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*Transmitted via Overnight Courier*

May 31, 2006

Mr. William P. Lovely, Jr.  
U.S. Environmental Protection Agency  
EPA New England  
One Congress Street, Suite 1100  
Boston, Massachusetts 02114-2023

**Re: GE-Pittsfield/Housatonic River Site  
Groundwater Management Area 3 (GEC330)  
Soil Gas Investigation Work Plan**

Dear Mr. Lovely:

In accordance with the United States Environmental Protection Agency's (EPA's) May 2, 2006 conditional approval letter regarding GE's February 2006 *Groundwater Management Area 3 Baseline Groundwater Quality and NAPL Monitoring Interim Report for Fall 2005* (Fall 2005 GMA 3 Baseline Report), enclosed is a document entitled *Soil Gas Investigation Work Plan for Groundwater Management Area 3*. As suggested in EPA's May 2, 2006 letter, the proposed sampling activities described herein include the collection and analysis of soil gas samples to assess whether constituents detected in LNAPL samples collected adjacent to Building 51 are also present in soil gas near the building. This Soil Gas Investigation Work Plan supersedes the previously-proposed method of evaluation presented in Section 5.2.4 of the Fall 2005 GMA 3 Baseline Report.

Please contact me if you have any questions or comments.

Sincerely,

John F. Novotny, P.E.  
Manager - Facilities and Brownfields Programs

Enclosure

V:\GE\_Pittsfield\_CD\_GMA\_3\Reports and Presentations\Soil Gas Investigation WP\30462196CvrLtr.doc

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Public Information Repositories  
GE Internal Repositories

**REPORT**

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*Soil Gas Investigation Work Plan  
for Groundwater Management Area 3*

**General Electric Company  
Pittsfield, Massachusetts**

**May 2006**

**BBL**<sup>®</sup>  
an ARCADIS company

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# Table of Contents

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<b>Section 1. Introduction .....</b>	<b>1-1</b>
1.1 General .....	1-1
1.2 Background.....	1-1
<b>Section 2. Proposed Soil Gas Investigation Activities .....</b>	<b>2-1</b>
2.1 General .....	2-1
2.2 Selection of Sample Locations .....	2-1
2.3 Soil Gas Sampling Methodology .....	2-1
2.4 Analyses .....	2-2
2.5 Assessment of Analytical Data .....	2-2
<b>Section 3. Schedule and Reporting .....</b>	<b>3-1</b>

## Tables

- 1 LNAPL Analytical Results
- 2 Proposed Soil Gas Sampling Analyte List

## Figure

- 1 Extent of NAPL and Proposed Soil Gas Sampling Locations

## Attachments

- 1 Standard Operating Procedure: Soil Gas Sampling Using EPA Method TO-15
- 2 Standard Operating Procedure: Administering Tracer Gas

# 1. Introduction

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## 1.1 General

In response to the identification of light non-aqueous phase liquid (LNAPL) in the vicinity of Building 51 at the Pittsfield, Massachusetts facility of the General Electric Company (GE), and in response to a May 2, 2006 conditional approval letter issued by the United States Environmental Protection Agency (EPA) concerning GE's *Groundwater Management Area 3 Groundwater Quality and NAPL Monitoring Interim Report for Fall 2005* (GMA 3 Fall 2005 Report), GE has prepared this plan (Soil Gas Investigation Work Plan) to determine whether constituents related to the detected LNAPL near Building 51 are present within the shallow soil gas near Building 51.

This Soil Gas Investigation Work Plan supersedes the previously-proposed method of evaluation presented in Section 5.2.4 of the GMA 3 Fall 2005 Report. The proposed sampling activities described herein, involving the collection of soil gas samples, will initially be performed to assess whether constituents detected in LNAPL samples collected adjacent to the building are present in soil gas near Building 51. If such constituents are detected in soil gas near Building 51, GE will evaluate the results and, if warranted, will propose further action as appropriate based on those results.

Relevant background information is presented in Section 1.2 below, followed by a discussion of the proposed sampling and evaluation activities, and anticipated schedule.

## 1.2 Background

The GMA 3 Fall 2005 Report provided a detailed discussion of site conditions, including the identification of areas where LNAPL has been observed. Figure 1 depicts the historical and recently-observed extent of LNAPL in the vicinity of Building 51. In fall 2005, LNAPL was observed in monitoring wells adjacent to the eastern, western, and southern edges of Building 51 at maximum thicknesses of 1.91 feet (in well 51-8), 0.84 feet (in well GMA 3-10), and 1.14 feet (in well 59-7), respectively.

