CONESTOGA-ROVERS
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May 17, 2013 Reference No. 081618

Mr. Stephen Scharf
New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Solid Waste and Corrective Action
625 Broadway
Albany, NY 12233-7258

Dear Mr. Scharf:

Re: Bayer Material Science LLC 125 New South Road Hicksville, New York
USEPA ID#: NYD002920312
Site Characterization Work Plan-Revision No. 1

On behalf of Bayer Material Science LLC (Bayer) and Glenn Springs Holdings, Inc. (GSH), this letter presents a revised Work Plan for a soil vapor investigation to identify the current potential for off-site migration of soil vapor from the former Bayer facility in Hicksville, New York. This Work Plan is being presented to the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) pursuant to ongoing discussions regarding soil vapor and in response to the NYSDEC/NYSDOH comments dated April 25, 2013. If the following approach is acceptable to the Departments, the Work Plan will be implemented on an expedited schedule by Bayer and GSH pursuant to an Order on Consent.

As described in this document, numerous activities have occurred at the site since 2004 that have reduced the concentrations of on-site volatile organic compounds (VOCs) thereby reducing the current possibility of off-site migration of soil vapors from the site and any residual off-site soil vapor that may have been sourced by the site in the past. This letter summarizes relevant information from soil, soil vapor, and groundwater investigations and remediation activities performed to date, and propose a Work Plan to determine current soil vapor conditions and to evaluate the potential for soil vapors to migrate off-site. The planned actions described in this Work Plan follow the protocols and procedures outlined in NYSDOH 2006 Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Guidance), and are consistent with the soil vapor investigations previously approved by NYSDEC/NYSDOH for this site.

GROUNDWATER INVESTIGATIONS

The groundwater beneath the site has been investigated extensively over the past 30 years. The investigations have demonstrated that the groundwater flows in a southerly direction and that the groundwater table is about 50 feet below the ground surface (ft bgs). Thus, the vadose zone is about 50 feet thick. The results of the groundwater sample analyses have confirmed that, with limited exception, the groundwater immediately beneath the site meets New York State Class GA drinking quality groundwater standards. Additionally, the highest concentrations of PCE, TCE, and vinyl chloride recorded at the site in the past 15 years were low (85 µg/L for PCE in 2002; 14 µg/L for TCE in 1998; and 17 µg/L for vinyl chloride in 2002). Now, 12 to 15 years later, the concentrations of these VOCs are expected to be at or below the Class GA drinking quality groundwater standards due to natural attenuation processes. Therefore, the focus of the soil vapor investigation should be vadose zone soils.

SOIL INVESTIGATIONS

Under NYSDEC's RCRA program, the vadose zone soils across the site were extensively investigated through a comprehensive series of seven successive phases of study over the period from 2004 to 2009. Initial phases of the investigations did not assess soils under the on-site buildings and structures existing at that time. However, the most recent sampling investigations (Phases IV through VII) were performed after the buildings were removed, providing access to all of the site soils. Soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals. Consequently, over the course of the seven phases of soil investigation, a thorough assessment of the presence of VOCs and VOC-impacted soil that could contribute to soil vapors has been completed. Moreover, of particular significance, when an area of VOC-impacted soil was identified, the horizontal and vertical extent of such impacted area was delineated and the soils removed as a RCRA Interim Corrective Measure.

During these seven phases, soil samples from over 450 locations have been analyzed for VOCs. The results of the VOC sampling events identified only two areas in the middle of the site, one beneath former Plant 1 and one immediately east of Plant 1, where VOC concentrations in excess of 1 mg/kg were present. Subsequent additional sampling was performed in these areas to fully delineate the horizontal and vertical extent of the elevated VOC concentrations. The primary VOCs present in these areas were tetrachloroethene (PCE) and trichloroethene (TCE). Figures 1 and 2 provide a color-coded depiction of the PCE and TCE concentrations found in the soil samples.

As previously stated, the primary VOCs were PCE and TCE. Additionally, cis-1,2-dichloroethene (a product of PCE and TCE degradation) was also present in some of the PCE and TCE impacted soil locations. Methylene chloride, toluene, MIBK, and styrene were present in four, two, one, and one sample locations respectively in the former Plant 1 area at concentrations greater than 1 mg/kg. Outside the Plant 1 areas, no VOCs, other than acetone (a common laboratory artifact) were detected in soils at concentrations exceeding the soil guidance values presented in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) titled "Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046, dated January 24,1994 (TAGM 4046) or above current 6 NYCRR Part 375 soil cleanup objectives. The identified elevated VOC-impacted soils in the former Plant 1 area were removed in 2009 as a RCRA Interim Corrective Measure.

There are no known remaining areas of soil with elevated concentrations of VOCs on the site. Other than five locations in the vicinity of former Plant 1 where PCE concentrations ranged from 0.05 to 1 mg/kg, the total VOC concentrations were either less than 0.05 mg/kg or were non-detect across the remainder of the site. Given that more than 450 sample locations have been tested, it is not expected that there are any residual sources of VOCs s that remain in soil on the Site. Figures 1 and 2 illustrate the limited pre-remedial areal extent of VOCs in soil and indicate that the localized areas of elevated concentrations of PCE and TCE were removed in 2009. With this known source removed, it is expected that any residual soil vapors will have begun to reduce in concentration and mass through natural attenuation processes including biodegradation, advection, dispersion, and diffusion since the last on-site soil vapor sampling events in 2009.

Details of the VOC soil sampling programs are included in the following documents, which have been reviewed and approved by the NYSDEC:

- RCRA Facility Investigation Report (ARCADIS BBL, June 2004)
- Phase II RFI Report contained in a letter from ARCADIS BBL to the NYSDEC dated January 5, 2005
- Interim Corrective Measure Certification Report (ARCADIS BBL, November 2005)
- Phase III soil results letter report, May 2006
- Phase IV Sampling Plan contained in a letter from ARCADIS BBL to the NYSDEC dated July 6, 2006
- Phase IV soil sample results and Proposed Phase V Scope Report, October 2006
- Phase V soil results letter report, October 2006
- Phase VI soil results letter report, June 2007

- Phase VII soil results letter report, June 2008

SOIL VAPOR INVESTIGATIONS

Soil vapor samples were first collected in 1989 during the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation at 55 locations across the site, except for areas covered by pavement or buildings at the time. Soil vapor field screening was performed using a photoionization detector (PID) and confirmatory soil vapor analysis for site-related VOCs, including TCE, PCE, trans-1,2- dichloroethene, and vinyl chloride was performed using portable gas chromatography. Based on the analytical results, PCE was the only VOC detected in the soil vapor samples, and then only in two sampling locations; one location southeast of Plant 1 and one location northwest of Plant 2. Details of this soil vapor sampling program are presented in the Remedial Investigation Report (Leggette, Brashears & Graham, Inc., revised August 1992).

Between September 2008 and August 2009, Bayer collected soil vapor samples from 28 sampling locations (locations SG-1 through SG-28, shown on Figure 3). The sampling locations were approved by NYSDEC/NYSDOH and selected to provide coverage across the site, including areas within/near the footprints of the former plant buildings and the various paved areas. Several samples were also collected along the entire property boundary to measure the soil vapors adjacent to neighboring properties. The results of the soil vapor sampling were presented in the reports submitted in 2007 through 2009. The results indicate that elevated VOC concentrations were present in the middle of the site, primarily in the location of former Plant 1. This finding is consistent with the results of the soil sampling program. Also consistent with the VOC concentrations in the soil, the highest soil vapor concentrations were those for PCE and TCE. Figures 3 and 4 show the historical soil vapor concentration contours for PCE and TCE respectively, and as can be seen on the figures, the elevated concentrations of PCE and TCE are centered in the former VOC source area in the soils beneath the former Plant 1 area that were removed in May through August 2009.

With regard to the prior soil vapor samples that were collected from along the property boundaries, the following conditions were identified:

- There were no exceedances of the NYSDOH Indoor Air Guidance Values along the north property boundary.
- There was one location (SG-21) with a PCE concentration of 430 $\mu g/m^3$ and TCE concentration of 170 $\mu g/m^3$ near the southwest corner of the site. However, follow-up sampling at four additional locations around this location identified no VOC concentrations

greater than the NYSDOH Indoor Air Guidance Values at these four locations, confirming that the one identified location is isolated and of limited areal extent.

