GE
159 Plastics Avenue
Pittsfield, MA 01201
USA

Transmitted via Overnight Courier

March 16, 2007

Mr. Dean Tagliaferro
EPA Project Coordinator
U.S. Environmental Protection Agency
c/o Weston Solutions, Inc.
10 Lyman Street
Pittsfield, MA 01201

Re: GE-Pittsfield/Housatonic River Site
Groundwater Management Area 3 (GECD330)
Supplemental Soil Gas Migration Assessment Report and Sampling Plan

Dear Mr. Tagliaferro:

Enclosed is a document titled *Supplemental Soil Gas Migration Assessment Report and Sampling Plan*. This document is an additional report on the investigations that GE has been conducting regarding certain volatile constituents found in the groundwater or light non-aqueous-phase liquid (LNAPL) near Buildings 51 and 59 at the GE facility. In accordance with EPA's conditional approval letter dated February 15, 2007, the enclosed report presents: (a) the results of inspections of Buildings 51 and 59 to identify potential vapor pathways through the slabs or sidewalls, along with a proposal for certain follow-up activities; and (b) a proposal for future air sampling below and within Buildings 51 and 59, as well as for conducting a concurrent inventory of products or materials within those buildings.

These studies and methods are not designed to address the appropriate occupational exposure air levels within these buildings. Issues relating to occupational exposure are beyond the scope of these investigations and are subject to applicable regulations governing workplace exposure.

Please contact me if you have any questions or comments.

Sincerely,

Richard W. Gates/JAP

Richard W. Gates
Remediation Project Manager

Enclosure
V:\GE_Pittsfield_CD_GMA_3\Reports and Presentations\Supp Soil Gas Mig Rpt\15371l324Ltr.doc

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General Electric Company
Pittsfield, Massachusetts

Supplemental Soil Gas Migration Assessment Report and Sampling Plan

Groundwater Management Area 3

March 2007

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Supplemental Soil Gas Migration Assessment Report and Sampling Plan

Groundwater Management Area 3

(Supplemental Assessment Report and Sampling Plan)

General Electric Company
Pittsfield, Massachusetts

Prepared for:
General Electric Company

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Our Ref.:
B0020186

Date:
March 2007

Table of Contents

1. Introduction

On October 20, 2006, the General Electric Company (GE) submitted to the United States Environmental Protection Agency (EPA) a document titled *Soil Gas Migration Assessment Report for Groundwater Management Area 3* (Migration Assessment Report). The activities described in that report were performed in late September 2006 as a follow-up to prior investigations reported in GE's *Soil Gas Investigation Summary Report for Groundwater Management Area 3* (Soil Gas Summary Report), submitted on September 15, 2006. Those prior investigations involved the collection of groundwater, light non-aqueous phase liquid (LNAPL), and deep soil gas (vapor) samples from several locations adjacent to the GE-owned Buildings 51 and 59 at its Pittsfield, Massachusetts facility, with analysis for volatile organic compounds (VOCs) and certain similar semi-volatile organic compounds (SVOCs). The follow-up activities reported in the Migration Assessment Report involved the collection of soil gas samples immediately beneath, and indoor air samples within, these buildings, with analysis for the same VOCs and SVOCs, to assess the potential for migration of such constituents from the underlying groundwater and LNAPL toward and into those buildings, as well as to obtain indoor air data for comparison to applicable governmental workplace standards. In addition, GE conducted sampling as part of an industrial hygiene assessment related to trichloroethene (TCE) in the workplace indoor air of Buildings 51 and 59.

GE received conditional approval of both the Soil Gas Summary Report and Migration Assessment Report from EPA in a letter dated February 15, 2007. In Condition 1 of that approval letter, EPA stated that it concurred with GE's conclusion (presented in the Migration Assessment Report) that the constituents detected in indoor air within Buildings 51 and 59 were below the limits for workplace exposure. EPA also stated that it did not concur with GE's conclusion that there is no clear link between the constituents found in the groundwater and LNAPL and those found in the indoor air of the buildings, although it did not address the rationale presented in the Migration Assessment Report for that conclusion. Therefore, EPA required, in Conditions 2 and 3 of its letter, that GE conduct additional assessment activities – namely: (a) the inspection of Buildings 51 and 59 to identify potential pathways for soil gas to enter into the buildings through the slabs or sidewalls; and (b) the preparation of a plan for future monitoring of soil gas and indoor air below and within Buildings 51 and 59, as well as for conducting a concurrent inventory to determine if products within those buildings contain the target chemicals.

This *Supplemental Soil Gas Migration Assessment Report and Sampling Plan* (Supplemental Assessment Report and Sampling Plan) has been prepared to address the requirements of Conditions 2 and 3 of EPA's February 15, 2006 letter. Section 2 of this report summarizes the results of the inspections of Buildings 51 and 59, along with a plan for certain follow-up activities. Section 3 provides a proposal for future sampling of soil gas and indoor air below and within Buildings 51 and 59, as well as conducting an inventory of building products and materials. Section 4 includes a proposed schedule for future inspection, sampling, and inventory activities and associated reporting.

It should be noted that the investigations described and proposed in this report are limited to assessing the potential impacts from constituents found in the groundwater or LNAPL in this area. They are not intended to address other potential indoor air impacts or occupational exposure levels, which are subject to applicable workplace regulations.

2. Recent Building 51 and 59 Inspections

In accordance with Condition 2 of EPA's conditional approval letter, GE conducted an inspection of Buildings 51 and 59 on March 7 and 8, 2007. The inspections were performed to identify physical features and existing conditions within these buildings by which underlying soil gas could potentially enter the indoor air within the buildings. Consistent with EPA's letter, these inspections were conducted (to the extent possible via visual and non-intrusive means) to identify and document the following:

- Large cracks in areas of unfinished concrete slab that appear to extend through the entire thickness of the slab;

- Conduits that penetrate the slab and are not well sealed between the conduit and the concrete;

- Conduits penetrating any below-ground foundation walls; and

- Floor drains.

