in more detail. As you know, ERM would like to start the VI work as soon as possible, as we are nearing the end of the heating season.

Thank you and have a nice weekend.

Regards,

Mike

**Michael Nigro, P.G.**
Principal Consultant

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-----Original Appointment-----
**From:** Alice Sandzen <Alice.Sandzen@erm.com>
**Sent:** Wednesday, January 30, 2019 2:48 PM
**To:** Alice Sandzen; Joe Fiacco; Catherine Regan; Michael Nigro; Pat Kornick; Doroski, Melissa A (HEALTH); Bethoney, Charlotte M (HEALTH); Walia, Jaspal (DEC)

**Subject:** Leica Site - Residential VI Evaluation
**When:** Thursday, February 07, 2019 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).
**Where:** WebEx

***Time change, this meeting is now at 1 pm***

Click 'join the meeting' below to enter the meeting room.

**Leica Site - Residential VI Evaluation**
Thursday, February 7, 2019
2:00 pm | Eastern Standard Time (New York, GMT-05:00) | 1 hr
Meeting number: 717 374 555
Meeting password: fDk8pXck

Add to Calendar When it's time, join the meeting.

**Join by phone**
Call-in toll-free number: 1-866-668-0721 (US)
Call-in number: 1-845-977-0098 (US)
Show global numbers
Conference Code: 603 667 0682

Can't join the meeting?

IMPORTANT NOTICE: Please note that this Webex service allows audio and other information sent during the session to be recorded, which may be discoverable in a legal matter. By joining this session, you automatically consent to such recordings. If you do not consent to being recorded, discuss your concerns with the host or do not join the session.

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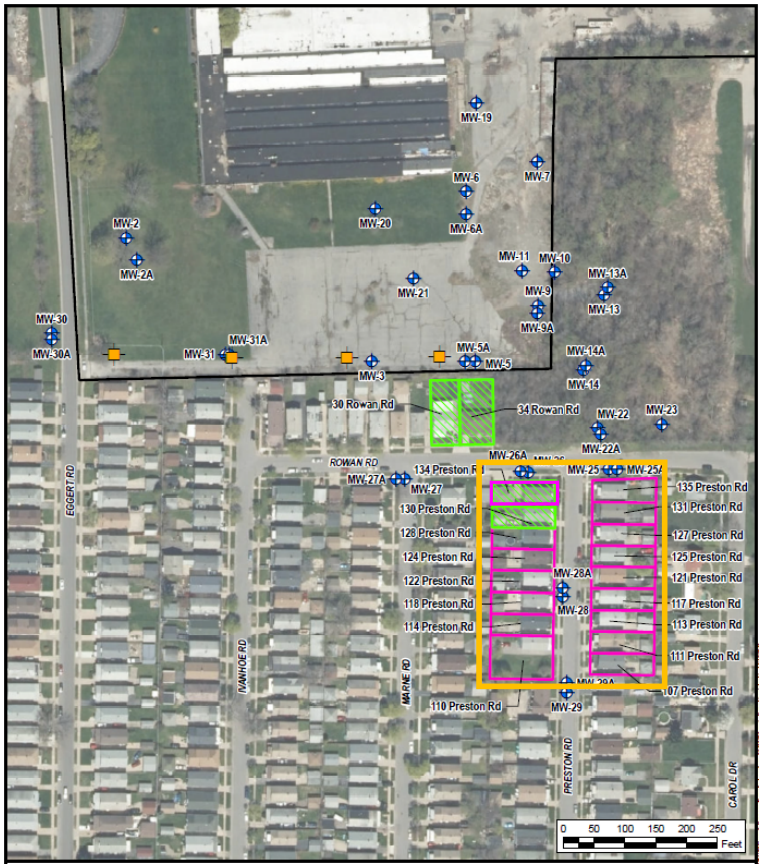
Please visit ERM's web site: https://protect2.fireeye.com/url?k=2888041a-74acf27b-288afd2f-0cc47a6d17e0-37a1917288349fe4&u=http://www.erm.com/. To find out how ERM manages personal data, please review our Privacy Policy