- There was one other location with elevated VOC concentrations (at SG-11 the PCE concentration was 3,000 µg/m³ and the TCE concentration was 32 µg/m³) along the southwest property boundary proximal to the former Plant 1 source area.
- The sampling on the eastern property boundary did identify some locations of elevated VOC concentrations with the highest VOC concentration being PCE at 8,100 µg/m³.

In April 2011, a supplemental soil vapor investigation was conducted beneath and inside the neighboring warehouse located to the east of the site. This investigation determined that while soil vapors were detected in some of the sub-slab areas beneath the building, no soil vapors were detected at actionable levels within the indoor air when compared to the NYSDOH soil vapor intrusion matrices. Some of the sub-slab soil vapor concentrations were higher than those observed on the Bayer property (with the highest VOC concentration being PCE at 32,000 µg/m³ vs. the highest east property boundary on-site concentration of 8,100 µg/m³), indicating that there are potential VOC sources on the warehouse property contributing to soil vapor in these areas. Also, considerable variability in the sub-slab samples was observed which is indicative that multiple sources exist. The results of this supplemental investigation were submitted to the NYSDEC in the report entitled "Vapor Intrusion Investigation Summary Report" (August 2011). Based upon a holistic evaluation of the existing soil vapor data, it is possible that VOC sources on the warehouse property are affecting the east side of the Bayer property.

The results of these investigations have been discussed with the NYSDEC and NYSDOH. This Work Plan proposes additional investigation to assess current soil vapor conditions at the site and the potential for off-site soil vapor migration.

REMEDIAL ACTION AND OTHER RELEVANT FACTORS

Since the start of the on-site soil vapor assessment in 2007, several activities have been performed that have the potential to reduce the on-site VOC concentrations. These activities have also reduced the potential for the presence of off-site vapor related to the site. The significant activities that have taken place include the following:

- In 2009, Bayer removed the only known pockets of elevated VOC-impacted soil from the site. Considering that over 450 soil samples were analyzed for VOCs, it is expected that any remaining pockets of soil with elevated VOC concentrations would be small and of limited extent. The 2009 remedial action removed approximately 1,450 cubic yards of soil primarily impacted with PCBs and the VOCs PCE and TCE. Removal of this material eliminated the only known locations of elevated VOCs in soil that would be contributing to soil vapors. This removal action will have had a significant effect on soil vapor concentrations and is expected to have substantially eliminated the generation of new soil vapors. This was confirmed by a subsequent soil gas sample collected in the area that was non-detect (see Figure 3). With the source removed, residual soil vapor concentrations in the surrounding areas will continue to dissipate and new soil vapor generation potential will have been minimalized. Given that the last on-site soil vapor samples were collected only 1 or 2 months after the 2009 removal activities, and almost 4 years ago, they are not believed to be representative of current concentrations.

- In 2009, a number of soil excavation projects were completed, primarily for PCBs. The opening of excavations to remove these soils promoted soil vapor movement in the immediate vicinity of the excavations. The degree of enhanced soil vapor movement depends on the size of the excavation, the duration for which the excavation remains open, and the fluctuations in the atmospheric conditions (wind, barometric pressure, temperature, etc.). Since the removal action, the subsurface conditions have had a few years to stabilize. Therefore the soil vapor concentrations detected in the last sampling event may not be representative of current conditions.
- In 2006, the former building foundations and floor slabs on the site were removed and, in the process, some of the pavement areas were broken up by the heavy equipment and some of the pavement was removed. The removal of the floor slabs and disturbance/removal of the pavement opens the pathway for soil vapor release to the atmosphere and for replenishment of clean air into the soil. The exposed soil is also subject to diurnal and seasonal variations in temperature and pressure that promotes vertical movement of soil vapor. The 2009 soil vapor samples were collected only 3 years after the removal of the relatively impervious cover layer across large areas of the site. Seven years have now passed and it is expected that the soil vapor concentrations will have decreased since the time of the last sampling event.

Based upon these events and circumstances, soil vapor migration/generation theory suggests that it would be most appropriate to collect a set of additional on-site soil vapor samples to provide a clearer understanding of current site conditions relevant to assessing the potential for off-site migration of soil vapor and to determine the most appropriate locations for certain off-Site soil vapor sampling locations (i.e., biased locations in areas of greatest potential impact). There are no underground utilities (i.e., electric, gas, etc.) that cross the east or southwest property boundaries that could provide a preferential pathway for off-site migration of soil vapors. Clearly, (1) the lack of any identifiable preferential pathway such as a utility corridor that would allow soil vapors to migrate onto the neighboring property and (2) the presence of the soil vapor concentrations that are higher on the neighboring property to the east than along the eastern property boundary, make it necessary to obtain current data from the site. Evaluation of these data may resolve the question of whether on-site soil vapor has the potential to affect off-site property and whether the off-site soil vapors beneath the warehouse east of the property are related to past activities at the site.

PROPOSED PLAN

The proposed plan of investigation has been developed with a phased implementation approach to allow for the best decisions to be made with respect to sample location selection. The phased approach will begin with a set of on-Site and off-site samples being collected to determine the current conditions across the Site, more particularly along the property boundaries and to the east of the commercial building located east of the site. Based on the results of the first sample phase, the appropriate locations for sampling on adjacent properties to the west/southwest will be selected. The intent will be to locate the westerly/southwesterly off-Site sampling stations adjacent to on-Site locations that exhibit the highest soil vapor concentrations, thereby biasing the off-Site sampling stations in the area of highest probabilities of detecting soil vapor emanating from the Site.

At the conclusion of each phase of sampling, Bayer and GSH will evaluate the data and make a written recommendation to the NYSDEC/NYSDOH with regard to the appropriate next actions. To expedite the completion of this work, it is recommended that a conference call be held by the parties, one week after each such submittal to move to the next phase as expeditiously as possible.

The details of the proposed sampling program are as follows:

PHASE I

- Collection of vadose zone soil vapor samples from along the perimeter of the site as shown on Figure 5. The samples will be collected from locations spaced approximately 150 ft apart along the eastern and southwestern property boundaries. To the extent practical, the sampling locations will match those locations that were sampled in 2009 to help determine whether the passage of time and the completed on-site remediation work have resulted in any improvement in soil vapor conditions. Consistent with the 2009 investigation, the probes will be installed with a screened interval that is 5 to 5.5 ft bgs.

- Collection of three soil vapor samples in the previously identified high soil concentration areas to help assess the changes that have occurred as a result of the on-site remediation work. Comparison to the historic data should demonstrate the effect of the remedial actions that have been performed. The locations of these three sampling points are also shown on Figure 5.
- Collection of pairs of soil vapor samples at three of the perimeter locations to help assess the potential for off-site migration of soil vapors. One of the probes will be installed immediately adjacent to the property boundary and the other probe will be installed 20 ft inward, perpendicular to the property boundary. Comparison of the results obtained at each probe pair will help assess whether there is a concentration gradient leading onto the adjacent neighboring properties off-site. The locations of these probe pairs are shown on Figure 5.
- Three of the sampling locations will be installed as vertical pairs to help assess the concentration gradients with depth. The shallow soil vapor probe of each pair will be installed at a depth of 5 to 5.5 ft to match the zone measured at all of the other probe locations. The deeper soil vapor probe will be installed and screened to collect samples from a depth of 15 to 15.5 ft bgs. The locations of these deep probes are shown on Figure 5.
- Collection of soil vapor samples from three off-site locations to the east of the commercial building bordering the east property boundary. The locations of these probes are shown on Figure 5.

PHASE II

- Based on the results of the first phase of sampling, appropriate additional off-site sample locations will be selected from areas adjacent to the on-Site sample locations that exhibit elevated soil vapor concentrations. It is planned that three off-site sample locations will be completed along each of the following property boundaries (a total of six additional off-site sample locations):
  - Three off-site samples on the commercial property to the southwest of the railroad trenches
  - Three off-site samples along New South Road between the Site and the residential neighborhood
- Tentative locations for the above off-Site sampling are presented on Figure 5. It is noted that these locations are tentative and may be adjusted as necessary based upon the on-Site concentrations of soil vapors and to accommodate property owner access permission and utility locations. In the event that no significant on-Site concentrations of VOCs are

detected, the proposed locations on Figure 5 will be utilized to provide sufficient coverage for the targeted off-Site investigation.

- Each off-Site sample will be collected from the 5 to 5.5 foot depth below ground surface (bgs) to be consistent with the 2009 investigation.

