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Infrastructure, environment, facilities

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ENVIRONMENT

Ms. Alicia Barraza
New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Solid Waste and Corrective Action
625 Broadway
Albany, New York 12233-7258

Subject:
Bayer MaterialScience LLC
125 New South Road
Hicksville, New York
USEPA ID#: NYD002920312
Site-Wide Soil Vapor Investigation

Date:
July 26, 2007

Contact:
John C. Brussel, PE

Phone:
315.671.9441

Email:
John.Brussel@arcadis-us.com

Our ref:
2253.32305 #5

Dear Ms. Barraza:

On behalf of Bayer MaterialScience LLC (Bayer), this letter presents a revised work plan for a site-wide soil vapor investigation at the above-referenced site. The work plan was originally submitted to the New York State Department of Environmental Conservation (NYSDEC) in a letter dated March 15, 2007. The NYSDEC provided an initial round of comments on the work plan in a letter dated May 8, 2007. Bayer's response to the NYSDEC's initial round of comments is provided in e-mail correspondence from ARCADIS of New York, Inc. (ARCADIS BBL) to the NYSDEC dated June 1, 2007. The NYSDEC provided a second round of comments in a letter dated June 14, 2007. The comments were discussed with the NYSDEC on June 20, 2007, and the NYSDEC provided a follow-up clarification in e-mail correspondence dated July 13, 2007. This revised work plan addresses the NYSDEC's two rounds of comments and clarification.

The activities described in this work plan will provide data for a site-wide evaluation of soil vapor conditions, including conditions in and around the former Plant 1 area where volatile organic compound- (VOC-) impacted soils were identified during foundation demolition activities in late December 2005. The VOC-impacted soils in the Plant 1 area were delineated by sampling activities performed in 2005 and 2006 (the "Phase I through III" pre-design sampling activities, as discussed below). The activities described in this work plan will also provide data for use in evaluating potential vapor intrusion mitigation measures as part of the upcoming Corrective Measures Study (CMS).

Polychlorinated biphenyl- (PCB-) impacted soils in the Plant 1 area continue to be delineated. Results for Phase VI pre-design soil sampling activities were recently submitted to the NYSDEC. Bayer originally anticipated that the PCB- and VOC-impacted soils would be addressed concurrently via an interim corrective measure (ICM) and that soil vapor sampling would be performed after the impacted soils were addressed. However, as agreed by the NYSDEC during a January 29, 2007 meeting, the PCB- and VOC-impacted soils (and potential VOC soil vapors) will be addressed via final corrective measures to be evaluated in the CMS.

Relevant background information related to the proposed soil vapor investigation, including a summary of previous VOC soil and soil vapor sampling, is presented below, followed by a discussion of the proposed additional soil vapor sampling activities.

I. BACKGROUND

VOC soil vapor sampling activities were previously performed at the site as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation (RI) in 1989. VOC soil sampling was performed most recently, as part of the two-phase Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) in 2004, an ICM in 2005, and Phase I through Phase VI pre-design sampling activities between late 2005 and 2007. These sampling activities and results are briefly summarized below.

Summary of Previous VOC Soil Vapor Sampling

Soil vapor samples were collected during the CERCLA RI at 55 locations that provided coverage 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 trichlorethene (TCE), tetrachloroethene (PCE), trans-1,2-dichloroethylene, and vinyl chloride monomer, was performed using portable gas chromatography. Based on the analytical results, PCE was the only VOC identified in the soil vapor samples. PCE was detected at only two soil vapor sampling locations – one location southeast of Plant 1 and one location northwest of Plant 2. However, the detection limits were higher than those that can be achieved using current analytical methods, and improvements to soil vapor sampling methodologies have been made since 1989.

Details of the previous soil vapor sampling are presented in the *Remedial Investigation Report* (Leggette, Brashears & Graham, Inc., Revised August 1992). Sections of the report related to the previous soil vapor sampling, including applicable tables and a figure, were provided to the NYSDEC in e-mail correspondence from ARCADIS BBL dated July 11, 2006. The soil gas summary was subsequently reviewed by the New York State Department of Health (NYSDOH), and comments were forwarded to Bayer in a January 22, 2007 letter from the NYSDEC. These comments have been considered in preparing this work plan.