The inspection of Building 51 was conducted on March 8, 2007, and the Building 59 inspection was performed on March 7, 2007. The information collected as part of the building inspections is presented in Appendix A to this report, which includes figures identifying the areas within each building where exposed concrete floor slab was visible and observations were made, and photographs with descriptions of the key observations made during the inspections. A summary of findings from the inspections is presented below, followed by a proposal for follow-up activities.

<u>Building 51 Inspection Findings</u>

The inspection conducted at Building 51 identified the following:

- The areas within Building 51 where the floor slab is visible for inspection represent approximately 20% of the overall floor space. These concrete floor areas are generally used for storage and building mechanical activities; none of these areas is occupied on a routine basis by the building occupants.

- Several floor slab penetrations were observed during the inspection; these were typically related to piping penetrations associated with roof drains, fire protection water, steam supply, floor drains, and sink drains. As shown on the photographs in Appendix A-1, these types of penetrations were generally well sealed and not likely to represent a potential soil gas migration pathway.

- Several manholes were noted within the floor slabs. Based on visual observations, review of building mapping, and discussions with GE personnel, these manholes are related to sub-slab sewer piping and/or electrical conduits.

- Some cracks were observed in floor slabs. However, none of these cracks appeared to extend through the entire thickness of the slabs.

- A number of pump pits were noted beneath the floor level.

- Within the boiler room located in the northeast portion of the building, the concrete floor slab was not present in several areas, totaling approximately 1,200 square feet (a gravel material was present in these areas). Photo No. 19 in Appendix A-1 shows a representative gravel-covered area within that room.

Building 59 Inspection Findings

The inspection conducted at Building 59 identified the following:

- The areas within Building 59 where the concrete floor slab is available for visual inspection represent approximately 35% of the overall floor space. The exposed concrete floor areas are generally used for storage and building mechanical activities; none of these areas is occupied on a routine basis by the building occupants.

- Several floor slab penetrations were observed during the inspection; these were typically related to piping penetrations associated with roof drains, fire protection water, steam supply, etc. As shown on the photographs in Appendix A-2, these types of penetrations were mostly well sealed and not likely to represent a potential soil gas migration pathway.

- Several areas of floor slabs with cracks were observed. However, none of these slabs appeared to have cracks or penetrations of sufficient size or depth to represent a potential soil gas migration pathway.

- Several floor drains were observed within the mechanical room located in the northern portion of the building (see Photos Nos. 5 through 8, 10, and 11 in Appendix A-2). These drains presumably lead to underground piping systems.

<u>Follow-up Activities</u>

Based on review of the items identified above and shown on the photographs in Appendix A, it appears that most of these items are not likely to represent a potential soil gas migration pathway. For those that could possibly constitute such a pathway, GE will conduct a further investigation of whether they actually involve a full, unsealed penetration of the floor slabs to the underlying soil and thus could provide a pathway for the migration of volatile constituents from the subsurface groundwater or LNAPL, via soil gas, into the indoor air of the buildings. If such penetrations are identified that can be readily sealed, GE will seal those penetrations. As discussed in Section 4, GE will provide a report on these follow-up investigations to EPA, along with a description of any actions taken or planned to address any such penetrations identified.

3. Proposed Inventory and Soil Gas and Indoor Air Monitoring

Pursuant to Condition 3 of EPA's February 15, 2007 conditional approval letter, this section presents: (a) GE's proposal to conduct an inventory of materials and/or products within each building that could contain volatile constituents similar to those that have been previously detected in the indoor air samples and are common to the target constituents in the LNAPL or groundwater: and (b) GE's proposal for the monitoring of soil gas beneath, and indoor air within, Buildings 51 and 59. Section 3.1 describes GE's proposed inventory activities, and Section 3.2 describes the proposed monitoring, including the identification of sampling locations, sampling and analysis methods, constituents subject to laboratory analyses, and data validation and assessment.

At this point, GE is proposing to conduct the activities described below in the fall of 2007 concurrently with the routine fall 2007 groundwater and NAPL monitoring for Groundwater Management Area (GMA) 3. GE will then review the results from those activities to evaluate the relationship between constituents in the groundwater or LNAPL and those in the indoor air, and to assess appropriate modifications to future inventory and soil gas/indoor air monitoring activities at Buildings 51 and 59. Based on that review and assessment, GE will include a proposal regarding the need for and scope of future periodic inventory and monitoring activities at these buildings in its GMA 3 Groundwater Quality and NAPL Monitoring Report for Fall 2007.

3.1 Building Products and Materials Inventory

Prior to the soil gas or indoor air monitoring event, GE will perform a visual assessment within each building to identify materials and/or products which could contain chemicals that could represent a potential source of volatile constituents in indoor air and that are common to the target constituents identified in the groundwater or LNAPL. The Migration Assessment Report, citing an EPA publication related to indoor air quality, noted that the presence of VOCs in indoor air can be attributed to many different types of industrial- and commercial-use products (as well as building materials themselves). Further, GE noted that the specific VOCs detected in the Building 51 and 59 indoor air samples are typically found in building materials and products. As such, to assess the possibility that VOCs previously detected in the indoor air samples (and common to those in the LNAPL or groundwater) could be wholly or partly attributable to industrial or commercial materials or products, a visual reconnaissance and inventory of each building will be performed.

Although certain building materials could potentially contain VOCs (e.g., carpeting, adhesives, paint, etc.), the inventory will focus on those materials and products that used or stored inside the buildings, such as fuels, chemicals, cleaning supplies, etc. – i.e., the inventory will not specifically focus on the building structure itself or on furnishings.