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In preparing GE's *Groundwater Management Area 3 Groundwater Quality and NAPL Monitoring Interim Report for Spring 2005* (GMA 3 Spring 2005 Report), in response to EPA's conditional approval letter dated January 20, 2005, GE collected samples of LNAPL from three wells located directly adjacent to Building 51: well 51-8, located to the east, and wells GMA3-10 and UB-PZ-3, located west and southwest of Building 51, respectively. The LNAPL samples were analyzed for volatiles and, for well 51-8, certain additional semivolatile organics. The few substances detected in the LNAPL samples from wells GMA3-10 and UB-PZ-3 were present at very low concentrations, as shown in Table 1. In the LNAPL sample collected from well 51-8, one VOC (trichloroethene, at 6.1 parts per million (ppm)) and two SVOCs (1,2,4-trichlorobenzene and naphthalene at 17 ppm and an estimated concentration of 3.8 ppm, respectively) were detected. Although these detected concentrations were in samples of LNAPL, if similar levels of these substances were also found in groundwater, such levels would be in excess of the Massachusetts Contingency Plan (MCP) Method 1 GW-2 standards. The newly-published Wave 2 MCP Method 1 GW-2 standards (published on March 24, 2006, effective on April 3, 2006) are 0.03 ppm for trichloroethene, 2 ppm for 1,2,4-trichlorobenzene, and 1 ppm for naphthalene.

For LNAPL detected in wells designed to assess GW-2 groundwater (i.e., located at average depths of 15 feet or less from the ground surface and within a horizontal distance of 30 feet from an existing occupied building [e.g., well 51-8]), the *Statement of Work for Removal Actions Outside the River* (SOW) requires a demonstration that constituents in the LNAPL do not pose an unacceptable risk to occupants of such building via volatilization and transport to the indoor air of such building. Such demonstration may include assessment activities such as soil gas sampling and desk-top modeling of potential volatilization of chemicals from the LNAPL (or associated groundwater) to the indoor air of the nearby occupied buildings. As such, these three constituents (i.e., trichloroethene, 1,2,4-trichlorobenzene, and naphthalene) are proposed for further assessment in this proposed soil gas investigation.

## **2. Proposed Soil Gas Investigation Activities**

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### **2.1 General**

The proposed activities to assess whether constituents present in LNAPL adjacent to the building are present in soil gas near Building 51 involve:

- Selection of appropriate sampling locations;
- Collection and analysis of soil gas samples, and
- Evaluation of the resultant data.

As noted above, if LNAPL-related constituents are detected in the soil gas near Building 51, GE will evaluate the analytical results and, if warranted, will propose additional activities as appropriate based on those results.

### **2.2 Selection of Sample Locations**

Soil gas sampling and analysis is proposed to evaluate the potential presence (and concentrations, if present) of the primary constituents detected in LNAPL near Building 51 (i.e., trichloroethene, 1,2,4-trichlorobenzene, and naphthalene). The proposed soil gas sampling locations shown on Figure 1 were selected to provide soil gas data from each side of the building where LNAPL has been observed. The final sampling locations may be slightly modified in the field to accommodate, as necessary, underground utilities or other subsurface obstructions.

### **2.3 Soil Gas Sampling Methodology**

The methods for collecting soil gas samples are detailed in the Standard Operating Procedures (SOPs) included as Attachments 1 and 2 to this Soil Gas Investigation Work Plan. For this investigation, the soil gas sampling points are proposed to be installed as temporary sampling points.

Samples (including a single duplicate sample and a field blank) are to be collected and analyzed in accordance with EPA Compendium Method TO-15, titled “*Compendium of Method for the Determination of Toxic Organics Compound in Ambient Air - Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-*

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*Prepared Canisters And Analyzed By Gas Chromatography Mass Spectrometry (GC/MS).*” The list of analytes and their associated method detection limits and quantitation limits are provided in Table 2.