Summary of Previous VOC Soil Sampling

Soil samples from nearly 170 locations have been analyzed for VOCs since the start of the RFI in February 2004. The VOC soil sampling locations and color-coded analytical results (concentration ranges) are shown on Figure 1. Details of the VOC soil sampling programs are included in the following documents, which have been 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 VI Pre-Design Soil Sampling Plan contained in a letter from ARCADIS BBL to the NYSDEC dated March 5, 2007 and follow-up e-mail correspondence from ARCADIS BBL dated April 9, 2007.

A total of 19 individual VOC constituents have been detected in the soil samples collected as part of the 2004 RFI, the 2005 ICM, and the 2005-2007 Phase I through Phase VI pre-design soil sampling activities. However, outside the Plant 1 area, 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). Nine VOCs were identified in the Plant 1 area soils at concentrations exceeding the TAGM 4046 soil guidance values. These VOCs

include acetone, 2-butanone, methylene chloride, 4-methyl-2-pentanone, PCE, trans-1,2-DCE, TCE, vinyl chloride, and xylenes. The VOC-impacted soils in the Plant 1 area are currently covered with polyethylene sheeting to minimize infiltration and release of VOCs to ambient air. These soils will be addressed via a final corrective measure to be determined during the CMS.

Based on the identification of VOC-impacted soils beneath the former Plant 1 floor slab and the elevated detection limits for the soil vapor sampling performed during the RI, site-wide soil vapor sampling will be performed, as discussed below.

II. PROPOSED SOIL VAPOR SAMPLING

The proposed sampling locations and rationale for the soil vapor investigation are discussed below, followed by the proposed sampling methods, quality assurance quality control (QA/QC) measures, laboratory analytical methods, and equipment decontamination and waste management measures.

Sampling Locations

As part of the proposed soil vapor investigation, soil vapor samples will be collected at 18 sampling locations (locations SG-1 through SG-18, as shown on Figure 1). The proposed sampling locations have been selected to provide coverage across the site, including in areas where building construction may occur during site redevelopment, within/near the footprints of the former plant buildings, near the areas where PCE was previously identified during the 1989 assessment, and in various paved areas. A proposed soil gas sampling summary, which identifies each soil gas sampling location and sampling rationale, is presented in the table below.

Sample ID	Sampling Location	Sampling Rationale
Locations Within Potential New Building Footprint		
Southern Section of Potential New Building		
SG-1	Immediately Northeast of the Plant 1 Building Footprint (Northeast of the VOC-Impacted Soil area)	To evaluate potential "worst-case" conditions beneath the future onsite building (i.e., within and near the existing VOC-impacted soil area)
SG-2	Within the Eastern Portion of the Plant 1 Building Footprint (Directly Within the VOC-Impacted Soil Area)	

Sample ID	Sampling Location	Sampling Rationale
SG-3	Along South End of the Plant 1 Building Footprint (Southwest of the VOC-Impacted Soil Area)	
Middle Section of Potential New Building		
SG-4	Within the Plant 2 Building Footprint	To evaluate potential soil vapor migration from the VOC-impacted soil area and potential conditions beneath the future onsite building
SG-5	West of the Plant 1 Building Footprint	
Northern Section of Potential New Building		
SG-6	Northwest of the Plant 2 Building Footprint	To evaluate potential conditions beneath the future onsite building. Note that location SG-6 is within approximately 50 feet of former location SG-76, where PCE was identified during the 1989 soil gas survey
SG-7	North of the Plant 3 Building Footprint	
SG-8	Within the Plant 3 Building Footprint	
Locations Outside Potential New Building Footprint		
SG-9	East of the VOC-Impacted Soil Area	To evaluate potential soil vapor migration
SG-10	Along the Southern Property Boundary	To evaluate potential soil vapor migration and conditions along the property boundary. Note that location SG-12 is within approximately 50 feet of former location SG-51, where PCE was identified during the 1989 soil gas survey
SG-11		
SG-12		
SG-13	Along the Eastern Property Boundary	To evaluate potential soil vapor migration and conditions near the existing and former rainwater runoff sumps/recharge basins at the property boundary
SG-14		
SG-15		
SG-16		
SG-17	Along the Northern Property Boundary	To evaluate potential conditions along the property boundary
SG-18		

Before the soil vapor sampling begins, an ARCADIS BBL 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. Each proposed final sampling location will then be surveyed and marked using a flagged, wooden stake.

Sampling Methods

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 October 2006 Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH VI Guidance) was used in the development of these SOPs.