3.2 Soil Gas and Indoor Air Sampling and Analysis

This section describes GE's proposed indoor air and soil gas monitoring activities for Buildings 51 and 59, including sampling locations, sample collection and analysis procedures, laboratory analyses, and data validation and assessment. As noted above, the activities described below will be conducted in the fall of 2007. Based on review and assessment of the data from that event, GE will evaluate the need for and scope of modifications to such monitoring activities for future years, and will make a proposal on that subject to EPA.

3.2.1 Sampling Locations

The indoor air sampling conducted by GE in September 2006 and summarized in the Migration Assessment Report included the collection of samples from three locations in each building. For the fall 2007 round of sampling, GE proposes to perform sampling at these same locations (as shown on Figure 1) to begin to establish a data set specific to these locations that may be helpful in assessing potential data variability related to seasonal variations, changes in the building heating/cooling system, and/or changes in building uses.

In addition, in an effort to further clarify the interaction between soil gas and indoor air, GE proposes to collect a soil gas sample from each of the proposed indoor air sample locations. The September 2006 indoor air and soil gas monitoring performed by GE did not include this type of co-located sampling in all cases (i.e., only two of the six indoor air samples collected from the two buildings included a co-located soil gas sample).

In total, GE proposes to collect a total of 3 indoor air samples and 3 co-located soil gas samples from each building at the locations shown on Figure 1.

3.2.2 Soil Gas and Indoor Air Sampling Procedures

All soil gas and indoor air samples will be collected and analyzed in accordance with EPA Compendium Method TO-15, titled *Compendium of Methods for the Determination of Toxic Organics Compounds in Ambient Air – Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*, following the methods outlined in the Standard Operating Procedures (SOPs) included as Appendices B and C to this

Supplemental Assessment Report and Sampling Plan. Helium will be used as a tracer gas during subsurface sample collection in accordance with the procedures included as Appendix D.

Each sample will be collected using a 6-liter SUMMA® 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® 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.

Indoor air samplers will be placed at the approximate height of the breathing zone of the building occupants. The collection of the soil gas samples will involve the drilling of a small diameter hole through the existing concrete floor slabs (which are estimated to range in thickness from 12 to 16 inches) to allow access for a sampling tube to the underside of the floor slab. At this time, it is uncertain if the subsurface soil gas sampling locations will be permanent or temporary installations. The attached SOP for subsurface soil gas sampling (Appendix B) provides guidelines for both scenarios.

For quality assurance/quality control purposes, one duplicate indoor air sample will be collected at one of the 6 sampling locations.

3.2.3 Laboratory Analyses

All subsurface soil gas and indoor air samples will be submitted for laboratory analysis in accordance with EPA Compendium Method TO-15 (cited above). The samples will be submitted to Lancaster Laboratories, Inc. of Lancaster, Pennsylvania, which has current National Environmental Laboratory Accreditation Program (NELAP) certification and is accredited in the Commonwealth of Massachusetts for conducting analyses in accordance with EPA Compendium Method TO-15. While the suite of constituents subject to analysis could be reduced (based on review of the prior data) from those analyzed for in the previous investigations, GE has elected, for the next round of sampling, to perform analyses for the same constituents for which analyses were performed previously – namely, VOCs and certain SVOCs that can be identified during the same analysis (i.e., 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and naphthalene).

3.2.4 Data Validation and Assessment

Following receipt of the analytical results and supporting laboratory documentation, GE will conduct data validation activities consistent with GE's *Field Sampling Plan/Quality Assurance Project Plan* (FSP/QAPP).

The validated data will be subject to review and assessment. Such assessments will focus on the potential interactions among constituents present in the LNAPL and/or groundwater, those in the soil gas, and those in the indoor air, so as to evaluate the potential for constituents present in the groundwater or LNAPL to migrate upward and enter the indoor air of Buildings 51 and/or 59. These assessments will be based on the collective (expanded) sampling data sets and other relevant information, including the results of the building inspections and material/product inventories, as well as the co-located soil gas and indoor air sampling data.

4. Proposed Schedule and Reporting

As discussed in Section 2, GE is planning to conduct a follow-up investigation of those items identified during the March 2007 building inspections that could possibly constitute a soil gas migration pathway. That investigation will assess whether such items actually involve a full, unsealed penetration of the floor slabs to the underlying soil and thus could provide a pathway for the migration of volatile constituents from the subsurface groundwater or LNAPL, via soil gas, into the indoor air of the buildings. GE will provide a report on these follow-up investigations to EPA, along with a description of any actions taken or planned to address any such penetrations identified, within approximately 30 days after EPA approval of this Supplemental Assessment Report and Sampling Plan.

In addition, consistent with EPA's February 15, 2007 conditional approval letter, GE proposes to conduct the material/product inventory and soil gas/indoor air sampling activities at Buildings 51 and 59, as described in Section 3, in the fall of 2007, concurrently with the regular fall 2007 groundwater and NAPL monitoring event for GMA 3. The results of these activities will be included in GE's GMA 3 Groundwater Quality and NAPL Monitoring Report for Fall 2007, which is due to EPA by February 28, 2008. That report will also include GE's review and assessment of the data, the identification of any data needs with respect to the overall assessment of potential VOC migration pathways, proposed activities (if any) to address VOCs in LNAPL and groundwater and related migration pathways, and an evaluation and proposal regarding the need for and scope of future periodic soil gas and indoor air monitoring, as well as material/product inventories, at Buildings 51 and 59.