As detailed in the SOPs, each sample will be collected using a 6-liter SUMMA<sup>®</sup> canister with an attached pre-set flow regulator. The laboratory will provide certified-clean canisters with an initial vacuum of approximately 26 inches of mercury (in. of Hg) for sample collection. Flow regulators for subsurface soil gas sampling will be pre-set by the laboratory to provide uniform sample collection over an approximate 2-hour sampling period. The valve on the SUMMA<sup>®</sup> canister will be closed when approximately 2 in. of Hg vacuum remains in the canister, leaving a vacuum in the canister as a means for the laboratory to verify the canister does not leak while in transit.

## **2.4 Analyses**

Following collection, the soil gas samples and associated quality assurance/quality control samples will be submitted for analysis of trichloroethene, 1,2,4-trichlorobenzene, and naphthalene. Analyses will be conducted by Lancaster Laboratories, Inc. of Lancaster, Pennsylvania, or and alternate laboratory with current National Environmental Laboratory Accreditation Program (NELAP) certification and accredited in the Commonwealth of Massachusetts in accordance with EPA Compendium Method TO-15. Following receipt of the analytical results, the analytical data report will be validated in accordance with the procedures outlined in GE’s Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP).

## **2.5 Assessment of Analytical Data**

Upon receipt of the data, GE will compare the analytical results to technical guidance tables (e.g., OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils [Subsurface Vapor Intrusion Guidance Tables]; November 2002) or other appropriate screening values. If the results of GE’s assessment indicate the need for further evaluations or other action, GE will propose to conduct additional activities as may be appropriate based on the data.

### ***3. Schedule and Reporting***

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Following EPA approval of this Soil Gas Investigation Work Plan, GE will implement the soil gas sampling activities proposed herein. GE anticipates that the soil gas sampling activities will be completed within approximately two weeks after EPA approval of this Soil Gas Investigation Work Plan.

Following receipt from the laboratory, GE will provide the preliminary soil gas analytical data in its monthly report on overall activities at the GE-Pittsfield/Housatonic River Site.

A summary report will also be prepared following receipt and validation of the soil gas sampling analytical results. That report will include:

- A summary of work performed and analytical results obtained during the soil gas sampling program;
- Data tables presenting validated laboratory analytical results;
- Figure(s) showing the soil gas sampling locations and corresponding laboratory analytical results;
- Copies of the laboratory analytical data validation reports;
- An evaluation of the soil gas results; and
- Recommendations for any additional assessment activities or response actions, if appropriate.

GE proposes to submit the summary report to EPA within two months after EPA approval of this Soil Gas Investigation Work Plan.



# *Tables*

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**TABLE 1  
LNAPL ANALYTICAL RESULTS**

**WORK PLAN FOR BUILDING 51 SOIL GAS INVESTIGATION  
GROUNDWATER MANAGEMENT AREA 3  
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS  
(Results are presented in parts per million, ppm)**

Parameter	Sample ID: Date Collected:	51-8 05/19/05	GMA3-10 05/12/05	UB-PZ-3 05/12/05
<b>Volatile Organics</b>				
Ethylbenzene		ND(5.6)	0.0064 J	ND(0.31)
Iodomethane		ND(5.6)	0.0058 J	ND(0.31)
Toluene		ND(5.6)	0.0086 J	ND(0.31)
Trichloroethene		6.1	ND(0.025)	ND(0.31)
Xylenes (total)		ND(5.6)	0.051	0.049 J
<b>Semivolatile Organics</b>				
1,2,4-Trichlorobenzene		17	NA	NA
Naphthalene		3.8 J	NA	NA

Notes:

1. Samples were collected by Blasland, Bouck & Lee, Inc., and submitted to SGS Environmental Services, Inc. for analysis of volatiles, 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, and Naphthalene.
2. NA - Not Analyzed.
3. ND - Analyte was not detected. The number in parenthesis is the associated detection limit.
4. Only detected constituents are summarized.

Data Qualifiers:

Organics (volatiles, semivolatiles)

J - Indicates an estimated value less than the practical quantitation limit (PQL).