In accordance with the NYSDOH VI Guidance, samples will be collected at depths greater than 5 feet below the ground surface (bgs) to reduce the likelihood of atmospheric air being introduced into the samples. Sample collection is proposed for the 5 to 5.5 foot interval bgs at each location, which is consistent with the depth of foundation footings for typical buildings in the nearby area. It is also consistent with the depth of potential subsurface utilities to remain or be installed as part of the anticipated site redevelopment. The sampling interval will be limited to approximately 6-inches to reduce potential sample dilution that could otherwise occur across a larger interval. Vertical profile sampling is not proposed because, as observed during completion of the RFI soil borings, subsurface soil conditions at the site are relatively uniform and potential confining layers are not apparent.

As part of the soil vapor investigation, a direct-push (i.e., Geoprobe® rig) will be used to collect soil samples continuously to a depth of approximately 5.5 feet deep at a distance of approximately 5 feet from each proposed soil vapor sampling point. Soils removed from the boring will be characterized for color, texture, moisture, density, cohesion, plasticity and indication (if any) of staining or obvious odor. The proposed sampling plan may be adjusted, as appropriate (with concurrence from Bayer and the NYSDEC) based on the soil conditions encountered. Digital photos will be taken to document soil conditions and subsequent soil gas probe installation. The soil borings will be backfilled with bentonite grout prior to installation of the adjacent temporary soil vapor sampling probes.

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 feet 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.

An initial gas draw (purging) will be performed prior to sampling to remove atmospheric gas from the system and charge the sampling apparatus with soil vapor in preparation for collection of a representative sample (as discussed below). 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 will be conducted in accordance with United States Environmental Protection Agency (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)." 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 (in. of Hg). 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 in. of Hg, 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.

Two upwind ambient air samples will be collected in support of the soil vapor sampling, including one on the first day of sampling and one mid-way through the sampling program. 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 regulators for the ambient air samples will be adjusted by the laboratory to provide uniform sample collection over an approximate 8-hour sampling period.

Quality Assurance/Quality Control

Key QA/QC measures to be implemented in connection with the soil vapor sampling include obtaining multiple canister vacuum readings, using a tracer gas, and collecting and analyzing duplicate samples, as discussed below.

Four sets of SUMMA® canister 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; and (4) prior to analysis in the laboratory. Vacuum readings (1) and (2) are expected to be within 1.5 in. of Hg, as are vacuum readings (3) and (4). Additional canisters will be available in the field for use in the event that vacuum reading (2) is less than reading (1) by >1.5 in. of Hg. If vacuum readings (3) and (4) are outside of 1.5 in. of Hg, the vacuum differences will be taking into consideration during the results evaluation, and the results will be qualified, as needed.

A tracer gas (helium) will be used in connection with the soil vapor sampling to evaluate the integrity of the seals around the soil vapor probe (provide a means to evaluate whether the soil vapor samples are diluted by surface air). A 5-gallon plastic pail (bucket) will be placed over the soil vapor sampling location. Hydrated bentonite will be used to create a seal around the lip of a 5-gallon pail to be installed/inverted over the casing [as shown on Figure 2.4(b) of the NYSDOH VI Guidance] and around the penetration of the sample tubing through the bottom of the 5-gallon pail. Prior to purging, helium will be introduced into the pail through a swagelock fitting on the side of the pail. The helium levels in the purge gas and in the pail (prior to purging, after purging, and immediately after sampling) will be measured using a gas detector. Improvements to the seals will be made, if needed, based on the results of real-time monitoring for helium during purging prior to sampling. Additional detail on the use of tracer gas is provided in the SOP included in Attachment 1.

Field duplicates will be collected in support of the soil vapor investigation at a frequency of one duplicate per 10 samples, with at least one duplicate per sample delivery group. Based on the total number of soil vapor and ambient air samples to be collected as part of the soil vapor investigation (18 soil vapor plus 2 air samples),

two field duplicate samples will be collected and submitted for laboratory analysis for QA/QC purposes.

Equipment blanks and trip blanks will not be used for the proposed investigation for the following reasons:

- The tubing to be used for the soil vapor sampling will be manufactured from laboratory- or food-grade quality inert material (e.g., polyethylene, fluoropolymer) that does not adsorb or off-gas VOCs. New, dedicated tubing (from the same roll) will be used at each soil vapor sampling location, and the tubing will be disposed of after use at a given location. Valves and fittings will also be new and/or decontaminated prior to use. In addition, the vapor probe, tubing, etc. will be purged prior to sampling so that any air that enters the tubing during handling/installation will be evacuated prior to sample collection. In the remote chance that the tubing were to be a source of VOC constituents in the soil vapor samples, this could be identified by comparing results from one location to the next [for similar levels of a particular constituent(s)].