# Residential VI Sampling Plan

- **130 and 134 Preston Road**
  - Included in NYSDOH request on 18 September 2018.
  - 130 Preston Road - No further action needed based on comparison of 2010 VI results to the current decision matrix.
  - 134 Preston Road - Additional monitoring recommended per the current decision matrix due to detection in soil gas combined with the elevated detection limit of cDCE in indoor air.
- **30 and 34 Rowan Road**
  - Not included in NYSDOH request on 18 September 2018.
  - No detections during the 2009 VI sampling; however, detection limits did not allow comparison to current decision matrix.
  - Groundwater data indicates lower VI risk today compared to 2009.
- **ERM will include 134 Preston Road in proposed VI sampling plan. If 2019 VI evaluation indicates further action is required in neighboring homes, 130 Preston Road, 30 Rowan Road, and 34 Rowan Road will be re-evaluated for VI.**

# Map of Sampling Locations




## Legend

- Proposed Exterior Soil Vapor Sample Locations
- Monitoring Well
- Previous Vapor Intrusion Sampling Location
- Proposed Vapor Intrusion Sampling Location
- NYSDOH 9/18/18 Sampling Request

| Previously Completed Vapor Intrusion Sampling Locations | |
|---|---|
| 30 and 34 Rowan Road - 2009 | |
| 130 and 134 Preston Road - 2010 | |
| **Proposed Vapor Intrusion Sampling Locations** | |
| 107 Preston Road | 122 Preston Road |
| 110 Preston Road | 124 Preston Road |
| 111 Preston Road | 125 Preston Road |
| 113 Preston Road | 127 Preston Road |
| 114 Preston Road | 128 Preston Road |
| 117 Preston Road | 131 Preston Road |
| 118 Preston Road | 134 Preston Road (resample) |
| 121 Preston Road | 135 Preston Road |

