nationalgrid

Brian M. Stearns
Lead Engineer
Environmental Department

February 18, 2009

Mr. Bradley Brown
Engineering Geologist
New York State Department of Environmental Conservation
Region 4 Headquarters
1130 Wescott Road
Schenectady, New York 12206

Re: National Grid
Gloversville Former MGP Site
Gloversville, New York
Soil Vapor Intrusion Investigation Work Plan

Dear Mr. Brown:

This Soil Vapor Intrusion Work Plan (Work Plan) presents the vapor intrusion evaluation activities to be implemented at the Gloversville former manufactured gas plant (MGP) site (the "site"). The activities outlined in this Work Plan are being performed to evaluate the potential presence, concentration, and distribution of MGP-related volatile organic compounds (VOCs) and other non-MGP-related VOCs in soil vapor below existing onsite buildings (hereafter, "sub-slab vapor") and in soil vapor by supplementing the sub-slab and soil vapor data previously collected at the site in 2005. This Work Plan has been prepared consistent with the draft *Conceptual Soil Vapor Sampling Plan* that was provided to the New York State Department of Environmental Conservation (NYSDEC) in an e-mail dated December 30, 2008 and includes the additional sampling activities requested by NYSDEC and agreed to during a February 11, 2009 conference call.

A summary of the relevant background information is presented below, followed by a discussion of the proposed soil vapor investigation activities, data reporting, and a schedule for implementing the activities.

1.0 Background

Based on historic information related to site operations, manufactured gas was produced at the site from 1900 to the late 1950s using a water carbonization process. During the late 1950s, select gas holders and other production equipment were removed from the site. Subsurface foundations associated with select former MGP structures remain at the site and are primarily located to the south of the current Service Center Building.

Currently, the site is situated in a mixed residential, commercial, and industrial area and serves as a service center for National Grid. The site features an office/garage building (the Service Center Building), a metal garage, an office trailer used for office space, an open garage, a groundwater treatment system building associated with the storm sewer IRM, a shed that houses the MW-8 NAPL collection system, and equipment storage. These site features are depicted on Figure 1.

In August 2005, sub-slab and soil vapor samples were collected by National Grid in response to a telephone call from an unnamed National Grid employee to the NYSDEC. During this sampling event, the following soil vapor samples were collected:

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- Sub-slab sample (SV-1) was collected near the northeast corner of the Service Center Building; and
- Soil vapor sample (SV-2) was collected just outside of the Service Center Building near the northeast corner of the building.

The sample collection procedures followed during this event are consistent with the procedures outlined in the New York State Department of Health (NYSDOH) Guidance and National Grid's current Standard Operating Procedures. The results of these previous sampling efforts were previously provided to NYSDEC in 2005. A table (Table 1) is attached to this Work Plan that compares the concentrations of detected compounds (that may be associated with the former MGP site) to USEPA 90th percentile background indoor air levels. The concentrations of VOCs identified in the soil vapor and sub-slab samples are generally low, and the contribution from the subsurface into the buildings (if any) would be less than the concentrations in soil vapor due to attenuation mechanisms. It should be noted, that some VOCs identified on the table that can be associated with water carbonization gas plant sites were not analyzed for. However, based on our experience these compounds are typically secondary compounds that do not dictate the conclusions drawn from vapor intrusion evaluations at MGP sites.

A Remedial Investigation/Feasibility Study Data Needs Work Plan (RI/FS Data Needs Work Plan) was submitted to NYSDEC on May 30, 2008 that identified the need for additional vapor intrusion sampling. A June 25, 2008 NYSDEC comment letter and July 11, 2008 ARCADIS comment response letter identified the need for the SVI Work Plan to address the entire site. Pursuant to this series of correspondence, the *Conceptual Soil Vapor Sampling Plan* was provided to the NYSDEC on December 30, 2008, and was subsequently discussed during a February 11, 2009 conference call between National Grid, ARCADIS, and the NYSDEC. The *Conceptual Soil Vapor Sampling Plan* and the results of the conference call have been used as the basis for the development of this Work Plan.

2.0 Proposed Soil Vapor Investigation Activities

The proposed soil vapor investigation will consist of a preliminary building review, sub-slab vapor and soil vapor sampling, and ambient air sampling. The investigation activities will be performed by ARCADIS and will be focused on the Service Center Building (in particular the locker room/break area and office/conference room area), the area near the office trailer, an area near the southeast corner of the Service Center Building, and an area east of the MW-8 Shed. The approximate locations of the samples are depicted on Figure 1. In addition, a summary which identifies the proposed soil vapor sampling locations, sampling intervals, and rationale for each sample is presented in Table 2. It should be noted that if groundwater is encountered immediately below a concrete slab/paved area or if water is observed weeping through a sample hole, this location will be abandoned by plugging the hole and no sample will be collected. The conclusion from this observation will be that there is not a sufficient unsaturated zone present to facilitate vapor intrusion. Details of the proposed investigation activities are presented in the subsections below.