Following each phase of sampling, the data collected and its evaluation will be presented to the NYSDEC and NYSDOH in a report as provided by the Order on Consent. The report will include a comparison of previous data to the current data to evaluate the impact of the completed remedial activities on the site and to assess potential migration of vapors. If the concentrations from the off-Site sampling event meet the NYSDOH Indoor Air Guidance Values, no further sampling will be required.

The report will also include a recommendation for the next appropriate action, which may include additional sample collection or other appropriate actions.

SAMPLING PROCEDURES AND PROTOCOLS

Before the soil vapor sampling begins, a field survey crew will field- identify the proposed sampling locations using coordinates obtained from the sampling locations map. The sampling locations will be adjusted in the field, if needed, for equipment access and to match as closely as possible with previous sampling locations, where appropriate. Each proposed final sampling location will then be located and recorded utilizing latitude/longitude GPS coordinates and marked using a flagged, wooden stake.

The methods for collecting soil vapor and ambient air samples are detailed in the Standard Operating Procedures (SOPs) provided in Attachments 1 and 2, respectively. The NYSDOH's Guidance was considered in the development of these SOPs. In accordance with the NYSDOH's Guidance, samples will be collected at depths greater than 5 ft bgs to reduce the likelihood of atmospheric air being introduced into the samples. Sample collection is proposed for the 5.0 to 5.5-foot interval bgs at each shallow location. The deep soil vapor probes will be set at a depth of 15 to 15.5 ft bgs. The sampling interval will be limited to approximately 6 inches to reduce potential sample dilution that could otherwise occur across a larger interval. To the extent that any soils are returned to the surface during the installation process, they will be screened using a photoionization detection unit (PID) to provide an indication of the vertical profile of the VOC content within the soils encountered.

At each proposed soil vapor sampling location, the Geoprobe® rig will be used to advance an assembly consisting of interconnected 4-foot lengths of 1.25"-diameter steel probe rod, affixed with an expendable point holder and expendable point at the downhole end, to the desired sampling depth (5.5/15.5 ft bgs). Hydrated bentonite will be used to seal the annular space (if any) between the steel rod and borehole wall to isolate the subsurface interval from the atmospheric air. After the target depth is reached, the expendable point will be disengaged by hydraulically retracting the steel probe rods upwards approximately 0.5 feet to create a void in the subsurface soil for soil vapor collection. A high-density polyethylene (HDPE) or fluoropolymer sample delivery tube (3/16" or 1/4" inside diameter) with an attached Post-Run-Tubing (PRT) threaded adapter will be lowered through the 1.25"-diameter steel rod and threaded into the expendable point holder. Digital photos will be taken to document the soil gas probe installations.

An initial gas draw (purging) will be performed immediately prior to sampling. At the ground surface, the sample delivery tube will be attached to an air sampling pump, and a minimum of one volume will be evacuated from the sampling system. An electronic flow sensor will be used to measure pump flow rate (not to exceed 100 milliliters per minute [mL/min] during purging activities), and the desired volume will be purged based on pumping duration. After one full purge volume (equivalent to 1½ times the volume inside the sampling line) has been expelled from the sampling system, the pump will be disconnected and a PID equipped with a 10.6 electron volt lamp will be attached to the tubing to measure approximate total organic vapor levels. A Swagelock™ valve will be closed prior to disconnecting the pump and connecting the PID to prevent atmospheric air from entering the tubing.

Sample collection and analysis will be conducted in accordance with USEPA Compendium Method TO-15, titled "Determination of VOCs in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)" and the USEPA Method TO-15 Standard Operating Procedure. At each sampling location, a pre-cleaned stainless-steel canister (a 6-liter SUMMA® canister) with an attached flow regulator will be connected to the sample tubing and slowly opened to collect the soil vapor sample. Batch-certified-clean canisters will be provided by the laboratory with an initial vacuum of at least 26 inches of mercury. Flow regulators will be pre-set to draw soil vapor at a flow rate of 200 mL/min. Each soil vapor sample will be collected over an approximately 30-minute period. When the canister vacuum reaches approximately 2 inches of mercury, the valve on the canister will be closed, leaving a vacuum in the canister as a means for the laboratory to verify the canister does not leak while in transit. Four sets of vacuum readings will be obtained in connection with sampling and analysis:

1. Following canister cleaning for shipping to the field
2. Prior to sampling, with all the connections and leak checks completed
3. At the end of sampling

4. Prior to analysis in the laboratory

A tracer gas (helium) will be used in connection with the soil vapor sampling to provide a means to evaluate whether the soil vapor samples are diluted by surface air. A 5-gallon plastic pail will be placed over the soil vapor sampling location, and hydrated bentonite will be used to create a seal between the pail and the ground surface and penetration for the downhole tooling (at the top of the pail) to create a containment unit within the pail. Prior to sampling, helium will be introduced into the pail through a fitting on the side of the pail to create a minimum 50 percent helium content level within the pail. The helium levels in the purge gas and in the pail (prior to and immediately after sampling) will be measured using a gas detector. In the event that the helium meter measures a helium content within the sampling assembly of greater than 10 percent of the helium content measured within the containment unit (e.g., 5 percent for 50 percent helium in the containment unit), the soil gas probe will be considered to permit significant leakage such that the collected soil gas sample will not be considered reliable or representative of soil gas concentrations. In such case, the sample will be recollected following appropriate remedial steps to eliminate surface air inclusion in the sample.

An upwind ambient air sample will be collected each day of soil vapor sampling. Consistent with the soil vapor sampling approach, the proposed air sampling will also involve use of a pre-cleaned 6-liter SUMMA® canister with an attached flow regulator. However, the regulator for the soil vapor sampling will be adjusted by the laboratory to provide uniform sample collection over an approximate 8-hour sampling period.

Prior to moving to the next sampling location, the sampling location will be confirmed by measurement to the survey marker and all down-hole equipment (i.e., steel rods, expendable point holder) will be decontaminated. Following completion of the sampling activities, the boreholes will be backfilled with bentonite grout. Soil sample liners, recovered soil samples, and used soil vapor sample tubing will be placed in steel 55-gallon drums for off-site transportation and disposal.

The air sample and soil vapor sample Summa canisters will be submitted to TestAmerica Laboratories, Inc. located in Burlington, Vermont for laboratory analysis for VOCs in accordance with USEPA Compendium Method TO-15. The samples will be analyzed for the complete VOC TO-15 analyte list and tentatively identified compounds (TICs). These constituents and their associated detection limits are identified in Table 1. Soil vapor samples from the Summa canisters will also be analyzed for helium using American Society for Testing and Materials (ASTM) Method D1946 to determine if surface air infiltration has occurred. TestAmerica is certified in the State of New York to perform air sample analyses. Laboratory analysis will be performed on a standard turnaround for reporting of analytical results (i.e., 3 to 4 weeks following sample collection).

REPORTING

As provided in the Order on Consent, a report will be prepared following receipt of each phase of the investigation results. The letter report will include:

- A summary of work activities performed and analytical results obtained for the soil vapor investigation
- An evaluation of the soil vapor results, including comparisons to guidance values presented in the NYSDOH Guidance
- Data tables presenting laboratory analytical results
- Figures showing the surveyed air and soil vapor sampling locations and corresponding laboratory analytical results
- Copies of the full laboratory report
- A CD containing the full laboratory analytical data reports
- An assessment of the results
- Proposed future actions

The report will be submitted to the NYSDEC/NYSDOH approximately 6 weeks after receipt of each phase of the final analytical data from the laboratory.

ANTICIPATED SCHEDULE

Bayer/GSH is prepared to implement the proposed soil vapor sampling activities shortly following NYSDEC/NYSDOH approval of this sampling plan and execution of the Order on Consent. The proposed field activities for the first phase will take approximately 2 weeks to arrange and 2 weeks to complete. Preliminary laboratory analytical results for the soil vapor sampling activities will be available approximately 3 to 4 weeks following sampling. As indicated above, a summary letter report on the first phase will be submitted to the NYSDEC/NYSDOH approximately 6 weeks after receipt of the final laboratory analytical data. Thereafter, arrangements for the second phase of sampling will be made and implemented.

We request NYSDEC/NYSDOH approval of the proposed soil vapor sampling activities. Please do not hesitate to contact David Schnelzer of Bayer at 412-777-7603 or Roger Smith at GSH at 972-687-7516 if you have any questions or require additional information.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

James Kay

James K. Kay, P. Eng.