Figure

LEGEND:

- SG-51E — AUGUST 2006 DEEP SOIL GAS SAMPLE LOCATION
- 51-8 — AUGUST 2006 GROUNDWATER / LNAPL SAMPLE LOCATION
- # 0511 — SEPTEMBER 2007 SUB-SLAB SOIL GAS SAMPLE LOCATION
- # 0200 — SEPTEMBER 2007 SUMMA CANISTER INDOOR AIR SAMPLE LOCATION
- # 5902 — SEPTEMBER 2007 INDUSTRIAL HYGIENE INDOOR AIR SAMPLE LOCATION
- APPROXIMATE PROPOSED (CO-LOCATED) SUB-SLAB SOIL GAS/INDOOR AIR 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.

0 100' 200'
GRAPHIC SCALE

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

EXISTING AND PROPOSED SAMPLE LOCATIONS

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FIGURE
1

Appendices

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Appendix A

Building 51 and 59
Inspection Photos

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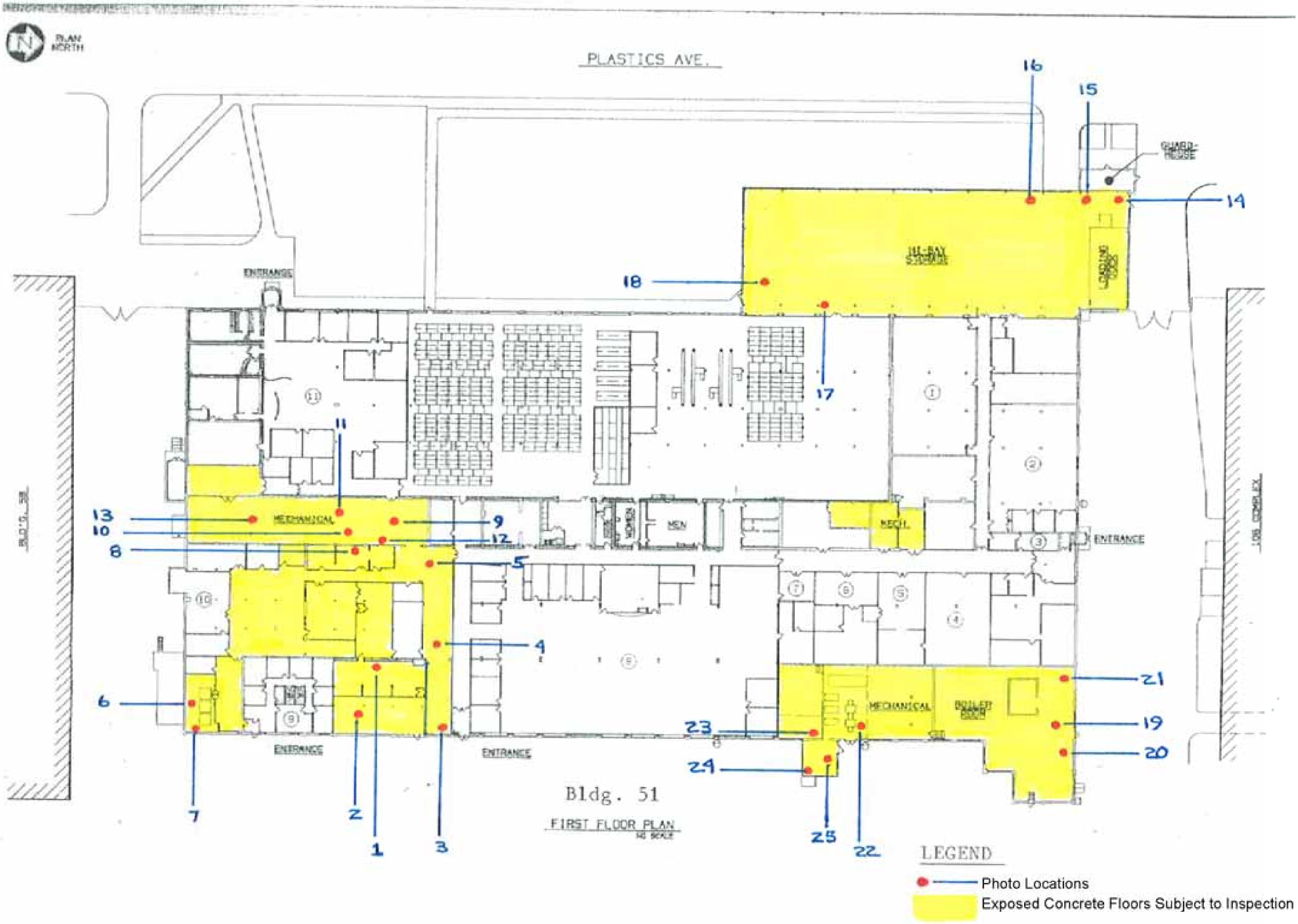
Appendix A-1