Each sub-slab vapor and ambient air sample will be submitted to TestAmerica Laboratories, Inc. (TestAmerica) located in Knoxville, Tennessee for laboratory analysis for VOCs in accordance with United States Environmental Protection Agency (USEPA) Compendium Method TO-15. The VOC analyte list and associated reporting limits are presented in Table 3. Laboratory analysis will be performed on a standard turnaround for reporting of analytical results.

A Fact Sheet identifying the proposed investigation activities will be prepared for distribution to personnel working inside the buildings prior to beginning the investigation activities.

2.1 Preliminary Building/Site Reconnaissance

ARCADIS will conduct a preliminary building/site reconnaissance accompanied by personnel from National Grid and (if available) the NYSDEC and NYSDOH to select the locations of the sub-slab and soil vapor samples based on site-specific considerations encountered during the sampling event. Final sample locations will be determined in the field to minimize disruption to the operations at the facility and based on safety.

As part of the building reconnaissance, ARCADIS will observe and record the layout of the lower floor of the Service Center Building (the building) and identify locations where VOCs (if present in the subsurface) could potentially enter the building. Building layout information collected will be related to interior wall configurations, foundation wall locations, relative floor elevations, doorways, windows, equipment, and other factors that influence pressure, ventilation, and air movement in the building. ARCADIS will document observed floor penetrations, cracks, or other preferential pathways that could potentially serve as a route for vapors to enter the building. The site reconnaissance will focus on identifying utilities or other obstructions, confirming the surface cover (i.e., asphalt, gravel, etc.) at the sample locations, and coordinating with site personnel to identify traffic patterns.

Photographs of the building and areas surrounding the soil vapor sample points will be taken during the reconnaissance activities. Results of the reconnaissance will be summarized in the Summary Report discussed in Section 3.0.

2.2 Sub-Slab Vapor Sampling

Sub-slab vapor sampling activities will be performed following completion of the building reconnaissance and concurrent with proposed soil vapor sampling discussed in Section 2.3. Samples will be collected from two sub-slab vapor sampling locations, as shown on Figure 1 and as summarized on Table 2.

The location of each sampling location will be documented by pulling ties in the field. The elevation of each sample will be based on floor elevation data.

Work activities to be performed in connection with the sub-slab vapor sampling include installing and purging temporary soil vapor points, completing tracer gas tests, and collecting soil vapor samples for laboratory analysis. Details of these work activities are presented in Attachment A. Tracer gas testing will be performed in accordance with the procedures outlined in Section 2.5 below. Attachment A describes the procedures associated with the sub-slab vapor sampling.

2.3 Soil Vapor Sampling

Soil vapor sampling will be performed following completion of the building reconnaissance and concurrently with sub-slab vapor sampling. As part of the proposed soil vapor investigation, soil vapor samples will be collected from temporary soil vapor probes installed at three onsite sampling locations (SV-4 through SV-6), as shown on Figure 1 and as summarized on Table 2.

The location and ground surface elevation of each final sampling location will be documented by land surveying activities.

Soil vapor sampling will be performed at one sampling interval per location (vertical profile sampling will not be performed). The water table is generally encountered at a depth of approximately 5 to 8 feet below ground surface (bgs). Soil vapor samples in unpaved areas will be collected at a depth of no more than approximately 1 to 2 feet above the groundwater table to minimize the potential leakage of atmospheric air into the samples and to evaluate potential worst-case conditions (close to impacted groundwater without drawing moisture/groundwater into the samples). Soil vapor samples in concrete or asphalt paved areas will be collected just below the pavement sub-base to evaluate conditions that could be encountered below a nearby building floor slab. At each location, the sampling interval will be limited to approximately 0.5 feet to reduce potential sample dilution that could otherwise occur across a larger interval.

Work activities to be performed in connection with the soil vapor sampling include installing and purging temporary soil vapor probes, completing tracer gas tests, and collecting soil vapor samples for laboratory analysis. Details of these work activities are presented in Attachment B. Tracer gas testing will be performed for the three soil vapor points in accordance with the procedures outlined in Section 2.5 below.

2.4 Ambient Air Sampling

A minimum of two (up to three) upwind ambient air samples will be collected each day that soil vapor sampling and sub-slab vapor sampling is performed. The ambient air sample collection will be performed in accordance with the procedures presented in National Grid's ambient air sampling SOP (Appendix B to National Grid's Soil Vapor Intrusion Standard Operating Procedures [National Grid's VI SOP]). Consistent with the soil vapor sampling approach, the proposed air sampling will also involve use of a pre-cleaned 6-Liter SUMMA® canister with an attached flow regulator. However, the regulator for the ambient air sample will be adjusted by the laboratory to provide uniform sample collection over a minimum two hour sampling period. The location of the ambient air samples will be determined by field personnel the day of sampling based on wind direction.