JK/mg/2
Encl.

cc: Thomas Taccone, USEPA
Mark Fisher, The ELM Group
Roger Smith, GSH
David Schnelzer, Bayer

figure 1

PCE SOIL CONCENTRATIONS

Hooker Ruco Site, Hicksville, New York

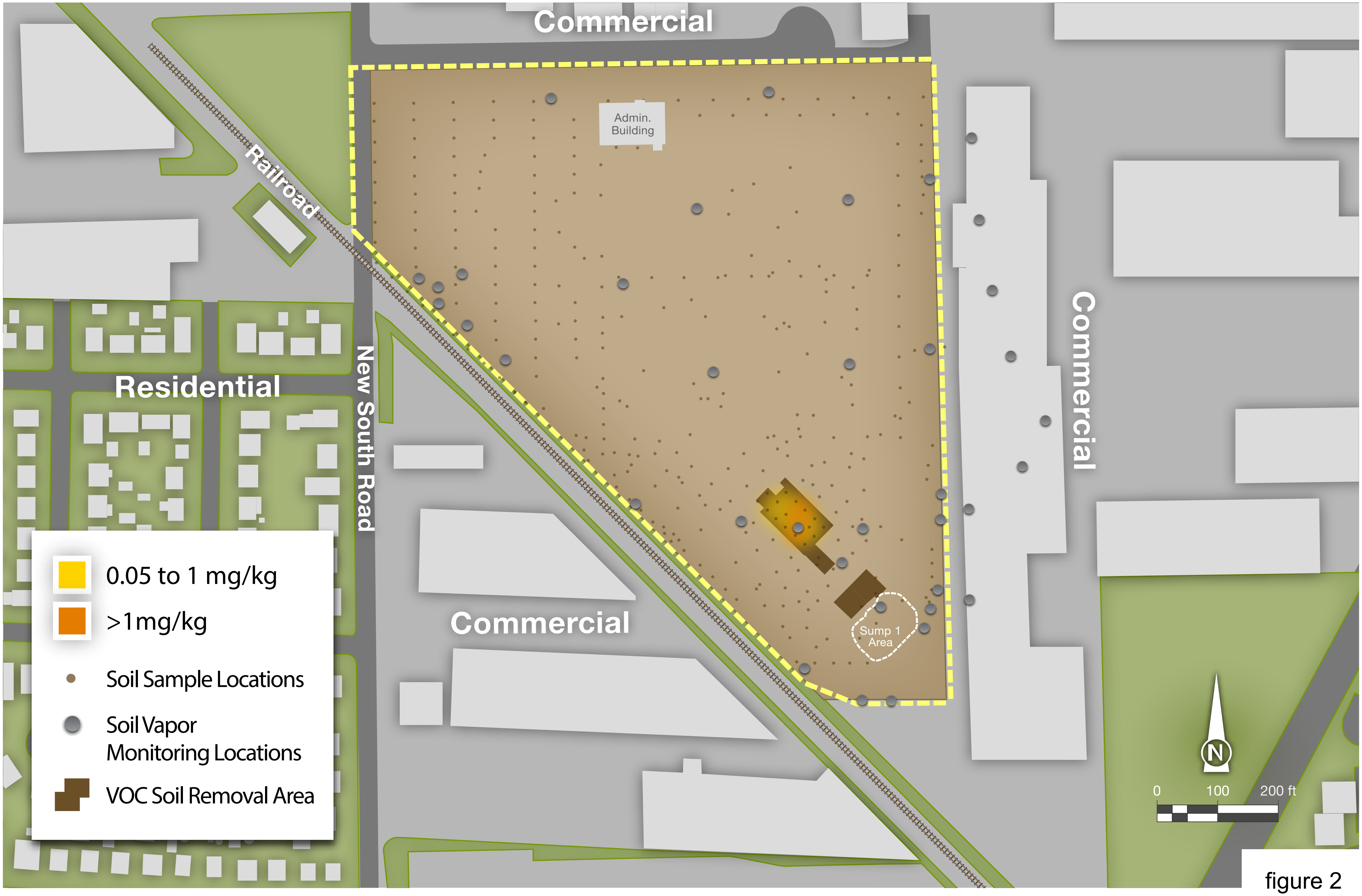

figure 2

TCE SOIL CONCENTRATIONS

Hooker Ruco Site, Hicksville, New York

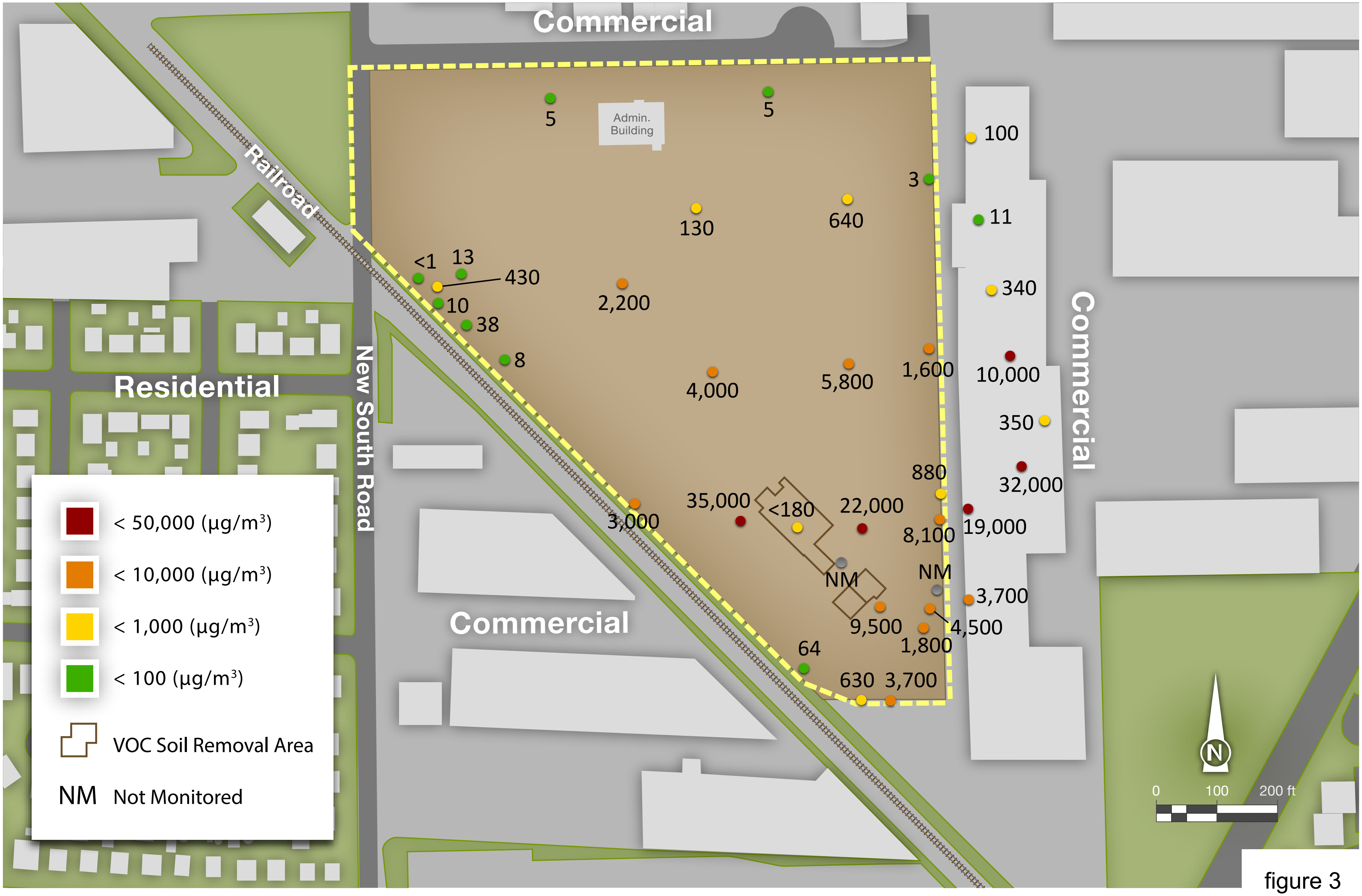

figure 3

MOST RECENT (2007-2011) PCE SHALLOW SOIL VAPOR CONCENTRATIONS

Hooker Ruco Site, Hicksville, New York