- SUMMA® canister vacuum readings obtained prior to shipment and following laboratory receipt will be compared. If the vacuum readings prior to and following shipment are consistent, this will support that gases did not enter or escape from the canisters while in transit (i.e., there was no cross-contamination of VOCs or introduction of VOCs during shipping and handling).

Laboratory Analysis

The air sample and soil vapor samples will be submitted to Severn Trent Laboratories, Inc. (STL) located in Burlington, Vermont for laboratory analysis for VOCs in accordance with USEPA Compendium Method TO-15. The VOC analyte list and associated detection limits are identified in Table 1. The soil vapor samples will also be analyzed for helium using American Society for Testing and Materials (ASTM) Method D1946. STL 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., three to four weeks following sample collection). The deliverable package provided by the laboratory will include the following items:

- Chain of custody forms.

- Instrument run logs with time and date information.

- A case narrative describing any QC problems (i.e. initial calibration, continuing calibration, system blank contamination) encountered by the lab, or conversely, a statement saying that there were no QC problems. The case narrative shall include a written statement with regard to sample holding times from collection to analysis (30 days for SUMMA® canisters).

- Contract Laboratory Procedure (CLP) Form I sheets for each sample analyzed plus total/extracted ion chromatograms.

- CLP Form II, system monitoring compound (surrogate) recoveries.

- CLP Form IV, system, field and trip blanks, where applicable.

- CLP Form V, GC/MS instrument performance check for bromofluorobenzene.

- CLP Form VI, GC/MS initial calibration form.

- CLP Form VII, internal standard area and retention time summaries.

- Starting and ending vacuum/pressure readings of each sample canister. If the laboratory pressurizes the canisters during the sample analysis, it will apply the appropriate dilution factor. The information used by the laboratory to calculate the dilution factor will be presented in the laboratory analytical data report.

Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences (RPDs) are not included under USEPA Method TO-15. Results for laboratory control/laboratory control spike (LC/LCS) samples will instead be provided in accordance with the analytical method.

Decontamination/Waste Management

Prior to moving to the next sampling location, all down-hole equipment (i.e., steel rods, expendable point holder) will be decontaminated by washing with Alconox and water and then rinsing with water. 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 offsite transportation and disposal. Water generated by the decontamination activities will be released onto the ground surface, away from the sampling locations.

III. REPORTING

A summary letter report will be prepared following receipt of the soil vapor laboratory analytical results. The letter report will include:

- A summary of work activities performed and analytical results obtained for the soil vapor investigation.
- An identification of potential VOC sources observed during the soil vapor investigation (e.g., outdoor sources that could bias results, such as automobiles, lawn mowers, construction equipment, etc.).
- An evaluation of the soil vapor results, including comparisons to guidance values presented in the NYSDOH VI Guidance (October 2006).
- Data tables presenting validated laboratory analytical results.
- Figures showing the surveyed air and soil vapor sampling locations and corresponding laboratory analytical results.
- A copy of the data validation report. Validation of the soil vapor analytical results will be performed in accordance with procedures in the USEPA National Functional Guidelines dated October 1999.
- A CD containing the full laboratory analytical data reports.
- Recommendations for follow-up soil vapor sampling or no further action related to soil vapor, as appropriate.

As indicated in Section 3.2.5(a) of the NYSDOH VI Guidance, “the State of New York does not have any standards, criteria, or guidance values for concentrations of VOCs in subsurface vapors (either soil vapor or sub-slab vapor)”. Bayer proposes to conservatively evaluate the results of the proposed soil vapor samples by comparing them to: (1) the 90th percentile values from the United States Environmental Protection Agency (USEPA) indoor air data for office and commercial buildings as suggested in Section 3.2.4 (and tabulated in Appendix C.2) of the NYSDOH VI Guidance; and (2) the guideline values presented in Table 3.1 of the NYSDOH VI Guidance and the related decision matrices presented in Section 3.4.3. These comparison values are presented in Table 1 for reference.