2.5 Quality Assurance/Quality Control (QA/QC)

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

- Four sets of SUMMA® canister vacuum readings will be obtained in connection with sampling and analysis:

  1) following canister cleaning for shipping to the field;
  2) prior to sampling, with all the connections and leak checks completed;
  3) at the end of sampling; and
  4) prior to analysis in the laboratory.

  Vacuum readings for (1) and (2) above are expected to be within 5 in. of Hg, as are vacuum readings (3) and (4). Additional canisters will be available in the field for use in the event that vacuum reading (2) is less than reading (1) by more than 5 in. of Hg. If vacuum readings for (3) and (4) above are outside of 5 in. of Hg, the vacuum differences will be taken into consideration during the results evaluation, and the results will be qualified, as needed.

- The tracer gas (helium) will provide a means to: (1) evaluate whether soil vapor samples could be diluted by surface air; and (2) determine if improvements to the seals might be needed. The tracer gas testing will be performed as illustrated in Figure 2.4(b) of the NYSDOH VI Guidance. The helium levels in the purge gas and inside the enclosure installed around the sampling point will be measured using a gas detector prior to and after purging. Improvements to the seals will be made, if needed, based on the results of real-time monitoring for helium. Following purging, the exposed end of the sample tubing will be sealed with melted beeswax or via crimping. Actual sampling will be performed the next day (so that samples can be collected concurrently over the proposed sampling periods).

- Field duplicates will be collected in accordance with Attachments A and B and submitted for laboratory analysis for QA/QC purposes.

The results of the QA/QC activities will be summarized in the Summary Report discussed in Section 3.0.

3.0 Data Reporting

In accordance with National Grid's VI SOP, preliminary laboratory analytical results and a figure showing sampling locations will be provided to the NYSDEC and NYSDOH within 48 hours following receipt of the data from the laboratory (before data are validated). The results of the investigation will be summarized and discussed with NYSDEC and NYSDOH to confirm that further evaluation of the soil vapor is not required prior to preparing the Summary Report. The Summary Report will be presented in a letter format and is anticipated to include:

- A summary of work activities performed (including QA/QC) and analytical results obtained for the soil vapor investigation

- An identification of potential VOC sources observed during the building reconnaissance including outdoor sources that could bias sampling results (vehicles, lawn mowers, delivery trucks, construction equipment, etc.)

- An evaluation of the sub-slab and soil vapor sampling results, including comparisons to potential screening values

- Figures showing the final sampling locations and depicting the general layout of the bottom floor of the Service center Building
- Data tables presenting validated laboratory analytical results
- The final, completed Building Inventory form
- A CD containing the full laboratory analytical data reports and a copy of the data validation report, validation of the analytical results will be performed in accordance with the procedures in the USEPA National Functional Guidelines dated October 1999
- Conclusions and recommendations

The final Summary Report will be submitted to NYSDEC and NYSDOH for approval and the approved Summary Report will be appended to the Remedial Investigation Report.

4.0 Schedule

National Grid and ARCADIS are prepared to commence the investigation activities within three weeks of approval of this Work Plan by NYSDEC/NYSDOH. The proposed investigation activities are anticipated to take two days to complete, as follows:

- One day for the building/site reconnaissance and installation of sub-slab and soil vapor points
- One day for sample collection of sub-slab vapor and soil vapor (will take place the day following installation of the sampling points)

Preliminary laboratory analytical results for the sub-slab vapor, soil vapor, and ambient air sampling activities will be available approximately one to two weeks following sampling. Data validation is anticipated to be completed within approximately one month following receipt of the final laboratory analytical results. The final letter report will be submitted to the NYSDEC/NYSDOH approximately one month following the validation of the laboratory analytical results.

Please do not hesitate to call me at (315) 428-3101 if you have any questions or require additional information regarding the proposed soil vapor investigation.

Sincerely,

Brian M. Stearns, P.E.
Lead Engineer

cc: Nathan Freeman, NYSDOH
Jason Brien, P.E., ARCADIS

ARCADIS

Tables

TABLE 1
2005 SOIL VAPOR ANALYTICAL RESULTS FOR MANUFACTURED GAS PLANT-RELATED CONSTITUENTS ($\mu g/m^3$)
SOIL VAPOR INVESTIGATION WORK PLAN