Building 51 Inspection Photos



PLAN NORTH
PLASTICS AVE.
GUARD-HOUSE
HI-BAY STORAGE
LOADING DOCK
ENTRANCE
MECHANICAL
WOMEN
MEN
MECH.
ENTRANCE
BLDG'S 5B
10S COMPLEX
MECHANICAL
BOILER ROOM
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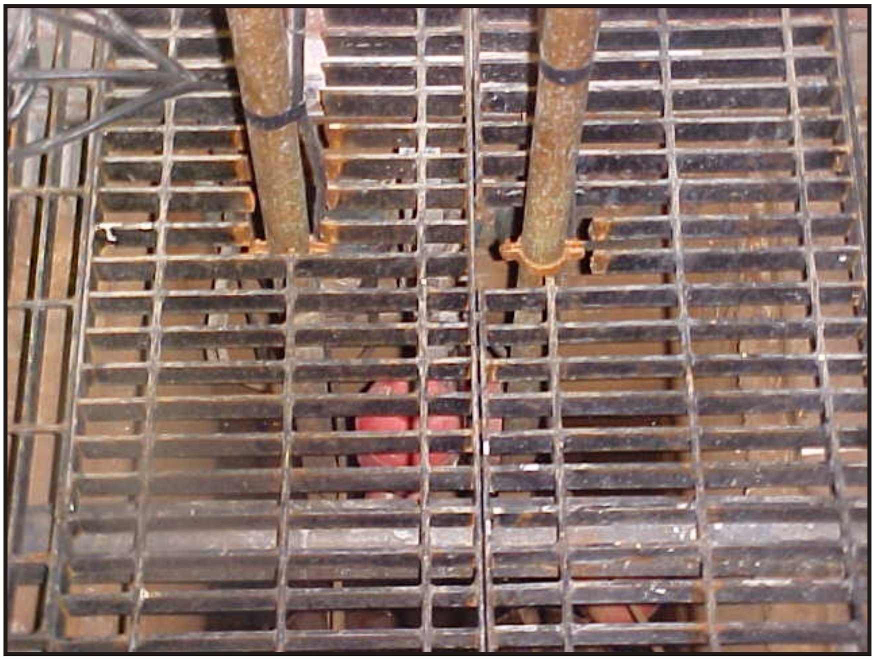
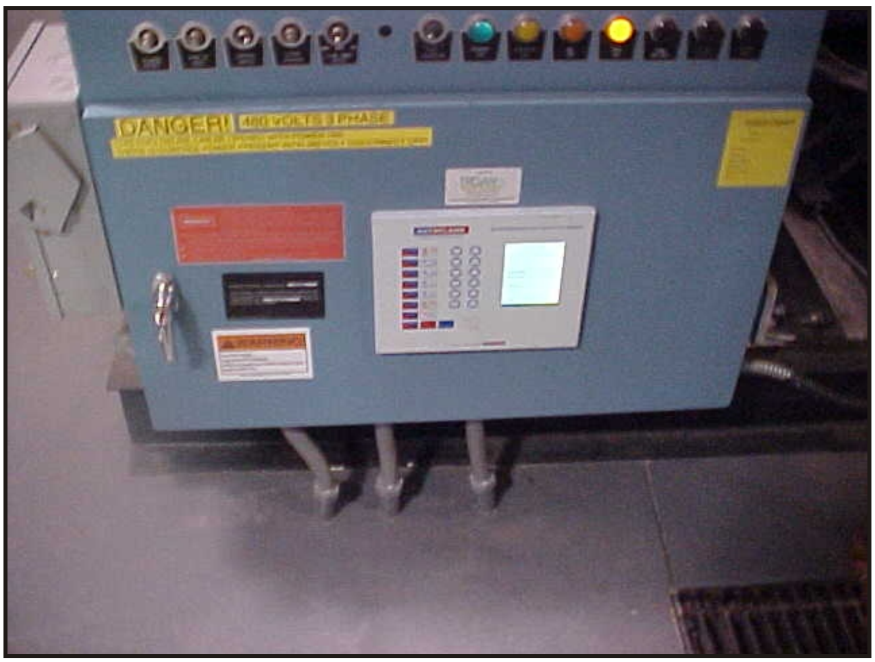
Bldg. 51
FIRST FLOOR PLAN
NO SCALE
LEGEND
Photo Locations
Exposed Concrete Floors Subject to Inspection



(1) Photo of a sump pump under a steel grate located in the new boiler room



(2) Photo of several conduits from a 480 Volt electrical box located in the new boiler room attached to boiler # 1

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G01.cdr

(3) Photo of a roof drain next to an overhead door just north of the new boiler room in an alleyway

(4) Photo of a storm drain manhole cover just north of the new boiler room.

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BUILDING 51 PHOTO LOG

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ATTACHMENT A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G02.cdr

(5) Photo of an electrical manhole cover just north of the new boiler

(6) Photo of a representative steel plated area covering a 4-foot vault, several other vaults were also present in this room

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BUILDING 51 PHOTO LOG

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A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G03.cdr

(7) Photo of a steam line in fire equipment storage area

(8) Photo of a fire riser (51-8B) in empty storage area

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BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G04.cdr

(9) Photo of a sewer manhole cover in the mechanical room at the south end of the building

(10) Photo of a floor drain in the mechanical room at the south end of the building, several others floor drains were also present in this room

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BUILDING 51 PHOTO LOG

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A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G05.cdr

(11) Photo of sealed conduit holes in the mechanical room at the south end of the building

(12) Photo of a sink drain line in the mechanical room at the south end of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G06.cdr

(13) Photo of a superficial crack in the floor in the mechanical room at the south end of the building

(14) Photo of a fire riser in the high bay storage area at the northwest corner of the building

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BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G07.cdr

(15) Photo of a roof drain in the high bay storage area at the northwest corner of the building

(16) Photo of a steam line pit under steel grating in the high bay storage area at the northwest corner of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G08.cdr

(17) Photo of a roof drain in the high bay storage area at the northwest corner of the building

(18) Photo of expansion cracks in the floor located in the high bay storage area at the northwest corner of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

(19) Photo of representative open gravel floor area in the old boiler room at the northeast end of the building

(20) Photo of a pump pit located below a steel grated area in the old boiler room at the northeast end of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G10.cdr

(21) Photo of an open pipe chase in the old boiler room at the northeast end of the building

(22) Photo of generator access manhole cover in the compressor room located at the northeast corner of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G11.cdr

(23) Photo of a sump pump pit located in the lower level of the compressor room at the northeast corner of the building

(24) Photo of a fire pump pit located just off the compressor room at the northeast corner of the building

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G12.cdr

(25) Photo of a fire line drain in the fire pump room just off of the compressor room at the northeast corner of the building

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PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 51 PHOTO LOG