If results of the proposed soil vapor sampling are elevated (i.e., above potential comparison values), additional soil vapor sampling will be performed, as appropriate, under a separate work plan submitted to the NYSDEC for review and approval. Timing for implementation of the follow-up soil vapor sampling will depend on whether the elevated results are within interior or exterior portions of the site (e.g., near the VOC-impacted soil area/former plant buildings or along the property boundary). Because there are no buildings presently at the site (other than the Administration building, which is not occupied and is anticipated to be demolished under current plans for site redevelopment), follow-up soil vapor sampling in the site interior, if needed, would be performed after implementation/construction of the preferred remedial measure outlined in the upcoming CMS. Follow-up soil vapor sampling along the property boundary would be performed, as needed, prior to implementation of the final site remedy.

IV. ANTICIPATED SCHEDULE

ARCADIS BBL is prepared to implement the proposed soil vapor sampling activities shortly following NYSDEC approval of this sampling plan. The proposed field activities will take approximately one to two weeks to complete. Preliminary laboratory analytical results for the soil vapor sampling activities will be available approximately three to four weeks following sampling. Data validation is anticipated to be completed within approximately one month following receipt of the final laboratory analytical results. The summary letter report will be submitted to the NYSDEC/NYSDOH approximately one month after the laboratory analytical results are validated.

We await NYSDEC approval of the proposed soil vapor sampling activities. Please do not hesitate to contact Wayne Baldwin of Bayer at 281.383.6117 or the undersigned at 315.671.9441 if you have any questions or require additional information.

Sincerely,

ARCADIS of New York, Inc.

John C. Brussel

John C. Brussel, PE
Senior Engineer II

Copies:
Mr. Paul Olivo, United States Environmental Protection Agency
Ms. Katy Murphy, New York State Department of Environmental Conservation
Mr. Wayne Baldwin, Bayer MaterialScience LLC
Mr. Joseph Molina III, PE, ARCADIS BBL

Table

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		NYSDOH Indoor Air Guidance Value	USEPA 90th Percentile Background Levels ($\mu g/m^3$)	
		(ppb v/v)	(µg/m3)	($\mu g/m^3$)	Indoor Air	Outdoor Air
Acetone (2-propanone)	67-64-1	4	10	- -	98.9	43.7
Benzene	71-43-2	0.16	0.51	- -	9.4	6.6
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	- -	< 1.7	< 1.6
1,3-Butadiene	106-99-0	0.40	0.88	- -	< 3.0	< 3.4
2-Butanone (Methyl ethyl ketone)	78-93-3	0.4	1.2	- -	12	11.3
Carbon disulfide	75-15-0	0.4	1.2	- -	4.2	3.7
Carbon tetrachloride	56-23-5	0.16	1.0	- -	< 1.3	0.7
Chlorobenzene	108-90-7	0.16	0.74	- -	< 0.9	< 0.8
Chloroethane	75-00-3	0.40	1.06	- -	< 1.1	< 1.2
Chloroform	67-66-3	0.16	0.78	- -	1.1	0.6
Chloromethane (Methyl chloride)	74-87-3	0.40	0.83	- -	3.7	3.7
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	- -	< 1.5	< 1.6
1,2-Dichlorobenzene	95-50-1	0.16	1.0	- -	< 1.2	< 1.2
1,3-Dichlorobenzene	541-73-1	0.16	1.0	- -	< 2.4	< 2.2
1,4-Dichlorobenzene	106-46-7	0.16	1.0	- -	5.5	1.2
Dichlorodifluoromethane (Freon 12)	75-71-8	0.40	1.98	- -	16.5	8.1
1,1-Dichloroethane	75-34-3	0.16	0.65	- -	< 0.7	< 0.6
1,2-Dichloroethane	107-06-2	0.16	0.65	- -	< 0.9	< 0.8
1,1-Dichloroethene	75-35-4	0.16	0.63	- -	< 1.4	< 1.4
1,2-Dichloroethene (cis)	156-59-2	0.16	0.63	- -	< 1.9	< 1.8
1,2-Dichloroethene (trans)	156-60-5	0.16	0.63	- -	- -	- -
1,2-Dichloropropane	78-87-5	0.16	0.74	- -	< 1.6	< 1.6
cis-1,3-Dichloropropene	10061-01-5	0.16	0.73	- -	< 2.3	< 2.2
trans-1,3-Dichloropropene	10061-02-6	0.16	0.73	- -	< 1.3	< 1.4
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	0.16	1.1	- -	- -	- -
Ethylbenzene	100-41-4	0.16	0.69	- -	5.7	3.5
4-Ethyltoluene (p-Ethyltoluene)	622-96-8	0.16	0.79	- -	3.6	3
n-Heptane	142-82-5	0.16	0.66	- -	- -	- -
Hexachlorobutadiene	87-68-3	0.16	1.7	- -	< 6.8	< 6.4
n-Hexane	110-54-3	0.40	1.41	- -	10.2	6.4
Methylene chloride	75-09-2	0.4	1.4	60	10	6.1
4-Methyl-2-pentanone (MIBK)	108-10-1	0.4	1.64	- -	6	1.9
MTBE (Methyl tert-butyl ether)	1634-04-4	0.4	1.4	- -	11.5	6.2
Styrene	100-42-5	0.16	0.68	- -	1.9	1.3
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	15.9	6.5
Toluene	108-88-3	0.16	0.60	- -	43	33.7
1,2,4-Trichlorobenzene	120-82-1	0.40	3.0	- -	< 6.8	< 6.4
1,1,1-Trichloroethane	71-55-6	0.16	0.9	- -	20.6	2.6
1,1,2-Trichloroethane	79-00-5	0.16	0.9	- -	< 1.5	< 1.6
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon TF)	76-13-1	0.16	1.2	- -	- -	- -
Trichloroethene (TCE)	79-01-6	0.16	0.86	5	4.2	1.3
Trichlorofluoromethane (Freon 11)	75-69-4	0.16	0.9	- -	18.1	4.3
1,2,4-Trimethylbenzene	95-63-6	0.16	0.79	- -	9.5	5.8