GLOVERSVILLE FORMER MGP SITE
NATIONAL GRID - GLOVERSVILLE, NEW YORK

Location ID: / Date Collected:	USEPA 90th Percentile Background Indoor Air Level	SV-1 8/18/2005	SV-2 8/18/2005
NYSDEC DER TO-15 TCL ($\mu g/m^3$)			
Benzene	9.4	1.6	3.2
Ethylbenzene	5.7	3	15
Toluene	43	13	49
m,p-Xylenes	22.2	10	52
o-Xylene	7.9	3.4	11
Naphthalene	5.1	4.9	2.6
Indene	NA	NA	NA
Indane	NA	NA	NA
1,2,4-Trimethylbenzene	9.5	6.4	9.8
n-Nonane	7.8	NA	NA
n-Decane	17.5	NA	NA
n-Undecane	22.6	NA	NA
n-Dodecane	15.9	NA	NA

Notes:

1. Samples collected by Blasland Bouck & Lee, Inc. (now ARCADIS) on the date indicated.
2. Samples analyzed by STL of Burlington, Vermont.
3. Laboratory analysis was conducted in 2005 using USEPA Method TO-15.
4. NA = Not Analyzed
5. USEPA 90th Percentile Background Indoor Air Levels are the 90th percentile of background indoor air values observed by the USEPA in a study of public and commercial office buildings, per USEPA database information referenced in Section 3.2.4 of the Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006).
6. Results shaded indicate exceedences of soil vapor concentrations when directly compared to USEPA 90th Percentile Background Indoor Air Levels. However, true indoor air levels are expected to be less than the concentration in soil vapor due to attenuation mechanisms.

TABLE 2
SOIL VAPOR INTRUSION SAMPLING SUMMARY
SOIL VAPOR INVESTIGATION WORK PLAN

GLOVERSVILLE FORMER MGP SITE
NATIONAL GRID - GLOVERSVILLE, NEW YORK

Sample ID	Sample Type[1,2]	Location	Surface Cover	Proposed Sampling Depth	Rationale
SV-1A	Sub-Slab	Within the northeast corner of the Service Center Building within newly constructed office area	Slab	0.5 feet below slab	This area was selected based on the use of this area, its proximity to the former MGP operations and observed site impacts, and to confirm the results from the August 2005 sample collected from this location.
SV-3	Sub-Slab	Beneath the break/locker room area in the Service Center Building	Slab	0.5 feet below slab	This area was selected based on the use of this area, its proximity to the former MGP operations and observed site impacts, to provide spatial distribution of sub-slab samples within the building, and based on the elevation of the floor slab in this area (which is lower than the floor slab in the office/conference room area in the northeast corner of the building).
SV-4	Soil Vapor	Southeast corner of the Service Center Building	Asphalt	0.5-1.0 feet bgs	This area was selected based on the presence of visually impacted soil (e.g., NAPL sheen, or odor), and is intended to represent a "worst-case" scenario for evaluating the presence of soil vapor at the site. This sample may be relocated in the field or removed from the program if the sample cannot be collected due to the groundwater elevation.
SV-5	Soil Vapor	South of the metal garage near the northeast corner of the site near the office trailer	Crushed Stone	5-6 feet bgs	This area was selected because it represents the next closest building to the MGP impacts that is regularly occupied (the Service Center Building is the closest).
SV-6	Soil Vapor	Southeast corner of the site adjacent to the MW-8 shed	Crushed Stone	5-6 feet bgs	This area was selected based on the presence of NAPL at MW-8.

Notes:
1. Sub-slab vapor sample SV-1 was previously sampled in August 2005. As part of the sampling effort conducted under this Work Plan a new soil vapor sample (SV-1A) will be located at (or close proximity to) the previous SV-1 sample location.
2. Sample SV-2 was collected west of the north-east corner of the Service Center Building in August 2005. Based on the laboratory analytical results for this sample, no further sampling is required.