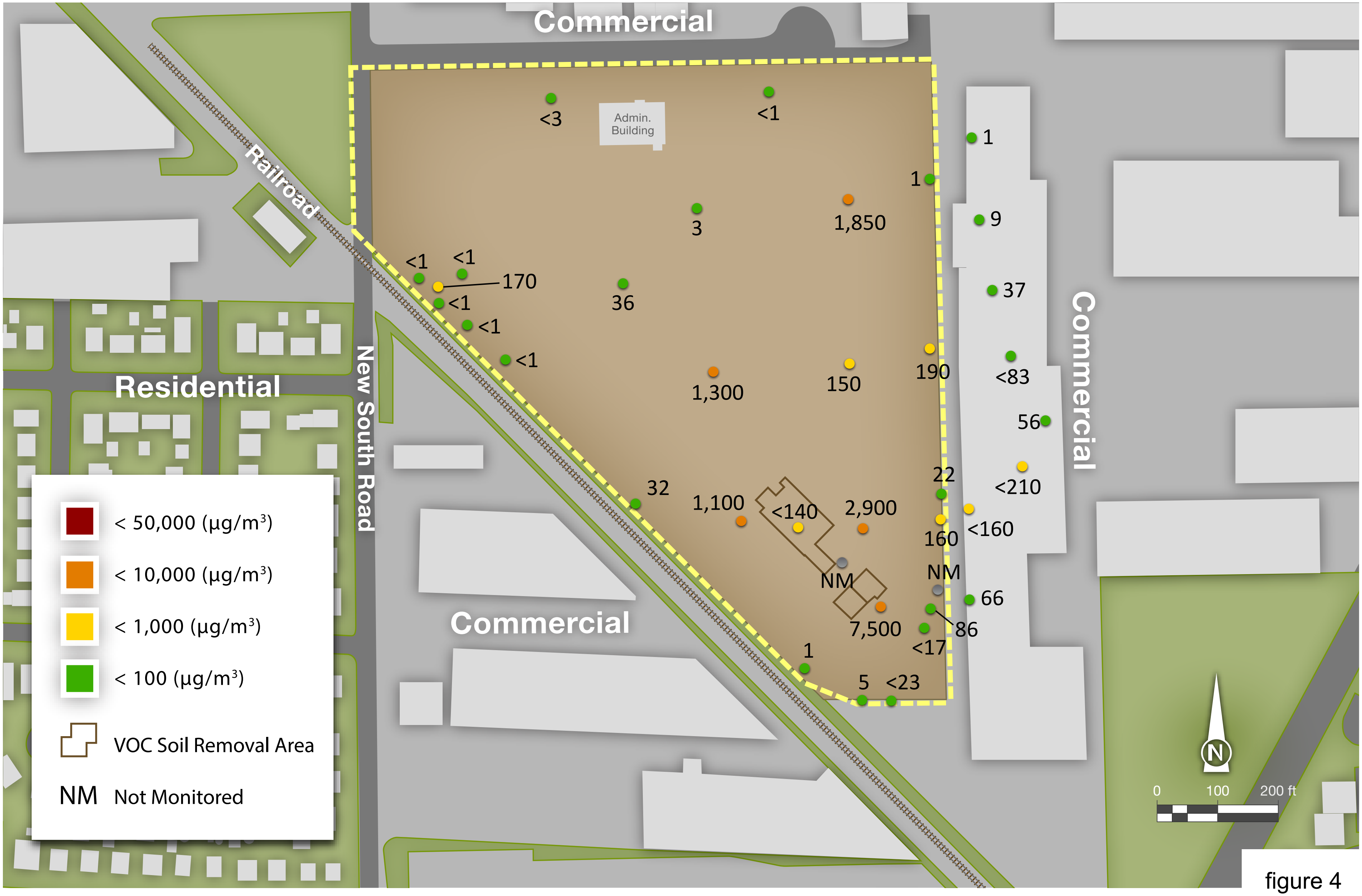

figure 4

MOST RECENT (2007-2011) TCE SHALLOW SOIL VAPOR CONCENTRATIONS

Hooker Ruco Site, Hicksville, New York

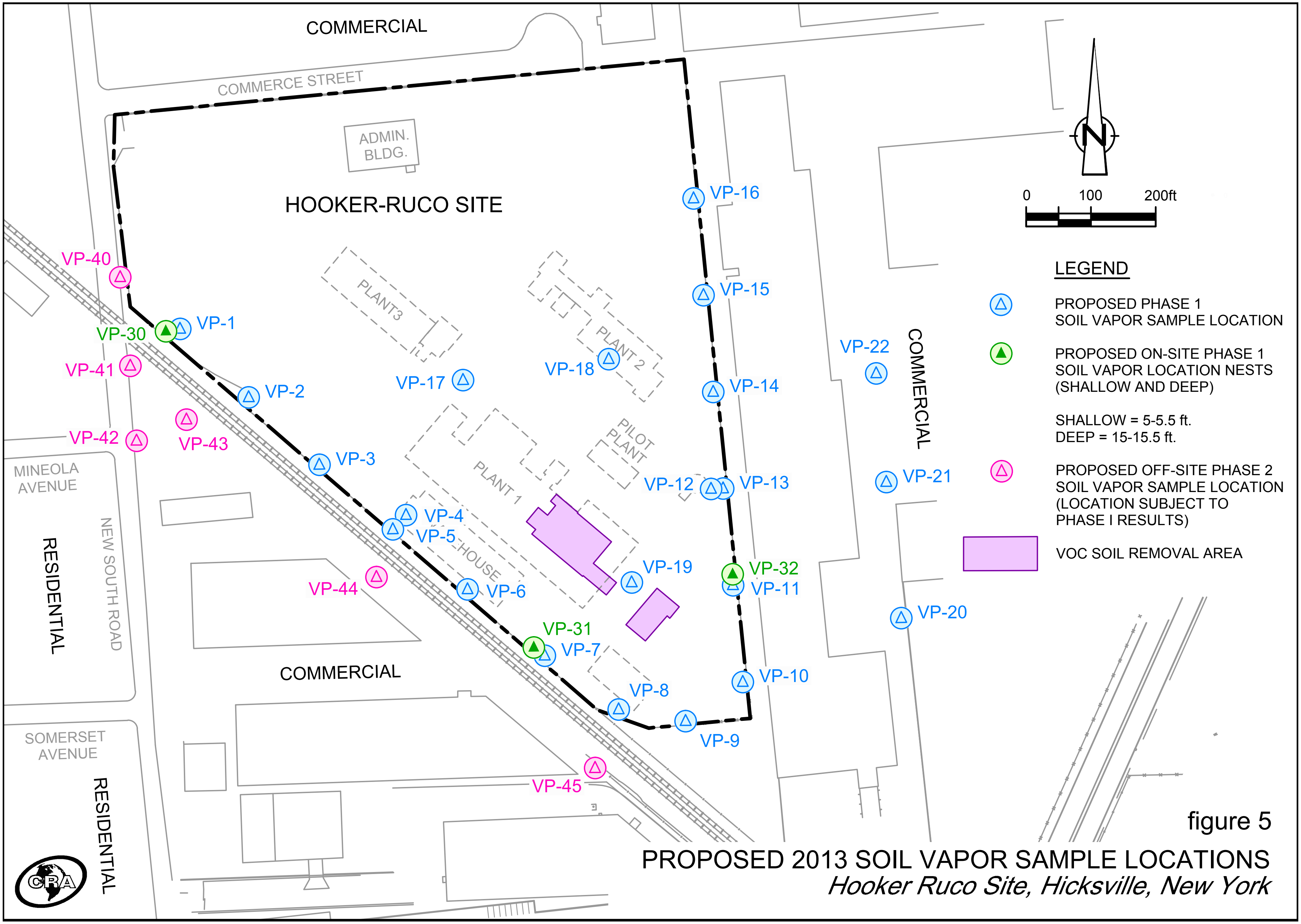

figure 5

PROPOSED 2013 SOIL VAPOR SAMPLE LOCATIONS

Hooker Ruco Site, Hicksville, New York

81618-D22101(SCHA002)GN-WA001 MAY 8/2013

TABLE 1

PROPOSED ANALYTE LIST AND REPORTING LIMITS
SOIL VAPOR INVESTIGATION WORK PLAN
BAYER MATERIALSCIENCE LLC
125 NEW SOUTH ROAD
HICKSVILLE, NEW YORK