**TABLE 2  
PROPOSED SOIL GAS SAMPLING ANALYTE LIST**

**WORK PLAN FOR BUILDING 51 SOIL GAS INVESTIGATION  
GROUNDWATER MANAGEMENT AREA 3  
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS**

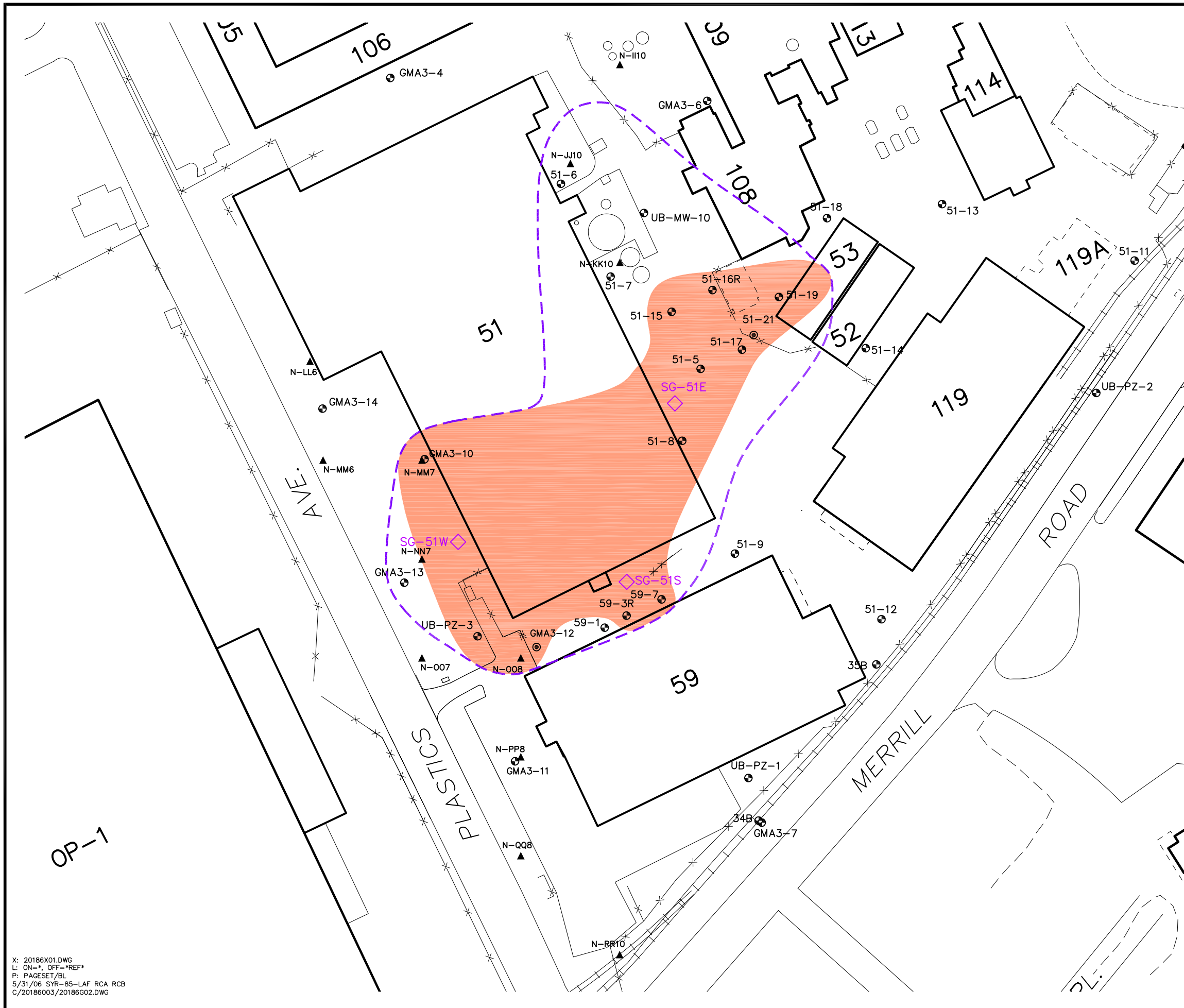
Parameter	Method Detection Limit		Limit of Quantitation	
	(Parts per Billion, by Volume)	(ug/m <sup>3</sup> )	(Parts per Billion, by Volume)	(ug/m <sup>3</sup> )
<b>Volatile Organics</b>				
Trichloroethene	0.2	1	1	5
<b>Semivolatile Organics</b>				
1,2,4-Trichlorobenzene	0.5	4	2	15
Naphthalene	0.4	2	1	5

Notes:

1. Samples proposed to be collected by Blasland, Bouck & Lee, Inc., and submitted to Lancaster Laboratories, Inc. for analysis of Trichloroethene, 1,2,4-Trichlorobenzene, and Naphthalene.