TABLE 3
TARGET ANALYTE LIST AND REPORTING LIMITS
SOIL VAPOR INVESTIGATION WORK PLAN

GLOVERSVILLE FORMER MGP SITE
NATIONAL GRID - GLOVERSVILLE, NEW YORK

Analyte	CAS Number	Molecular Weight	Reporting Limit (ppbv)	Reporting Limit (mg/m^3)
NYSDEC DER TO-15 TCL				
Benzene	71-43-2	78.11	0.20	0.64
Benzyl chloride	100-44-7	140.57	0.40	2.3
Bromodichloromethane	75-27-4	163.83	0.20	1.3
Bromoform	75-25-2	252.75	0.20	2.1
Bromomethane (Methyl bromide)	74-83-9	94.95	0.20	0.78
2-Butanone (Methyl ethyl ketone)	78-93-3	72.11	1.0	2.9
Carbon Tetrachloride	56-23-5	153.84	0.20	1.3
Chlorobenzene	108-90-7	112.56	0.20	0.92
Chloroethane	75-00-3	64.52	0.20	0.53
Chloroform	67-66-3	119.39	0.20	0.98
Chloromethane (Methyl chloride)	74-87-3	50.49	0.50	1.0
Cyclohexane	110-82-7	84.16	0.50	1.7
Dibromochloromethane	124-48-1	208.29	0.20	1.7
1,2-Dibromoethane	106-93-4	187.88	0.20	1.5
1,2-Dichlorobenzene	95-50-1	147.01	0.20	1.2
1,3-Dichlorobenzene	541-73-1	147.01	0.20	1.2
1,4-Dichlorobenzene	106-46-7	147.01	0.20	1.2
Dichlorodifluoromethane (Freon 12)	75-71-8	120.92	0.20	0.99
1,1-Dichloroethane	75-34-3	98.97	0.20	0.81
1,2-Dichloroethane	107-06-2	98.96	0.20	0.81
1,1-Dichloroethene	75-35-4	96.95	0.20	0.79
1,2-Dichloroethene (cis)	156-59-2	96.95	0.20	0.79
1,2-Dichloroethene (trans)	156-60-5	96.95	0.20	0.79
1,2-Dichloropropane	78-87-5	112.99	0.20	0.92
cis-1,3-Dichloropropene	10061-01-5	110.98	0.20	0.91
trans-1,3-Dichloropropene	10061-02-6	110.98	0.20	0.91
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	170.93	0.20	1.4
1,4-Dioxane	123-91-1	88.11	0.50	1.8
Ethanol *	64-17-5	46.07	0.20	0.38
Ethylbenzene	100-41-4	106.16	0.20	0.87
Hexachlorobutadiene	87-68-3	260.76	1.0	10.7
n-Hexane	110-54-3	86.18	0.50	1.8
Methylene Chloride	75-09-2	84.94	0.50	1.7
4-Methyl-2-pentanone (MIBK)	108-10-1	100.16	0.50	2.0
MTBE (Methyl tert-butyl ether)	1634-04-4	88.15	1.0	3.6
Styrene	100-42-5	104.14	0.20	0.85
Tertiary Butyl Alcohol (TBA)	76-65-0	74.12	2.0	6.1
1,1,2,2-Tetrachloroethane	79-34-5	167.86	0.20	1.4
Tetrachloroethene (PCE)	127-18-4	165.85	0.20	1.4
Toluene	108-88-3	92.13	0.20	0.75
1,2,4-Trichlorobenzene	120-82-1	181.46	1.0	7.4
1,1,1-Trichloroethane	71-55-6	133.42	0.20	1.1
1,1,2-Trichloroethane	79-00-5	133.42	0.20	1.1
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 11	76-13-1	187.38	0.20	1.5
Trichloroethene (TCE)	79-01-6	131.40	0.20	1.1
Trichlorofluoromethane (Freon 11)	75-69-4	137.38	0.20	1.1
1,2,4-Trimethylbenzene	95-63-6	120.19	0.20	0.98
1,3,5-Trimethylbenzene	108-67-8	120.19	0.20	0.98
2,2,4-Trimethylpentane	540-84-1	114.23	0.50	2.3
Vinyl Chloride	75-01-4	62.50	0.20	0.51
Xylenes (m&p)	1330-20-7	106.16	0.20	0.9
Xylenes (o)	95-47-6	106.16	0.20	0.87

TABLE 3
TARGET ANALYTE LIST AND REPORTING LIMITS
SOIL VAPOR INVESTIGATION WORK PLAN

GLOVERSVILLE FORMER MGP SITE
NATIONAL GRID - GLOVERSVILLE, NEW YORK

Analyte	CAS Number	Molecular Weight	Reporting Limit (ppbv)	Reporting Limit (mg/m^3)
Compounds on National Grid Standard List, but not on NYSDEC DER TO-15 TCL				
Acetone (2-propanone)	67-64-1	58.08	5.0	12
Bromoethene	593-60-2	106.96	0.20	0.87
1,3-Butadiene	106-99-0	54.09	0.40	0.88
Carbon Disulfide	75-15-0	76.14	0.50	1.6
3-Chloropropene (allyl chloride)	107-05-1	76.53	0.20	0.63
2-Chlorotoluene	95-49-8	126.59	0.40	2.1
4-Ethyltoluene (p-ethyltoluene)	622-96-8	120.20	0.40	2.0
n-Heptane	142-82-5	101.20	0.50	2.1
Isopropyl Alcohol	67-63-0	61.09	2.0	5.0
Methyl Butyl Ketone	591-78-6	100.16	0.50	2.0
National Grid Supplemental Compound List				
n-Butane	106-97-8	58.12	0.40	1.0
n-Decane	124-18-5	142.29	1.0	5.8
n-Dodecane	112-40-3	170.34	1.0	7.0
n-Nonane	111-84-2	128.26	0.50	2.6
n-Octane	111-65-9	114.23	0.40	1.9
n-Pentane	109-66-0	72.15	1.0	3.0
n-Undecane	1120-21-4	156.31	1.0	6.4
1,2,3-Trimethylbenzene**	80-62-6	120.19	0.20	1.0
Naphthalene	91-20-3	128.17	0.50	2.6
1-Methylnaphthalene**	90-12-0	142.20	2.50	15
2-Methylnaphthalene**	91-57-6	142.20	2.50	15
Tetramethylbenzene*	25619-60-7	134.21	TBD	TBD
Indene**	95-13-6	116.16	0.40	1.9
Indane**	496-11-7	118.18	0.20	1.0
Thiophene**	110-02-1	84.14	0.20	0.7