Compound	*CAS Number*	*Reporting Limit (ppb v/v)*	*Reporting Limit* $(\mu g/m^3)$	*NYSDOH Indoor Air Guidance Value* $(\mu g/m^3)$
Acetone (2-propanone)	67-64-1	4	10	- -
Benzene	71-43-2	0.16	0.51	- -
Bromodichloromethane	75-27-4	0.16	1.1	- -
Bromoethene	593-60-2	0.16	0.70	- -
Bromoform	75-25-2	0.16	1.7	- -
Bromomethane (Methyl bromide)	74-83-9	0.16	0.62	- -
1,3-Butadiene	106-99-0	0.40	0.88	- -
2-Butanone (Methyl ethyl ketone)	78-93-3	0.4	1.2	- -
Carbon disulfide	75-15-0	0.4	1.2	- -
Carbon tetrachloride	56-23-5	0.16	1.0	- -
Chlorobenzene	108-90-7	0.16	0.74	- -
Chloroethane	75-00-3	0.40	1.06	- -
Chloroform	67-66-3	0.16	0.78	- -
Chloromethane (Methyl chloride)	74-87-3	0.40	0.83	- -
3-Chloropropene (allyl chloride)	107-05-1	0.40	1.25	- -
2-Chlorotoluene (o-Chlorotoluene)	95-49-8	0.16	0.83	- -
Cyclohexane	110-82-7	0.16	0.55	- -
Dibromochloromethane	124-48-1	0.16	1.4	- -
1,2-Dibromoethane	106-93-4	0.16	1.2	- -
1,2-Dichlorobenzene	95-50-1	0.16	1.0	- -
1,3-Dichlorobenzene	541-73-1	0.16	1.0	- -
1,4-Dichlorobenzene	106-46-7	0.16	1.0	- -
Dichlorodifluoromethane (Freon 12)	75-71-8	0.40	1.98	- -
1,1-Dichloroethane	75-34-3	0.16	0.65	- -
1,2-Dichloroethane	107-06-2	0.16	0.65	- -
1,1-Dichloroethene	75-35-4	0.16	0.63	- -
1,2-Dichloroethene (cis)	156-59-2	0.16	0.63	- -
1,2-Dichloroethene (trans)	156-60-5	0.16	0.63	- -
1,2-Dichloropropane	78-87-5	0.16	0.74	- -
cis-1,3-Dichloropropene	10061-01-5	0.16	0.73	- -
trans-1,3-Dichloropropene	10061-02-6	0.16	0.73	- -
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	0.16	1.1	- -
Ethylbenzene	100-41-4	0.16	0.69	- -
4-Ethyltoluene (p-Ethyltoluene)	622-96-8	0.16	0.79	- -
n-Heptane	142-82-5	0.16	0.66	- -
Hexachlorobutadiene	87-68-3	0.16	1.7	- -
n-Hexane	110-54-3	0.40	1.41	- -
Methylene chloride	75-09-2	0.4	1.4	60
4-Methyl-2-pentanone (MIBK)	108-10-1	0.4	1.64	- -
MTBE (Methyl tert-butyl ether)	1634-04-4	0.4	1.4	- -
Styrene	100-42-5	0.16	0.68	- -
Tertiary butyl alcohol (TBA)	75-65-0	4	12	- -
1,1,2,2-Tetrachloroethane	79-34-5	0.16	1.1	- -
Tetrachloroethene (PCE)	127-18-4	0.16	1.1	100
Toluene	108-88-3	0.16	0.60	- -
1,2,4-Trichlorobenzene	120-82-1	0.40	3.0	- -
1,1,1-Trichloroethane	71-55-6	0.16	0.9	- -
1,1,2-Trichloroethane	79-00-5	0.16	0.9	- -
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon TF)	76-13-1	0.16	1.2	- -

TABLE 1

PROPOSED ANALYTE LIST AND REPORTING LIMITS
SOIL VAPOR INVESTIGATION WORK PLAN
BAYER MATERIALSCIENCE LLC
125 NEW SOUTH ROAD
HICKSVILLE, NEW YORK

Compound	*CAS Number*	*Reporting Limit (ppb v/v)*	*Reporting Limit (µg/m³)*	*NYSDOH Indoor Air Guidance Value (µg/m³)*
Trichloroethene (TCE)	79-01-6	0.16	0.86	5
Trichlorofluoromethane (Freon 11)	75-69-4	0.16	0.9	- -
1,2,4-Trimethylbenzene	95-63-6	0.16	0.79	- -
1,3,5-Trimethylbenzene	108-67-8	0.16	0.79	- -
2,2,4-Trimethylpentane	540-84-1	0.16	0.75	- -
Vinyl chloride	75-01-4	0.16	0.41	- -
Xylenes (m&p)	1330-20-7	0.40	1.74	- -
Xylenes (o)	95-47-6	0.16	0.69	- -
1,2-Dichloroethene (total)	540-59-0	0.16	0.63	- -
1,4-Dioxane	123-91-1	4.0	14	- -
Isopropyl Alcohol	67-63-0	4.0	10.0	- -
Methyl Butyl Ketone	591-78-6	0.4	1.64	- -
Tetrahydrofuran	109-99-9	4.0	12	- -
Helium	7440-59-7	0.2%		

Notes:

1. Analyses to be performed by Severn Trent Laboratories, Inc. (STL) of Burlington, Vermont using the following methods:
   - United States Environmental Protection Agency (USEPA) Method TO-15 for volatile organic compounds (VOCs); and
   - American Society for Testing and Materials (ASTM) Method D1946 for helium.
2. CAS = Chemical Abstract Service.
3. ppb (v/v) = parts per billion volumetric basis.
4. µg/m³ = micrograms per cubic meter.
5. -- = Not available.
6. NYSDOH Indoor Air Guidance Value is from Table 3.1 of the "Guidance for Evaluating Soil Vapor in the State of New York" (NYSDOH, October 2006).
7. Shading designates VOCs detected in soil samples previously collected at the site as part of the 2004 RCRA Facility Investigation, the 2005 Interim Corrective Measure, and the 2006 Phase I through Phase III pre-design soil sampling activities.

TABLE 2

PROPOSED SOIL VAPOR SAMPLING PROBE DETAILS
BAYER MATERIAL SCIENCE LLC
125 NEW SOUTH ROAD
HICKSVILLE, NEW YORK

	Sampling Interval (ft bgs)	
Vapor Probe ID	***Phase I***	***Phase II***
VP-1	5.0 to 5.5	
VP-2	5.0 to 5.5	
VP-3	5.0 to 5.5	
VP-4	5.0 to 5.5	
VP-5	5.0 to 5.5	
VP-6	5.0 to 5.5	
VP-7a	5.0 to 5.5	
VP-7b	15.0 to 15.5	
VP-8	5.0 to 5.5	
VP-9	5.0 to 5.5	
VP-10	5.0 to 5.5	
VP-11a	5.0 to 5.5	
VP-11b	15.0 to 15.5	
VP-12	5.0 to 5.5	
VP-13	5.0 to 5.5	
VP-14	5.0 to 5.5	
VP-15	5.0 to 5.5	
VP-16	5.0 to 5.5	
VP-17	5.0 to 5.5	
VP-18	5.0 to 5.5	
VP-19	5.0 to 5.5	
VP-20	5.0 to 5.5	
VP-21	5.0 to 5.5	
VP-22	5.0 to 5.5	
VP-23a	5.0 to 5.5	
VP-23b	15.0 to 15.5	
VP-40		5.0 to 5.5
VP-41		5.0 to 5.5
VP-42		5.0 to 5.5
VP-43		5.0 to 5.5
VP-44		5.0 to 5.5
VP-45		5.0 to 5.5

Notes:

(1) All sampling probes are currently planned to be tempora

ATTACHMENT 1

ARCADIS BBL

Attachment 1

Standard Operating Procedure:
Soil Vapor Sampling and Analysis Using USEPA Method TO-15

Standard Operating Procedure: Soil Vapor Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This document describes the procedures to install a temporary soil vapor sampling point and collect soil vapor samples for the analysis of volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). The TO-15 method uses a passivated stainless steel canister to collect a whole-air sample that is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS).

The following sections list the necessary equipment and detailed instructions for installing temporary soil vapor sampling points and collecting samples for VOC analysis.

II. Personnel Qualifications

ARCADIS BBL field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, site-specific training, first-aid, and cardiopulmonary resuscitation (CPR), as needed. ARCADIS BBL field sampling personnel will be well versed in the relevant standard operating procedures (SOPs) and possess the required skills and experience necessary to successfully complete the desired field work. ARCADIS BBL personnel responsible for leading soil vapor sample collection activities must have previous soil vapor sampling experience.