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ATTACHMENT
A-1

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_51/20186G13.cdr

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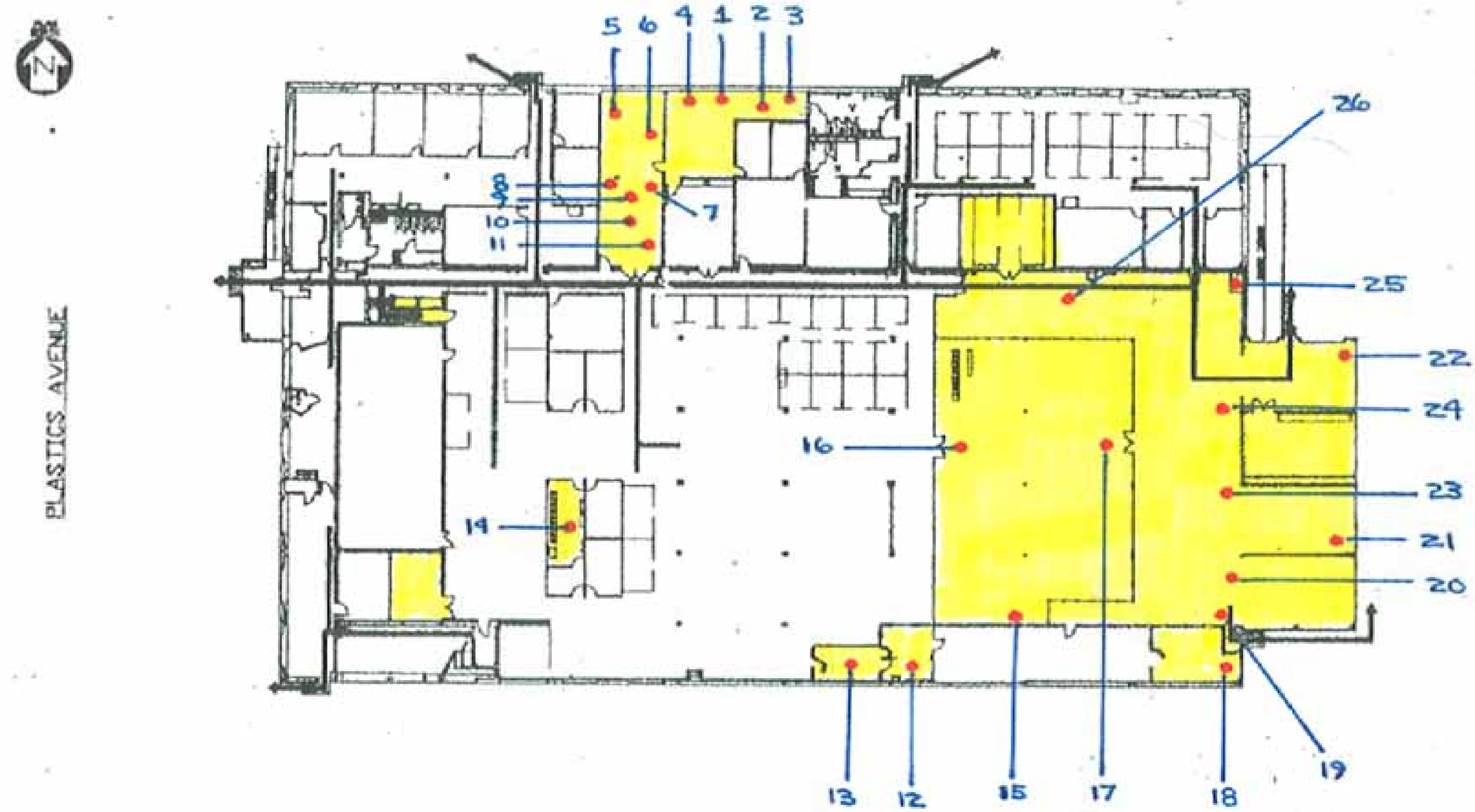
Appendix A-2

Building 59 Inspection Photos



BUILDING 59

SOIL GAS MIGRATION INSPECTION

LEGEND

Photo Locations

Exposed Concrete Floors Subject to Inspection

(1) Photo of several conduits in the server room

(2) Photo of the chiller water piping in the server room

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PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

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ATTACHMENT
A-2

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G01.cdr

(3) Photo of a roof drain in the server room

(4) Photo of a crack in the concrete floor on the north wall of the server room that appears to be superficial with an apparent depth of 2-3"

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

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ATTACHMENT
A-2

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G02.cdr

(5) Photo of a floor drain in the northeast section of the mechanical room

(6) Photo of a floor drain in the southeast section of the mechanical room

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

ARCADIS BBL
Infrastructure, environment, facilities

ATTACHMENT
A-2

03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G03.cdr

(7) Photo of a floor drain in the South Central section of the mechanical room

(8) Photo of a floor drain in the North Central section of the mechanical room

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G04.cdr

(9) Photo of a roof drain in the center of the mechanical room

(10) Photo of a floor drain in the center of the mechanical room

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G05.cdr

(11) Photo of a floor drain in the southwest section of the mechanical room

(12) Photo of a fire riser in the insurance claims storage room

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G06.cdr

(13) Photo of a fire riser in the health and safety records storage room

(14) Photo of electrical conduit in the MCC room

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G07.cdr

(15) Photo of a roof drain on the south wall of the record storage area room

(16) Photo of two (2) conduit openings on the west wall of the fenced in record storage area in front of the steel double door opening

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G08.cdr

(17) Photo of a superficial floor crack on the east end of the fenced in records storage area in front of the double fenced gate

(18) Photo of a condensate pump drain in the electrician's storage area

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SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G09.cdr

(19) Photo of a superficial floor crack in front of the southeast exit door of the records storage area.