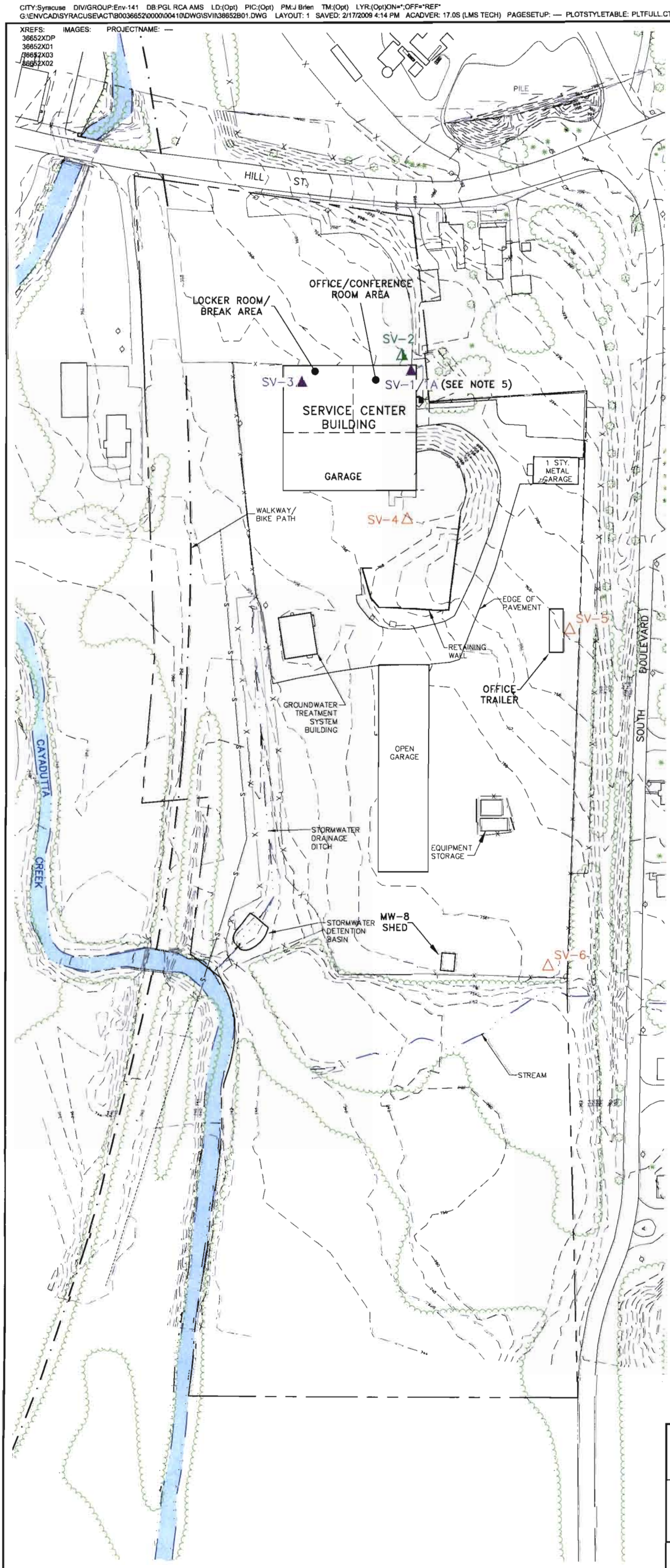
Notes:

1. NYSDEC DER TO-15 TCL = New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER) Target Compound List (TCL) as presented in the February 2008 "NYSDEC Modifications to EPA Region 9 TO-15 QA/QC Criteria."
2. Compounds on "National Grid Standard List" and "Supplemental Compound List" are from Tables 2 and 7 of the "draft" Standard Operating Procedures document titled "Soil Vapor Intrusion Evaluation at National Grid MGP Sites in New York State", prepared by O'Brien & Gere, last updated September 2007.
3. Analyses to be performed using United States Environmental Protection Agency (USEPA) Compendium Method TO-15.
4. CAS = Chemical Abstract Services.
5. Molecular weights are presented in grams per mole.
6. ppbv = parts per billion volumetric basis.
7. mg/m^3 = micrograms per cubic meter.
8. TBD = To be determined; reporting limit not available.
9. * = Compound to be included in laboratory analysis as a tentatively identified compound (TIC).
10. ** = 1-point calibration.