***Figure***

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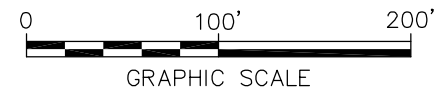


**LEGEND:**

- 51-6 ● EXISTING MONITORING WELL
- N-LL6 ▲ EXISTING SOIL BORING
- 51-21 ● NAPL RECOVERY WELL (SKIMMER)
- EXTENT OF MEASURABLE LNAPL DURING FALL 2005 SEMI-ANNUAL MONITORING EVENT
- ⋯ MAXIMUM HISTORICAL EXTENT OF MEASURABLE LNAPL
- ◇ SG-51E PROPOSED SOIL GAS SAMPLE LOCATION

**NOTES:**

1. FIGURE IS BASED ON PHOTOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC.—FLOWN IN APRIL 1990 AND DATA PROVIDED BY GENERAL ELECTRIC COMPANY.
2. NOT ALL PHYSICAL FEATURES SHOWN.
3. SITE BOUNDARIES, SAMPLE AND BUILDING LOCATIONS ARE APPROXIMATE.
4. AN INSTRUMENT DETECTION OF LNAPL WAS RECORDED AT WELL 51-06 AND GMA3-5, BUT NO LNAPL WAS VISUALLY OBSERVED IN THIS WELL.



GENERAL ELECTRIC COMPANY  
PITTSFIELD, MASSACHUSETTS  
**WORK PLAN FOR BUILDING 51  
SOIL GAS INVESTIGATION**

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**EXTENT OF LNAPL AND PROPOSED  
SOIL GAS SAMPLING LOCATIONS**

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**BBL**  
BLASLAND, BOUCK & LEE, INC.  
engineers, scientists, economists

FIGURE  
**1**

X: 20186X01.DWG  
L: ON=\*, OFF=\*REF\*  
P: PAGESET/BL  
5/31/06 SYR-85-LAF RCA RCB  
C/20186003/20186G02.DWG

# ***Attachments***

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# *Attachment 1*

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## **Standard Operating Procedure: Soil Gas Sampling Using EPA Method TO-15**

# Standard Operating Procedure: Subsurface Soil-Gas Sampling and Analysis Using USEPA Method TO-15

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## I. Scope and Application

This document describes the procedures to subsurface soil-gas 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 6-liter SUMMA<sup>®</sup> passivated stainless-steel canister. An evacuated 6-liter SUMMA<sup>®</sup> canister (<28 inches of mercury [Hg]) will provide a recoverable whole-gas sample of approximately 5.5 liters when allowed to fill to a vacuum of 2 inches of Hg. The whole-air sample will be analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GC/MS) system to provide compound detection limits of 0.5 parts per billion volume (ppbv).

The following sections list the necessary equipment and provide detailed instructions for the installation of soil-gas probes (using direct-push technology and steel rods) and the collection of soil-gas samples for VOC analysis.

## II. Personnel Qualifications

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. 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. BBL personnel responsible for leading subsurface soil-gas sample collection activities must have previous subsurface soil-gas sampling experience.

## III. Equipment List

The equipment required to install a soil vapor probe is presented below:

- Appropriate PPE (as required by the Health and Safety Plan);
- Direct-push rig (e.g., PowerProbe<sup>™</sup>) 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 (with a lamp of 11.7 eV);
- ¼-inch inside diameter (ID) tubing (Teflon<sup>®</sup>, polyethylene, or similar);
- Commercially available clean sand or play sand; and
- Non-coated bentonite.



The equipment required for soil-gas sample collection is presented below:

- Stainless steel SUMMA<sup>®</sup> 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 ID tubing (Teflon<sup>®</sup>, polyethylene, 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 (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 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.

Care must be taken to properly seal around the vapor probe at ground surface to prevent leakage of atmosphere into the soil vapor probe during purging and sampling. Temporary sampling points are to be sealed at the surface using hydrated bentonite. Permanent points are sealed at the surface using quick-setting hydraulic cement powder.

#### **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 subsurface vapor probe installation, drilling with a direct-push drilling rig should be done only by personnel with prior experience using such a piece of equipment.

## VI. Procedure

### Soil-Gas Steel Rod Monitoring Point Installation

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., 1 to 2 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 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 soil-gas sample collection.