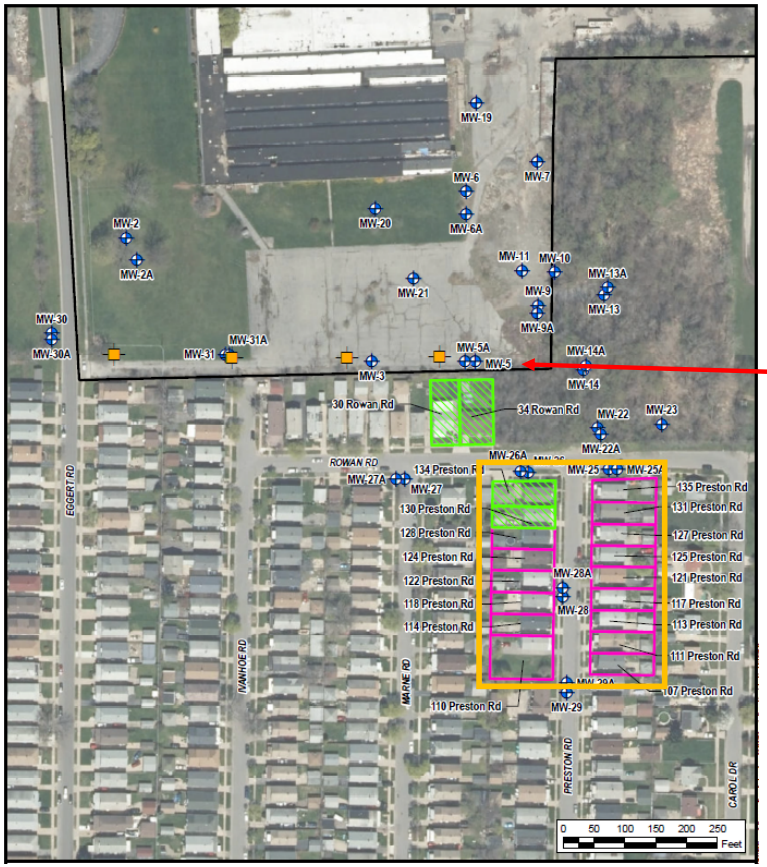
# Previous VI Evaluations

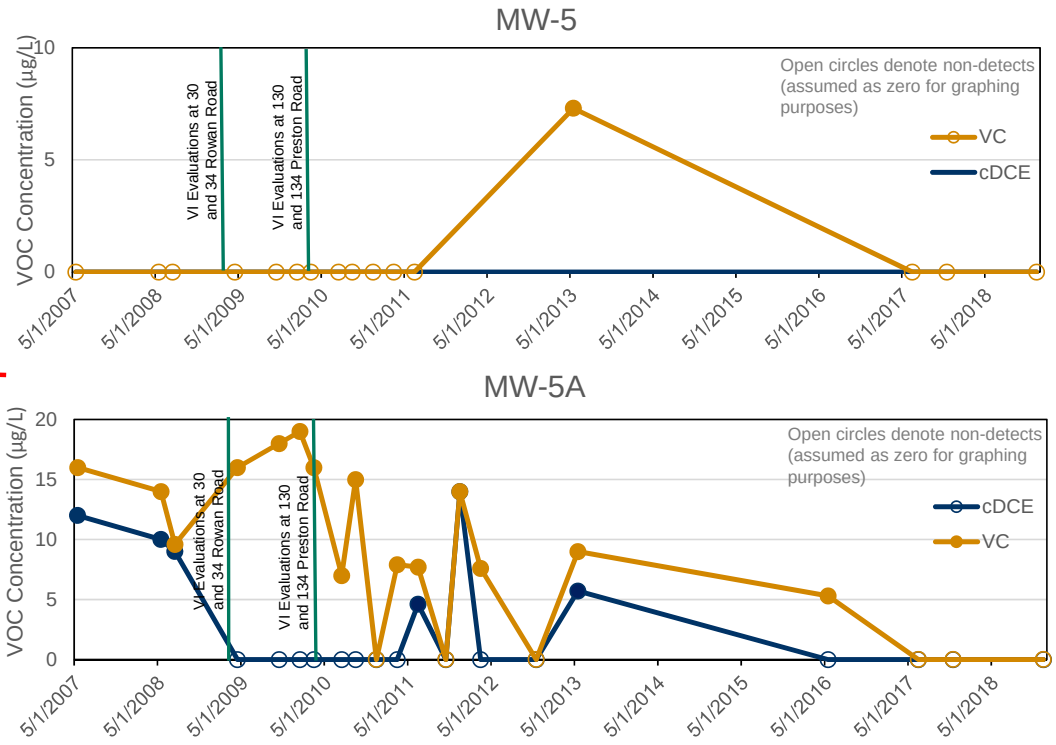
## Previous VI results compared to the current NYSDOH VI Decision Matrix:

| Home | Date | cDCE | | | Vinyl Chloride | | |
|---|---|---|---|---|---|---|---|
| | | Soil Gas ($\mu g/m^3$) | Indoor Air ($\mu g/m^3$) | NYSDOH decision matrix | Soil Gas ($\mu g/m^3$) | Indoor Air ($\mu g/m^3$) | NYSDOH decision matrix |
| 130 Preston Road | 3/25/2010 | *<0.58* | *<0.67* | No Further Action | *<0.037* | *<0.043* | No Further Action |
| 134 Preston Road | 3/25/2010 | **8.7** | *<0.60* | **Monitor** | *<0.035* | **0.17** | No Further Action |
| 30 Rowan Road | 3/26/2009 | *<0.60* | *<0.60* | N/A | *<0.10* | *<0.39* | N/A |
| 34 Rowan Road | 3/16/2009 | *<0.60* | *<0.60* | N/A | *<0.39* | *<0.39* | N/A |

- 130 Preston Road requires No Further Action based on current decision matrix.
- 134 Preston Road requires additional monitoring based on the current decision matrix based on the detection in soil gas paired with the elevated detection limit of cDCE in indoor air.
- 30 and 34 Rowan Road cannot be compared to the current decision matrix due to detection limits. There were no detections of cDCE or VC in indoor air or soil gas, and groundwater concentrations have since decreased, so additional monitoring is not recommended at this time.

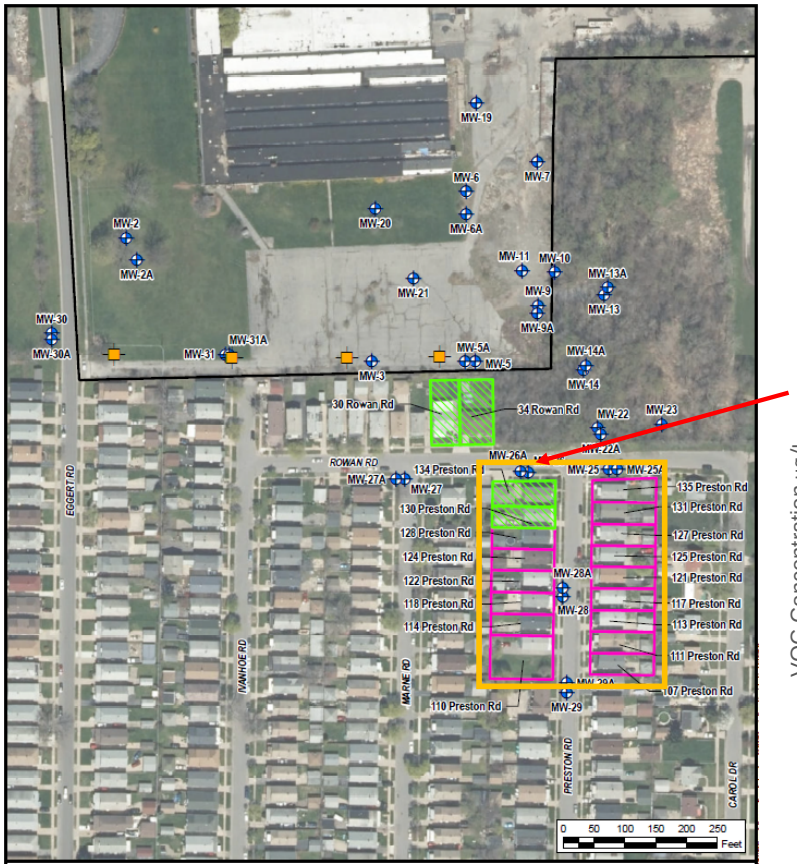
# MW-5 (overburden) and MW-5A (bedrock)