(20) Photo of a superficial crack in the concrete floor that runs from north to south in front of the mechanics crib

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PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

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Infrastructure, environment, facilities

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G10.cdr

(21) Photo of a roof drain on the east wall of the maintenance shop

(22) Photo of a roof drain in the northeast corner of the loading dock area

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G11.cdr

(23) Photo of a roof drain on the side of a steel beam in the maintenance shop area

(24) Photo of a building grounding cable in the maintenance shop area

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

BUILDING 59 PHOTO LOG

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Infrastructure, environment, facilities

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G12.cdr

(25) Photo of two (2) steam pipes that go through a steel grated plate in the northeast corner of the maintenance shop area*

(26) Photo of a conduit on the north wall of the open record storage area

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
SUPPLEMENTAL SOIL GAS MIGRATION ASSESSMENT REPORT AND SAMPLING PLAN

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03/12/07 SYR-D85-DJH
20186002/CDR/BLD_59/20186G13.cdr

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Appendix B

Standard Operating Procedure – Sub-Slab Soil Gas Sampling and Analysis

Standard Operating Procedure: Sub-Slab Soil Gas Sampling and Analysis Using USEPA Method TO-15

I. Scope and Application

This document describes the procedures to install a sub-slab sampling port and collect sub-slab 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® passivated stainless steel canister. An evacuated SUMMA canister (less than 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 is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS) system to provide compound detection limits of 0.5 parts per billion volume (ppbv).

The following sections list the necessary equipment and detailed instructions for installing sub-slab soil gas probes and collecting soil gas 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 sub-slab soil gas sample collection activities must have previous sub-slab soil gas sampling experience.

III. Equipment List

The equipment required to <u>install a permanent sub-slab soil gas probe</u> is presented below:

- Electric impact drill
- 5/8-inch and 1-inch-diameter concrete drill bits for impact drill
- Stainless steel soil gas probe (typically 3/8-inch outside diameter [OD], 2- to 2.5-inch long [length will ultimately depend on slab thickness], 1/8-inch inside diameter [ID] pipe, stainless steel pipe nipples with 0.5-inch OD stainless steel coupling, and recessed stainless steel plugs per DiGiulio et. al., 2003)

- Photoionization detector (PID)
- Polyethylene tubing
- Quick-setting hydraulic cement powder

The equipment required to install a temporary sub-slab soil gas probe is presented below:

- Electric impact drill
- 5/8-inch-diameter concrete drill bit for impact drill
- 3/8-inch tubing (Teflon®, polyethylene, or similar)
- PID
- Hydrated bentonite
- Teflon® tape

The equipment required for soil gas 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 ID tubing (Teflon®, 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)
- 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 point that the canister reaches atmospheric pressure.

Care must be taken to properly seal around the soil gas probe at slab surface to prevent leakage of atmosphere into the soil gas probe during purging and sampling. Temporary points are fit snug into the pre-drilled hole using Teflon® tape and a hydrated bentonite seal at the surface. Permanent points are fit snug 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 sub-slab soil gas probe installation, drilling with an electric concrete impact drill should be done only by personnel with prior experience using such a piece of equipment.

VI. Procedures

Permanent Soil Gas Probe Installation

Permanent sub-slab soil gas probes are installed using an electric drill and manual placement of the probe. Drill an 1-inch diameter hole approximately 1-inch deep, in the concrete and then use the 5/8-inch-diameter drill to advance the hole to approximately 3 inches below the base of the floor slab. The soil gas probe is inserted into the hole and grouted with a quick-setting hydraulic cement power. The soil gas probe is equipped with a recessed threaded cap and stainless steel threaded fitting or compression fitting to allow collection of soil gas sample through the stainless steel tubing. The soil gas probe and tubing will be purged with a portable sampling pump prior to collecting the soil gas sample.

1. Remove, only to the extent necessary, any covering on top of the slab (e.g., carpet).

2. Drill a 5/8-inch-diameter hole through the slab using the electric drill. (Optional: Although not required, use a source of dust control/suppressant during drilling operations).

3. Advance the drill bit approximately 3 inches beneath the bottom of the slab.

4. Overdrill the upper 1 inch of slab to a hole diameter of 1 inch.

5. Insert the soil gas probe so that it sits flush with the top of the slab.

6. Use a quick-setting hydraulic cement to grout the probe in-lace and allow the grout to set.

7. Purge the soil gas probe and tubing with a portable sampling pump prior to collecting the soil gas sample (see sample collection section below).

8. Proceed to soil gas sample collection.

9. When sub-slab soil gas sampling is complete, plug the soil gas probe opening with a stainless steel plug.

Temporary Soil Gas Probe Installation

Temporary sub-slab soil gas probes are installed using an electric drill and manual placement of tubing. The drill will be advanced to approximately 3 inches beneath the bottom of the slab. A 3/8-inch ID hole is installed through the slab. The tubing, wrapped in Teflon® tape, is inserted into the hole. The tubing is purged prior to collection of a soil gas sample. Probe locations are resealed after sampling is complete.

1. Remove, only to the extent necessary, any covering on top of the slab (e.g., carpet).

2. Drill a 3/8-inch-diameter hole through the concrete slab using the electric drill.

3. Advance the drill bit approximately 3 inches into the sub-slab material to create an open cavity.

4. Wrap the tubing with Teflon® tape, to the extent necessary, for a snug fit of tubing and hole.

5. Insert the tubing approximately 1.5 inches into the sub-slab material.

6. Prepare a hydrated bentonite mixture and apply bentonite at slab surface around the tubing.

7. Purge the soil gas probe and tubing with a portable sampling pump prior to collecting the soil gas sample (see sample collection section below).

8. Proceed to soil gas sample collection.

9. When the sub-slab soil gas sampling is complete, remove the tubing and grout the hole in the slab with quick-setting hydraulic cement powder or other material similar to the slab.

Sub-Slab Soil Gas Sample Collection

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

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

    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 soil gas probe and sampling line using a portable pump [purge volume = 1.5 Pi r^2h] at a rate of approximately 100 mL/min. Measure organic soil gas levels with the PID.