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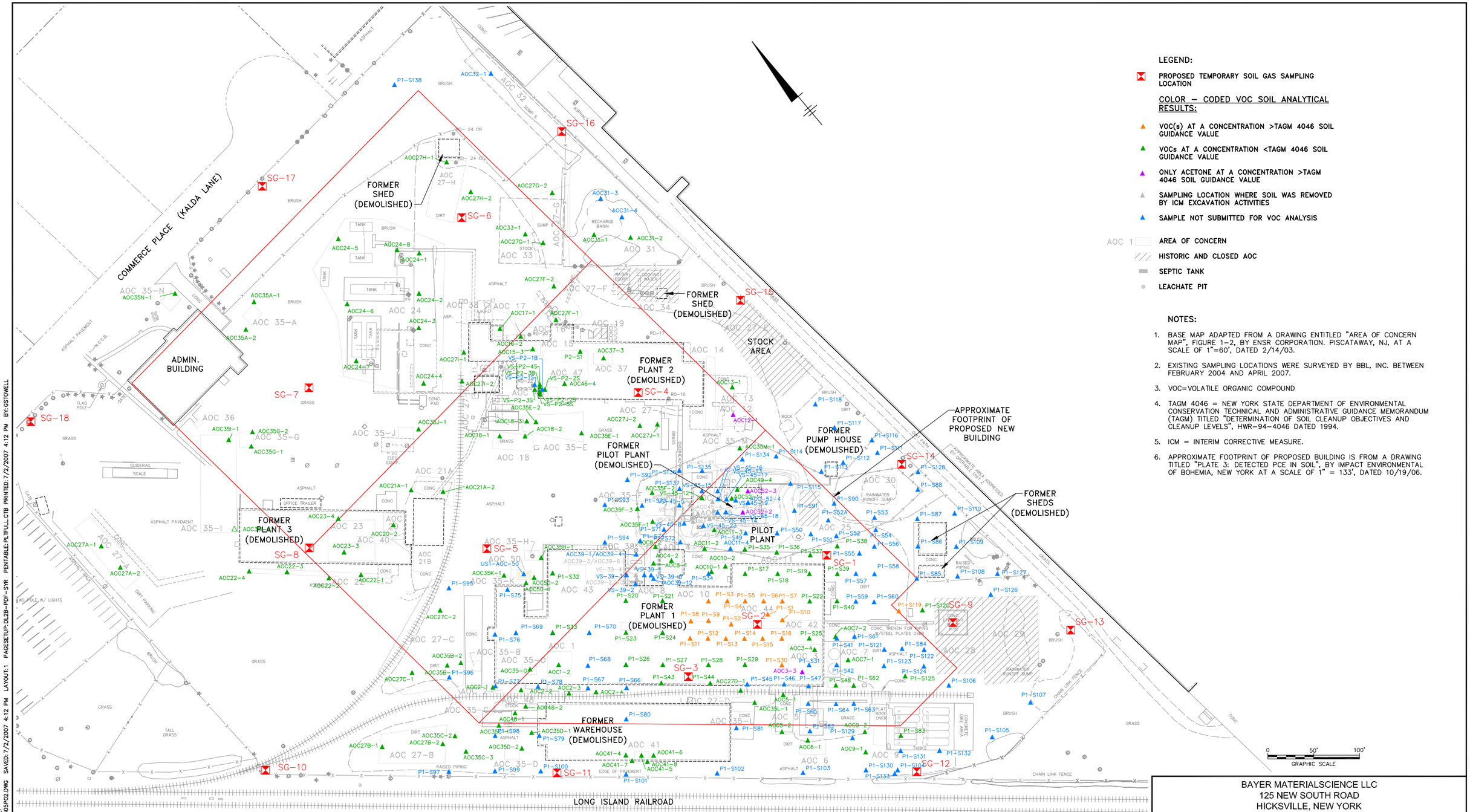
BAYER MATERIALSCIENCE LLC
125 NEW SOUTH ROAD
HICKSVILLE, NEW YORK