III. Equipment List

The equipment required to <u>install a temporary soil vapor point</u> is presented below:

- Direct-push rig (e.g., PowerProbe™ or Geoprobe®) equipped with interconnecting 4-foot lengths of 1.25 inch-diameter steel rods;
- Expendable points (one per sample);
- Expendable point holder, and appropriate twist-to-lock connector;
- Photoionization detector (PID);
- High-density polyethylene (HDPE) tubing;
- Non-coated bentonite;
- Appropriate PPE (as required by the Health and Safety Plan); and

- Digital camera.

The equipment required for vapor sample collection is presented below:

- Stainless steel SUMMA® canisters (order at least one extra, if feasible);
- Flow controllers with in-line particulate filters and vacuum gauges; flow controllers are pre-calibrated to specified sample duration (e.g., 30 minutes, 8 hours, 24 hours) or flow rate (e.g., 200 milliliters per minute [mL/min]); confirm with the laboratory that the flow controller comes with an in-line particulate filter and pressure gauge (order at least one extra, if feasible);
- 1/4-inch or 3/16-inch ID tubing (Teflon®, HDPE, fluoropolymer, or similar);
- Twist-to-lock fittings;
- Stainless steel "T" fitting (if collecting duplicate [i.e., split] samples);
- Portable vacuum pump capable of producing very low flow rates (e.g., 100 to 200 mL/min);
- Rotameter or an electric flow sensor if vacuum pump does not have a flow gauge;
- Tracer gas source (e.g., helium);
- PID;
- Appropriate-sized open-end wrench (typically 9/16-inch);
- Chain-of-custody (COC) form;
- Sample collection log (a sample is attached); and
- Field notebook.

IV. Cautions

Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens, wear/apply fragrances, or smoke cigarettes/cigars before and/or during the sampling event

Care should also be taken to ensure that the flow controller is pre-calibrated to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, but sample integrity can be compromised if the event is extended to the time that the canister reaches atmospheric pressure.

Care must be taken to properly seal around the steel rods and tubing at the ground surface to prevent leakage of atmosphere into the soil vapor point during purging and sampling. Temporary points are to be sealed at the surface using hydrated bentonite.

V. Health and Safety Considerations

Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances. For soil vapor sampling point installation, the direct-push rig should be operated only by personnel with prior experience using such a piece of equipment.

VI. Procedures

Temporary Soil Vapor Point Installation

Temporary soil vapor points are installed using a direct push rig to advance an assembly of interconnected 4-foot lengths of 1.25"-diameter steel probe rod, affixed with an expendable point holder and expendable point at the downhole end, to the desired sampling depth. Hydrated bentonite is used to seal the annular space (if any) between the steel rod and borehole wall to isolate the subsurface interval from the atmospheric air. After the target depth is reached, the expendable point is disengaged by hydraulically retracting the steel probe rods upwards approximately 0.5-feet to create a void in the subsurface soil for soil gas collection. An HDPE or fluoropolymer sample delivery tube (3/16" or 1/4" inside diameter) with an attached Post-Run-Tubing (PRT) threaded adapter is lowered through the 1.25"-diameter steel rod and threaded into the expendable point holder. The tubing will be purged with a portable sampling pump prior to collecting the vapor sample.

1. Advance an assembly consisting of interconnected lengths of decontaminated 1.25-inch-diameter steel drive rods, affixed with an expendable point holder and expendable point at the downhole end, to the bottom of the desired sampling interval.

2. Cut a length of sample collection tubing slightly longer (e.g., 2 to 3 feet) than the collection depth. Attach a twist-to-lock connector to one end of the sample collection tubing and lower the twist-to-lock connector and attached tubing through the drive rods. Thread the twist-to-lock connector into the expendable point holder, by twisting counterclockwise.

3. Hydraulically retract the sampling assembly approximately 6 inches or more if needed, allowing the expendable point to fall off, and creating a void in the subsurface for soil gas sample collection.

4. Fill annular space between the steel drive rod and the borehole wall (if any) with hydrated bentonite. Typically, only a bentonite surface seal is needed since there is no annular space between the steel drive rods and the borehole wall.

5. Proceed to vapor sample collection.

6. When soil vapor sampling is complete, backfill the borehole with bentonite grout.

Soil Vapor Sample Collection

Preparation of Stainless Steel Canister and Collection of Sample

1. Record the following information in the field notebook/sample collection logs, if appropriate (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the information):

    a. wind speed and direction;
    b. ambient temperature;
    c. barometric pressure; and
    d. relative humidity.

2. A tracer gas (helium) will be used in connection with the soil vapor sampling to provide a means to evaluate whether the soil vapor samples are diluted by surface air. A 5 gallon plastic pail will be placed over the soil vapor sampling location, and hydrated bentonite will be used to create a seal between the pail and the ground surface and penetration for the downhole tooling (at the top of the pail to create a containment unit within the pail). Prior to sampling, helium will be introduced into the pail through a fitting on the side of the pail to create a minimum 50 percent helium content level within the pail. The helium levels in the purge gas and in the pail (prior to and immediately after sampling) will be measured using a gas detector. In the event that the helium meter measures a helium content within the sampling assembly of greater than 10 percent of the helium content measured within the containment unit (e.g., 5 percent for 50 percent helium in the containment unit), the soil gas probe will be considered to permit significant leakage such that the collected soil gas sample will not be considered reliable or representative of soil gas concentrations. In such case,

the sample will be recollected following appropriate remedial steps to eliminate surface air inclusion in the sample.

3. Remove the brass plug (dust cap) from the sampling canister and connect the flow controller with in-line particulate filter and vacuum gauge to the canister. Do not open the valve on the canister. Record in the field notebook/sample collection log and on the COC form the flow controller number with the appropriate canister number.

4. Connect the flow controller, sample collection tubing, and purge pump to a T-connection equipped with a valve. Be sure the purge pump is connected to the valved opening of the T-connection. Open the valve on the T-connection and purge 1 to 2 (target 1.5) volumes of air from the sampling line using the purge pump [purge volume = 1.5 Pi r^2h] at a rate of approximately 100 mL/min. An electronic flow sensor will be used to measure pump flow rate. Close the Swagelock™ valve on the T-connection following purging. Disconnect the pump and attach a PID with a 10.6 eV lamp to the tubing to measure approximate total organic vapor levels.

5. Open the *valve* on the sampling canister. Record the initial canister vacuum pressure in the field notebook/sample collection log and COC form. If the initial vacuum pressure does not register less than -28 inches of Hg, then the canister is not appropriate for use and another canister should be used (if this occurs, return to Step 2).

6. Record in the field notebook/sample collection log the time sampling began and take a photograph of the canister and surrounding area.

Termination of Sample Collection

1. Arrive at the canister location at least 10 to 15 minutes prior to the end of the required sampling interval.

2. Stop collecting the sample by closing the canister *valve.* Record the final vacuum pressure. The canister should have a minimum amount of vacuum (approximately 2 inches of Hg or slightly greater).

3. Record the date and local time (24-hour basis) of valve closing in the field notebook/sample collection log and COC form.

4. Remove the particulate filter and flow controller from the canister, re-install the brass plug on the canister fitting, and tighten with the appropriate wrench.

5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The canister does not

require preservation with ice or refrigeration during shipment.

6. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with a string).

7. Complete the COC form and place the requisite copies in a shipping container. If shipping by courier service (e.g. FedEx) close the shipping container and affix a custody seal to the container closure. Ship the container to the laboratory *via* overnight carrier for analysis. If transporting directly to laboratory or for laboratory sample pick up, follow standard Chain of Custody procedures.

Soil Vapor Monitoring Point Abandonment

Once the soil vapor samples have been collected, the soil vapor monitoring points will be abandoned by removing the drive rods and filling the resulting hole with bentonite.

VII. Waste Management

Field personnel will collect and containerize all investigation-derived waste materials (including disposable equipment) for proper disposal.