### Soil-Gas Sample Collection

#### Preparation of SUMMA<sup>®</sup>-Type Canister and Collection of Sample

1. Record the following information in the field notebook, 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. Connect a short piece of polyethylene tubing to the sub-slab sampling port using a twist-to-lock fitting.
3. Connect a portable vacuum pump to the sample tubing. Purge 1 to 2 (target 1.5) volumes of air from the vapor probe and sampling line using a portable pump [purge volume =  $1.5 \text{ Pi r}^2 \text{h}$ ] at a rate of approximately 100 mL/min. Measure organic vapor levels with the PID.
4. Check the seal established around the soil vapor probe by using a tracer gas (e.g., helium) or other method established in the state guidance documents. [Note: Refer to SOP "Administering Tracer Gas," adapted from NYSDOH 2005, for procedures on tracer gas use.]
5. Remove the brass plug from the SUMMA<sup>®</sup> canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA<sup>®</sup> canister. Do not open the valve on the SUMMA<sup>®</sup>

canister. Record in the field notebook and COC form the flow controller number with the appropriate SUMMA<sup>®</sup> canister number.

6. Connect the polyethylene sample collection tubing to the flow controller and the SUMMA<sup>®</sup> canister valve. Record in the field notebook the time sampling began and the canister pressure.
7. Connect the other end of the polyethylene tubing to the sub-slab sampling port.
8. Open the SUMMA<sup>®</sup> canister valves. Record in the field notebook the time sampling began and the canister pressure.
9. Take a photograph of the SUMMA<sup>®</sup> canister and surrounding area.

#### Termination of Sample Collection

1. Arrive at the SUMMA<sup>®</sup> canister location at least 10 to 15 minutes prior to the end of the required sampling interval (e.g., 30 to 60 minutes).
2. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA<sup>®</sup> canister valves. 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 SUMMA<sup>®</sup> 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 SUMMA<sup>®</sup> 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).

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

#### **Soil-Gas Monitoring Point Abandonment**

Once the soil-gas samples have been collected, the soil-gas 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 remove all investigation-derived waste materials (including disposable equipment) for proper disposal.

### **VIII. Data Recording and Management**

Measurements will be recorded 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**

Soil-gas 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.

All analytical results will be reported in units of  $\mu\text{g}/\text{m}^3$ .

### **X. References**

New York State Department of Health (NYSDOH). 2005. DRAFT "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" February 23, 2005.

 <b>BLASLAND, BOUCK &amp; LEE, INC.</b> <i>engineers, scientists, economists</i>		<b>Soil-Gas Sample Collection Log</b>	
		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:	_____	Approximate Purge Volume:	_____
Time of Collection:	_____	Background PID Ambient Air Reading:	_____

**Nearby Groundwater Monitoring Wells/Water Levels:**

Well ID	Depth to Groundwater (ft)

**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

**General Observations/Notes:**


**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.

## *Attachment 2*

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# **Standard Operating Procedure: Administering Tracer Gas**

## **Standard Operating Procedure: Administering Tracer Gas**

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When collecting subsurface vapor samples as part of a vapor intrusion evaluation, a tracer gas serves as a quality assurance/quality control device to verify the integrity of the vapor probe seal. Without the use of a tracer, verification that a soil vapor sample has not been diluted by surface air is difficult.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically, sulfur hexafluoride (SF<sub>6</sub>) or helium are used as tracers because they are readily available, have low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as a tracer in some situations. The protocol for using a tracer gas is straightforward: simply enrich the atmosphere in the immediate vicinity of the area where the probe intersects the surface with the tracer gas and measure a vapor sample from the probe for the presence of high concentrations (> 20%) of the tracer. A cardboard box, plastic pail, or even a plastic bag can serve to keep the tracer gas in contact with the probe during the testing.

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

1. Include the tracer gas in the list of target analytes reported by the laboratory; or
2. Use a portable monitoring device to analyze a sample of soil vapor for the tracer prior to and after sampling for the compounds of concern. (Note that tracer gas samples can be collected via syringe, Tedlar bag, etc. They need not be collected in SUMMA<sup>®</sup> canisters or minicans.)

The advantage of the second approach is that the real-time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection.

Because minor leakage around the probe seal should not materially affect the usability of the soil vapor sampling results, the mere presence of the tracer gas in the sample should not be a cause for alarm. Consequently, portable field monitoring devices with detection limits in the low ppm range are more than adequate for screening samples for the tracer. If high concentrations (> 20%) of tracer gas are observed in a sample, the probe seal should be enhanced to reduce the infiltration of ambient air.

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