ARCADIS

Figure

CITY:Syracuse DIV/GROUP:Env-141 DB:PGL RCA AMS LD:(Opt) PIC:(Opt) PM:J Brien TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0036652\0000\00410\DWG\SVII\36652B01.DWG LAYOUT: 1 SAVED: 2/17/2009 4:14 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/18/2009 3:03 PM BY: SCHILLING, ADAM
XREFS: IMAGES: PROJECTNAME: —
36652XDP
36652X01
36652X03
36652X02



LEGEND:

- TOPOGRAPHIC ELEVATION CONTOUR
- PROPERTY LINE
- WATER
- TREE LINE
- FENCE
- SANITARTY SEWER
- UTILITY POLE
- SV-2 EXISTING VAPOR SAMPLING LOCATION – AUGUST 2005 WITH NO FURTHER SAMPLING
- SV-1 PROPOSED SUB-SLAB VAPOR SAMPLING LOCATION
- SV-4 PROPOSED SOIL VAPOR SAMPLING LOCATION

NOTES:

1. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICALDATUM OF 1929.
2. THE NATIONAL GRID PROPERTY LINE SHOWN IS APPROXIMATE.
3. ALL LOCATIONS ARE APPROXIMATE.
4. PROPOSED SOIL VAPOR SAMPLE LOCATIONS WILL BE SURVEYED FOLLOWING THE COMPLETION OF FIELD ACTIVITIES.
5. SUB-SLAB VAPOR SAMPLE SV-1 WAS PREVIOUSLY SAMPLED IN AUGUST 2005. AS PART OF THIS SAMPLING EFFORT A SOIL VAPOR SAMPLE (SV-1A) WILL BE LOCATED AT (OR CLOSE IN PROXIMITY TO) THIS LOCATION.

0 60' 120'
GRAPHIC SCALE

NATIONAL GRID
GLOVERSVILLE (HILL STREET) FORMER MGP SITE
GLOVERSVILLE, NEW YORK
SOIL VAPOR INTRUSION INVESTIGATION WORK PLAN

PROPOSED SAMPLING LOCATIONS

ARCADIS

FIGURE
1

ARCADIS

Attachments

ARCADIS

Attachment A

Sub-Slab Vapor Sampling Procedures

Attachment A
Sub-Slab Vapor Sampling Procedures

1. Introduction

This sampling procedure will be used for installation and sampling of temporary sub-slab vapor collection points.

2. Temporary Sub-Slab Vapor Collection Point Installation

On the day prior to sampling, ARCADIS will install a temporary sub-slab vapor sample collection point at each proposed sampling location inside the buildings. Each point will be installed by coring through the floor slab using a hammer drill equipped with a ½-inch diameter pulverizing bit, and then inserting a section of ¼-inch inside diameter Teflon®-lined tubing into the corehole. If necessary, the drill bit will be advanced two to three inches into the sub-slab material to create an open cavity. The annular space between the tubing and the corehole will be sealed with melted beeswax or hydrated bentonite.

3. Sub-Slab Vapor Purging Activities

Prior to initiating the collection of samples, purging will be performed to remove atmospheric air from the sample point and attached tubing. The purging will be performed using a gas-tight syringe at a flow rate of less than 200 milliliters per minute (mL/min). Purging will continue until approximately one to three times the volume of air inside the tubing has been removed. The purge air collected in the syringe will be discharged outdoors. Tracer gas testing will be performed during purging to evaluate the integrity of the seals around the soil vapor sampling points.

4. Sub-Slab Vapor Collection Activities

Sub-slab vapor sampling will be performed using the approach presented in Appendix D to National Grid's Standard Operating Procedures (SOP) document titled Soil Vapor Intrusion Evaluation at National Grid MGP sites in New York State (O'Brien & Gere, latest revision September 2007) (hereafter, "National Grid's VI SOP"). Each sub-slab vapor sample will be collected in a separate, pre-cleaned SUMMA® canister. Batch-certified-clean canisters will be provided by the laboratory with an initial vacuum of at least 26 inches of mercury (in. of Hg). Flow regulators will be pre-set to draw soil vapor at a uniform rate over an approximate 2-hour period (i.e., at approximately 50 mL/min). When the canister vacuum reaches approximately five in. of Hg, the valve on the canister will be closed, leaving a vacuum in the canister as a means for the laboratory to verify the canister does not leak while in transit. After sampling is completed, the coreholes for the sub-slab vapor sampling will be restored using hydraulic cement.

An upwind, ambient air sample will be collected on the day of sub-slab vapor air sampling in accordance with Appendix B of National Grid's VI SOP and Section 2.4 of the Work Plan. In addition, field duplicates will be collected in support of the sub-slab vapor sampling at a frequency of one duplicate per 10 samples, with at least one duplicate per sample delivery group.