VIII. Data Recording and Management

Measurements will be recorded on field sample collection logs or in the field notebook at the time of measurement with notations of the project name, sample date, sample start and finish time, sample location (e.g., GPS coordinates, distance from permanent structure, canister serial number, flow controller serial number, initial vacuum reading, and final pressure reading. Field sampling logs and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Vapor sample analysis will be performed using USEPA TO-15 methodology. This method uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits. The GC/MS system requires a 1-liter gas sample (which can easily be recovered from a 6-liter canister) to provide a 0.5-ppbv detection limit. The 6-liter canister also provides several additional 1-liter samples in case subsequent re-analyses or dilutions are required. This system also offers the advantage of the GC/MS detector, which confirms the identity of detected compounds by evaluating their mass spectra in either the SCAN or SIM mode.

X. References

New York State Department of Health (NYSDOH). 2006. "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" October 2006.

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Soil Gas Sample Collection Log

(Page 1 of 2)

Sample ID:

Client:		Date/Day:	
Project:		Weather:	
Location:		Temperature:	
Project#:		Wind Speed/Direction:	
Samplers:		Subcontractor:	
Logged By:		Equipment:	
Coordinates:		Moisture Content of Sampling Zone (circle one):	Dry / Moist
Sampling Depth:			
Probe (circle one):	Permanent / Temporary	Approximate Purge Volume:	
Time of Collection:	Start: Finish:	Background PID Ambient Air Reading:	

Nearby Groundwater Monitoring Wells/Water Levels:

Well ID	Depth to Groundwater (feet)

SUMMA Canister Information

Size (circle one): 1L 6L

Canister ID: ____________________

Flow Controller ID: -

Tracer Gas Information (if applicable)

Tracer Gas: -

Canister Pressure (inches Hg):

Reported By Laboratory	Measured Prior to Sample Collection	Measured Following Sample Collection

Tracer Gas Concentration (if applicable):

Measured in Purge Effluent	Measured in 'Concentrated' Area Prior to Sample Collection	Measured in 'Concentrated' Area Following Sample Collection

Weather Conditions	Start of Sample Collection	End of Sample Collection
Temperature		
Humidity		
Wind Velocity		
PID		

Approximating One-Well Volume (for purging):
When using 1.25.-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL.
Each foot of 0.25-inch tubing will have a volume of approximately I0 mL.

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Soil Gas Sample Collection Log

(Page2 of2)

Sample ID:

General Observations/Notes:

ATTACHMENT 2

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Attachment 2

Standard Operating Procedure:
Ambient Air Sampling and
Analysis Using USEPA Method
TO-15

Standard Operating Procedure: Ambient Air Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This standard operating procedure (SOP) describes the procedures to collect ambient air samples for the analysis of volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). The TO-15 method uses a passivated stainless steel canister to collect a whole-air sample that is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS).

The following sections list the necessary equipment and provide detailed instructions for placing the sampling device and collecting ambient air samples for VOC analysis.

II. Personnel Qualifications

ARCADIS BBL field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, site-specific training, first aid, and cardiopulmonary resuscitation (CPR), as needed. ARCADIS BBL field sampling personnel will be well versed in the relevant SOPs and possess the required skills and experience necessary to successfully complete the desired field work. ARCADIS BBL personnel responsible for leading ambient air sample collection activities must have previous ambient air sampling experience.

III. Equipment List

The equipment required for ambient air sample collection is presented below:

- 6-liter, stainless steel SUMMA® canisters (order at least one extra, if feasible);
- Flow controllers with in-line particulate filters and vacuum gauges (flow controllers are pre-calibrated by the laboratory to a specified sample duration [e.g., 8-hour, 24-hour]). Confirm with lab that flow controller comes with in-line particulate filter and pressure gauge (order an extra set for each extra SUMMA® canister, if feasible);
- Appropriate-sized open-end wrench (typically 9/16-inch);
- Chain-of-custody (COC) form;
- Sample collection log;
- Field notebook;

- Sample collection logs (a sample is attached);
- Digital camera;
- Lock and chain; and
- Ladder or similar to hold canister above the ground surface (optional).

IV. **Cautions**

Care must be taken to minimize the potential for introducing interferences during the sampling event. As such, care must be taken to keep the canister away from heavy pedestrian traffic areas (e.g., main entranceways, walkways). If the canister is not to be overseen for the entire sample duration, precautions should be taken to maintain the security of the sample (e.g., do not place in areas regularly accessed by the public, fasten the sampling device to a secure object using lock and chain, label the canister to indicate it is part of a scientific project, place the canister in secure housing that does not disrupt the integrity/validity of the sampling event). Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens, wear/apply fragrances, or smoke cigarettes before and/or during the sampling event.

Care should also be taken to ensure that the flow controller is pre-calibrated to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, but sample integrity can be compromised if the event is extended to the point that the canister reaches atmospheric pressure.

V. Health and Safety Considerations

Field sampling equipment must be carefully handled to minimize the potential for injury and the spread of hazardous substances.

VI. Procedures

Preparation of Stainless Steel Canister and Collection of Sample

1. Record the following information in the field notebook/sample collection log (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the following information):

    a. wind speed and direction;

   b. ambient temperature;
   c. barometric pressure; and
   d. relative humidity.

2. Choose the sample location in accordance with the sampling plan. If a breathing zone sample is required, place the canister on a ladder, tripod, or other similar stand to locate the canister orifice 3 to 5 feet above ground or floor surface. If the canister will not be overseen for the entire sampling period, secure the canister as appropriate (e.g., lock and chain).

3. Record canister serial number and flow controller number in the field notebook/sample collection log and COC form. Assign sample identification on canister ID tag, and record in the field notebook/sample collection log and COC form.

4. Remove the brass plug (dust cap) from the canister. Attach the flow controller with in-line particulate filter and vacuum gauge (leave swage-lock cap on the vacuum gauge during this procedure) to the canister with the appropriate-sized wrench. Tighten with fingers first, then gently with the wrench.

5. Open the canister valve to initiate sample collection. Record the date and local time (24-hour basis) of valve opening in the field notebook/sample collection log and COC form.

6. Record the initial canister vacuum pressure in the field notebook/sample collection log and COC form. If the initial vacuum pressure does not register less than -28 inches of Hg, then the canister is not appropriate for use and another canister should be used.

7. Take a photograph of the canister and surrounding area.

Termination of Sample Collection

1. Arrive at the canister location at least 10 to 15 minutes prior to the end of the sampling interval (e.g., 8-hour).

2. Stop collecting the sample when the canister vacuum reaches approximately 2 inches of Hg (leaving some vacuum in the canister provides a way to verify if the canister leaks before it reaches the laboratory) or when the desired sample time has elapsed.

3. Record the final vacuum pressure. Stop collecting the sample by closing the canister valve. Record the date, local time (24-hour basis) of valve closing in the field notebook/sample collection log and COC form.

4. Remove the particulate filter and flow controller from the canister, re-install brass plug on canister fitting, and tighten with wrench.

5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The canister does not require preservation with ice or refrigeration during shipment.

6. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with string).

7. Complete COC form and place requisite copies in shipping container. Close shipping container and affix custody seal to container closure. Ship to laboratory via overnight carrier (e.g., Federal Express) for analysis.

VII. Waste Management

No specific waste management procedures are required.

VIII. Data Recording and Management

Measurements will be recorded on field sample collection logs or in the field notebook at the time of measurement, with notations of project name, sample date, sample start and finish times, sample location (e.g., description and GPS coordinates if available), canister serial number, flow controller number, initial vacuum reading, and final vacuum reading. Field notebooks/sample collection logs and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Ambient air sample analysis will be performed using USEPA Method TO-15. This method uses a quadrupole or ion-trap GC/MS with a capillary column to provide optimum detection limits. The GC/MS system requires a 1-liter gas sample (which can easily be recovered from a 6-liter canister) to provide a 0.5 ppbv detection limit. The 6-liter canister also provides several additional 1-liter samples in case subsequent re-analyses or dilutions are required. This system also offers the advantage of the GC/MS detector, which confirms the identity of detected compounds by evaluating their mass spectra in either the SCAN or SIM mode.

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Indoor/Ambient Air Sample Collection Log

Sample ID:

Client:		Date/Day:	
Project:		Sample Intake Height:	
Location:		Subcontractor:	
---P_ro_j'--e_ct_#_: Samplers:		Miscellaneous Equipment:	
Coordinates:		Time Start:	
Outdoor/Indoor:		Time Stop:	

<u>Instrument Readings:</u>

Time	Canister Pressure (inches Hg)	Temperature (F or C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure	PID (ppm or ppb)

<u>SUMMA Canister Information</u>

Size (circle one): 1L 6L

Canister ID: ______________

Flow Controller ID: ______________

<u>General Observations/Notes:</u>