4. If necessary, check the seal established around the soil gas probe by using a tracer gas (e.g., helium) or other method established in the state guidance documents. [**Note: Some states (e.g., New York) may not require use of a tracer gas in connection with sub-slab sampling**. Refer to the Administering Tracer Gas SOP, adapted from NYSDOH 2006, for how to use a tracer gas.]

5. Remove the brass plug from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister. Record in the field notebook and on the COC form the flow controller number with the appropriate SUMMA® canister number.

6. Connect the polyethylene sample collection tubing to the flow controller and the SUMMA® 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® canister valves. Record in the field notebook the time sampling began and the canister pressure.

9. Take a photograph of the SUMMA® canister and surrounding area.

<u>Termination of Sample Collection</u>

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

2. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® 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 (attached), and COC form.

4. Remove the particulate filter and flow controller from the SUMMA® 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® 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. 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, a temporary soil gas monitoring point will be abandoned by removing the sampling materials and filling the resulting hole with concrete. Replace the surface covering (e.g., carpet) to the extent practicable.

VII. Waste Management

No specific waste management procedures are required.

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 [e.g., two walls, corner of room]), 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 in either the SCAN or SIM mode.

X. References

DiGiulio et. al. 2003. Draft Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA TO-15 to Support Vapor Intrusion Investigations. http://www.cdphe.state.co.us/hm/indoorair.pdf (Attachment C).

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

Sub-Slab Sample Collection Log

ARCADIS BBL Infrastructure, environment, facilities		Sub-Slab Sample Collection Log	
		Sample ID:	
Client:		**Outdoor/Indoor:**	
Project:		**Sample Intake Height:**	
Location:		**Miscellaneous Equipment:**	
Project #:		**Time On/Off:**	
Samplers:		**Subcontractor:**	
Sample Point Location:		**Moisture Content of Sampling Zone (circle one**	Dry / Moist
Sampling Depth:		**Approximate Purge Volume and Method:**	
Time of Collection			

Instrument Readings:

Time	Canister Pressure (inches of HG)	Temperature (F or C)	Relative Humidity (%)	Air Speed (ft/min)	Pressure Differential (inches of H20)	PID (ppm or ppb)

<u>SUMMA Canister Information:</u>

Size (circle one): 1 L 6 L

Canister ID: ________________

Flow Controller ID: ________________

General Observations/Notes:

Approximating One-Well Volume (for purging): When using 1 ¼-inch "Dummy Point" and a 6-inch sampling interval, sampling space will have a volume of approximately 150 mL. Each foot of ¼-inch tubing will have a volume of approximately 10 mL.

Please record current weather information including wind speed and direction, ambient temperature, barometric pressure, and relative humidity via suitable information source (e.g., weatherunderground.com).

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Appendix C

Standard Operating Procedure –
Indoor Air Sampling and Analysis

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

I. Scope and Application

This standard operating procedure (SOP) describes the procedures to collect indoor 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 6-liter SUMMA® passivated stainless steel canister. An evacuated SUMMA® 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 is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/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 placing the sampling device and collecting indoor 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 indoor air sample collection activities must have previous indoor air sampling experience.

III. Equipment List

The equipment required for indoor 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)

- Stainless steel "T" fitting (for connection to SUMMA® canisters and Teflon® tubing to collect split [i.e., duplicate] samples)

- Appropriate-sized open-end wrench (typically 9/16-inch)

- Chain-of-custody (COC) form

- Sample collection log (attached)

- Field notebook

- Camera

- Lock and chain

- Ladder or similar to hold canister above the ground surface

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 SUMMA®-Type Canister and Collection of Sample

1. Record the following information in the field notebook (contact the local airport or other suitable information source [e.g., weatherunderground.com] to obtain the following information):

   a. ambient temperature

   b. barometric pressure

   c. relative humidity

2. Choose the sample location in accordance with the sampling plan. If a breathing zone 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). Canister may be affixed to wall/ceiling support with nylon rope or placed on a stable surface. In general, areas near windows, doors, air supply vents, and/or other potential sources of “drafts” shall be avoided.

3. Record SUMMA® canister serial number and flow controller number in the field notebook 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 dust cap from the SUMMA® 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 SUMMA® canister with the appropriate-sized wrench. Tighten with fingers first, then gently with the wrench.

5. Open the SUMMA® 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. Collection of duplicate/split samples will include attaching a stainless steel "T" to split the indoor air stream to two SUMMA® canisters, one for the original investigative sample and one for the duplicate/split sample.

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

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

Termination of Sample Collection

1. Arrive at the SUMMA® 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 SUMMA® 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 SUMMA® 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 SUMMA® 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 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 and COC records will be transmitted to the Project Manager.

IX. Quality Assurance

Indoor 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

ARCADIS BBL Infrastructure, environment, facilities		Indoor/Ambient Air Sample Collection Log	
		Sample ID:	
Client:		**Outdoor/Indoor:**	
Project:		**Sample Intake Height:**	
Location:		**Miscellaneous Equipment:**	
Project #:		**Time On/Off:**	
Samplers:		**Subcontractor:**	

Instrument Readings:

Time	Canister Pressure (inches of HG)	Temperature (F or C)	Relative Humidity (%)	Air Speed (ft/min)	Pressure Differential (inches of H20)

SUMMA Canister Information:

Size (circle one): 1 L 6 L

Canister ID: ________________

Flow Controller ID: ________________

General Observations/Notes:

Please record current weather information including wind speed and direction, ambient temperature, barometric pressure, and relative humidity via suitable information source (e.g., weatherunderground.com).

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Appendix D

Standard Operating Procedure – Administering Tracer Gas

Standard Operating Procedure: Administering Tracer Gas

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_6) 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: simple 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® 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.