ARCADIS

Attachment B

Soil Vapor Sampling Procedures

Attachment B
Soil Vapor Sampling Procedures

1. Introduction

This sampling procedure will be used for installation and sampling of temporary soil vapor probes.

2. Temporary Soil Vapor Probe Collection Point Installation

One temporary soil vapor probe will be installed at each soil vapor sampling location. The probes will be installed in accordance with procedures approved by the NYSDEC and NYSDOH that are presented in Appendix A to National Grid's VI SOP, with the following changes:

- A machined stainless steel implant will not be needed. Under the revised approach, a "twist-to-lock" connector attached to inert sample tubing will be lowered through small-diameter steel drive rods and threaded into an expendable point holder. Instead of being drawn from a stainless steel implant, soil vapor will be drawn from the void created when the expendable drive point is disengaged (pulled up approximately 0.5 feet) from the expendable point, as detailed below.

- A filter pack and bentonite slurry will not be needed. Under the revised approach, steel drive rods inserted into the subsurface will be kept in-place during sampling (there will be no "open" borehole to seal). The "twist-to-lock" connector will isolate the sampling interval from atmospheric air inside the steel drive rods, as detailed below.

This modification to National Grid's soil vapor sampling SOP has been previously utilized and approved by NYSDEC and NYSDOH at other sites and will provide for collection of a representative sample while: (1) minimizing interference that might otherwise occur through use of a machined steel implant and other non-native materials (filter pack, bentonite grout); and (2) minimizing the amount of investigation-derived waste materials (steel implant, filter pack, and bentonite) that would otherwise be generated.

At each proposed soil vapor sampling location, the PowerProbe™ rig will be used to advance an assembly consisting of interconnected 4-foot lengths (as needed) of 1.25"-inch diameter steel probe rod, affixed with an expendable point holder and expendable point at the downhole end, to the desired sampling depth. Bentonite will be used to seal the space (if any) between the steel rod and borehole wall to further isolate the subsurface interval from atmospheric air. After the target depth is reached, the expendable point will be disengaged by hydraulically retracting the steel probe rod upwards approximately 0.5-feet

to create a void in the subsurface for soil vapor sample collection. A food-grade (inert) Teflon-lined polyethylene or fluoropolymer sample delivery tube (3/16" or 1/4" inside diameter) with an attached Post-Run-Tubing (PRT) threaded adapter (a "twist-to-lock" connector) will be lowered through the 1.25"-diameter steel rod and threaded into the expendable point holder. Digital photographs will be taken to document the soil vapor probe installation and subsequent purging and sampling activities.

3. Soil Vapor Purging Activities

Following installation of the temporary soil vapor probe, purging will be performed to remove atmospheric air from the sample probe and attached tubing and charge the sampling apparatus with soil vapor in preparation for collection of a representative sample (as discussed below). Purging will be performed as detailed in National Grid's VI SOP and summarized below.

At the ground surface, the sample delivery tube will be attached to an air sampling pump, and a minimum of one to three "implant" volumes (the volume of the probe and attached tubing) will be evacuated. An electronic flow sensor will be used to measure pump flow rate [not to exceed 200 milliliters per minute (mL/min) during purging activities)], and the desired volume will be purged from the probe/tubing based on pumping duration. After the purge volume has been expelled from the sampling system, the pump will be disconnected and a PID equipped with a 10.6 electron volt lamp will be attached to the tubing to measure approximate total organic vapor levels. The swagelock valve will be closed prior to disconnecting the pump and connecting the PID to prevent atmospheric air from entering the tubing.

4. Soil Vapor Sample Collection Activities

Following purging, soil vapor sample collection will proceed in accordance with the procedures presented in National Grid's soil vapor sampling SOP. At each sampling location, a pre-cleaned stainless steel canister (a 6-Liter SUMMA® canister) with an attached flow regulator will be connected to the sample tubing and slowly opened to collect the soil vapor sample. Batch-certified-clean canisters will be provided by the laboratory with an initial vacuum of at least 26 inches of mercury (in. of Hg). Flow regulators will be pre-set to draw soil vapor at a uniform rate over an approximate 2-hour period (i.e., at approximately 50 mL/min). When the canister vacuum reaches approximately five in. of Hg, the valve on the canister will be closed, leaving a vacuum in the canister as a means for the laboratory to verify the canister does not leak while in transit. Following collection of each soil vapor sample, the temporary soil vapor probe will be removed and the borehole will be backfilled with bentonite grout.

An upwind, ambient air sample will be collected on the day of soil vapor sampling in accordance with Appendix B of National Grid's VI SOP and Section 2.4 of the Work Plan. In addition, field duplicates will be collected in support of the soil vapor sampling at a frequency of one duplicate per 10 samples, with at least one duplicate per sample delivery group.