Compound	CAS Number	Reporting Limit		NYSDOH Indoor Air Guidance Value	USEPA 90th Percentile Background Levels ($\mu g/m^3$)	
		(ppb v/v)	(µg/m3)	($\mu g/m^3$)	Indoor Air	Outdoor Air
1,3,5-Trimethylbenzene	108-67-8	0.16	0.79	- -	3.7	2.7
2,2,4-Trimethylpentane	540-84-1	0.16	0.75	- -	- -	- -
Vinyl chloride	75-01-4	0.16	0.41	- -	< 1.9	< 1.8
Xylenes (m&p)	1330-20-7	0.40	1.74	- -	22.2	12.8
Xylenes (o)	95-47-6	0.16	0.69	- -	7.9	4.6
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	- -	- -	- -

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. $\mu g/m^3$ = micrograms per cubic meter.
5. -- = Not available.
6. New York State Department of Health (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. USEPA Indoor Air Background Levels and USEPA Outdoor Air Background Levels are the 90th percentile of background air values observed by the USEPA in a study of public and commercial office buildings, per USEPA database information referenced in Section 3.2.4 of the "Guidance for Evaulating Soil Vapor Intrusion in the State of New York" (NYSDOH, October 2006).
8. 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.

Figure



LEGEND:

- PROPOSED TEMPORARY SOIL GAS SAMPLING LOCATION

COLOR – CODED VOC SOIL ANALYTICAL RESULTS:

- VOC(s) AT A CONCENTRATION >TAGM 4046 SOIL GUIDANCE VALUE
- VOCs AT A CONCENTRATION <TAGM 4046 SOIL GUIDANCE VALUE
- ONLY ACETONE AT A CONCENTRATION >TAGM 4046 SOIL GUIDANCE VALUE
- SAMPLING LOCATION WHERE SOIL WAS REMOVED BY ICM EXCAVATION ACTIVITIES
- SAMPLE NOT SUBMITTED FOR VOC ANALYSIS

AOC 1 – AREA OF CONCERN

- HISTORIC AND CLOSED AOC
- SEPTIC TANK
- LEACHATE PIT

NOTES:

1. BASE MAP ADAPTED FROM A DRAWING ENTITLED "AREA OF CONCERN MAP", FIGURE 1–2, BY ENSR CORPORATION. PISCATAWAY, NJ, AT A SCALE OF 1"=60', DATED 2/14/03.
2. EXISTING SAMPLING LOCATIONS WERE SURVEYED BY BBL, INC. BETWEEN FEBRUARY 2004 AND APRIL 2007.
3. VOC=VOLATILE ORGANIC COMPOUND
4. TAGM 4046 = NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM (TAGM) TITLED "DETERMINATION OF SOIL CLEANUP OBJECTIVES AND CLEANUP LEVELS", HWR–94–4046 DATED 1994.
5. ICM = INTERIM CORRECTIVE MEASURE.
6. APPROXIMATE FOOTPRINT OF PROPOSED BUILDING IS FROM A DRAWING TITLED "PLATE 3: DETECTED PCE IN SOIL", BY IMPACT ENVIRONMENTAL OF BOHEMIA, NEW YORK AT A SCALE OF 1" = 133', DATED 10/19/06.