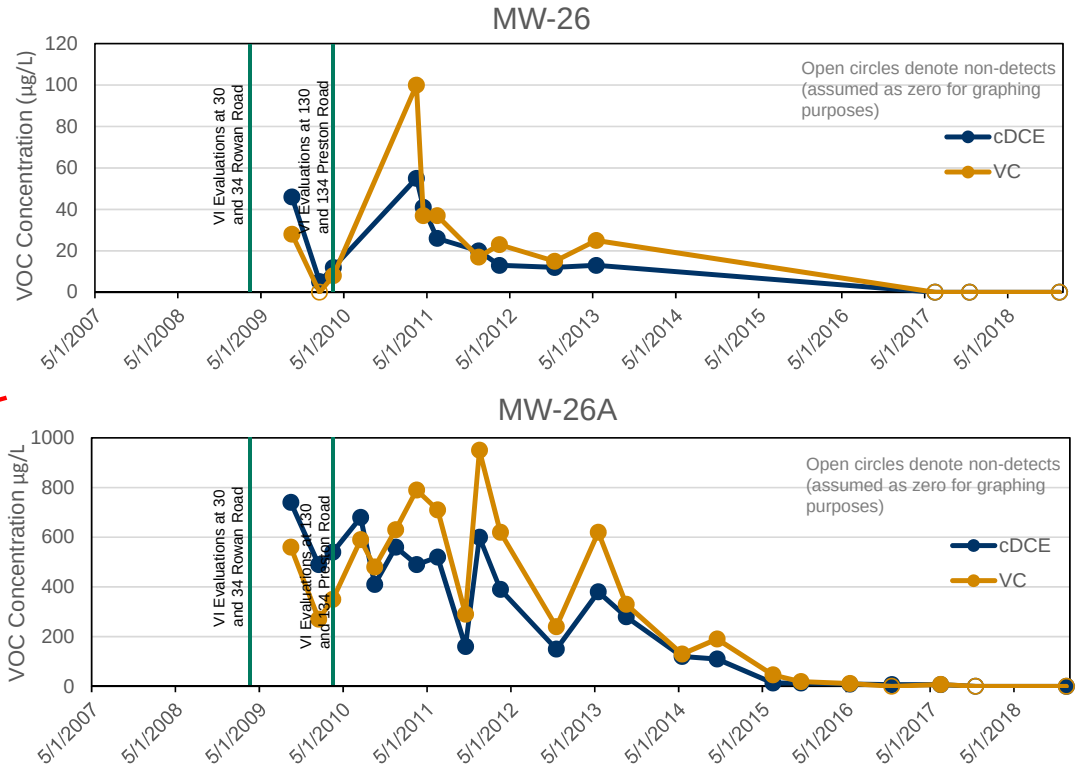



During prior residential VI evaluations, cDCE and VC were not detected in groundwater at overburden well MW-5 which is consistent with current conditions. Concentrations of cDCE and VC in bedrock well MW-5A fluctuated following the previous VI evaluations, but have since decreased to non-detect.

# MW-26 (overburden) and MW-26A (bedrock)







At overburden well MW-26, the concentrations of cDCE and VC briefly increased following the VI evaluation at Preston Road, but have since decreased to non-detect. At bedrock well MW-26A, the concentrations of cDCE and VC in groundwater fluctuated following the VI evaluation at Preston Road, but have since decreased to non-detect.