BAYER MATERIALSCIENCE LLC
125 NEW SOUTH ROAD
HICKSVILLE, NEW YORK

SOIL VAPOR INVESTIGATION WORK PLAN

PROPOSED SOIL VAPOR SAMPLING LOCATIONS

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
1

SYR-85-RCB GMS LAYER: ON=* OFF=*REF
G:\CAD\ACTIVE\-DWG\ACT\32305016\32305P02.DWG SAVED:7/2/2007 4:12 PM LAYOUT:1 PAGESETUP:DL2B-PDF-SYR PENTABLE:PLTFULL.CTB PRINTED:7/2/2007 4:12 PM BY:GSTOWELL
PROJECTNAME:----
XREFS: IMAGES:
32305X01

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 install a temporary soil vapor point 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;
- 5-Gallon plastic pail with swagelock fitting;
- Tracer gas source (e.g., helium);
- Helium detector;
- 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. 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. 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.

3. 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.

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. Place a 5-gallon plastic pail (bucket) with appropriately-size hole in the bottom and swagelock valve on the side, inverted over the soil vapor sampling location as shown on Figure 2.4(b) of the New York State Department of Health (NYSDOH) document titled *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 (NYSDOH VI Guidance). Extend the sample collection tubing through the hole in what is now the "top" of the pail.

6. Use hydrated bentonite to create a seal around the lip of the 5-gallon pail and around the penetration of the sample tubing through the inverted 5-gallon pail.

7. After the seal is created, introduce helium into the pail through the swagelock valve on the side of the pail (to enrich the atmosphere in the area where the drill rods/sample tubing intersect the ground surface to approximately 20% helium by volume).

8. Measure the helium concentration in the pail (inside the "Concentrated Area") by inserting the probe of the helium detector through the swagelock valve. Document the result on the field sampling log.

9. Proceed to vapor sample collection.

10. 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 weather-related information):

a. wind speed and direction;
b. ambient temperature;
c. barometric pressure;
d. relative humidity; and
e. potential outdoor sources that could bias sampling results (e.g., automobiles, lawn mowers, construction equipment, etc.).

2. 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.

3. 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.

4. Measure the helium concentration in the purge gas to evaluate potential infiltration around the soil vapor sampling probe. If helium is detected in the purge gas, take steps to improve the seals prior to sample collection, and perform additional purging and helium measurement. Close the valve on the T-connection at the end of purging.

5. Measure the helium concentration inside the pail following purging to verify the concentration remains at 20% (and helium is not escaping through the seals around the pail).

6. 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 at least 26 inches of Hg, then the canister is not appropriate for use and another canister should be used (if this occurs, return to Step 2, then skip to Step 7).

7. 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. Measure the final helium concentration inside the pail. If the helium level inside the pail is lower post-sampling vs. pre-sampling, this will indicate a potential helium loss due to infiltration around the soil vapor sampling probe or escape through the seals around the pail. Helium loss (if any) will be further evaluated by laboratory analysis of the soil vapor sample collected in the canister for helium.

5. 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.

6. 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.

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

8. 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

Blind duplicate samples will be collected in support of the soil vapor sampling at a frequency of one duplicate per 10 soil vapor samples, with at least one duplicate per sample delivery group. A stainless steel “T” will be used at the desired sampling location(s) to split the vapor stream into two SUMMA® canisters – one for the sample and one for the duplicate.

Vapor sample analysis will be performed using USEPA TO-15 methodology for VOCs and American Society for Testing and Materials (ASTM) Method D1945 for helium. Method TO-15 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

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): **1 L** **6 L**

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 1¼-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL.
Each foot of ¼-inch tubing will have a volume of approximately 10 mL.

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Soil Gas Sample Collection Log

Sample ID:

General Observations/Notes:

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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 logs, if appropriate (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the weather-related information):

a. wind speed and direction;
b. ambient temperature;
c. barometric pressure;
d. relative humidity; and
e. potential outdoor sources that could bias sampling results (e.g., automobiles, lawn mowers, construction equipment, etc.).

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.

Indoor/Ambient Air Sample Collection Log

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Sample ID:

Client:		**Date/Day:**	
Project:		**Sample Intake Height:**	
Location:		**Subcontractor:**	
Project #:		**Miscellaneous Equipment:**	
Samplers:			
Coordinates:		**Time Start:**	
Outdoor/Indoor:		**Time Stop:**	

Instrument Readings:

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

SUMMA Canister Information

Size (circle one): **1 L** **6 L**

Canister ID: _____

Flow Controller ID: _____

General Observations/Notes:
