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Infrastructure, environment, facilities

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Mr. William Ottaway
Bureau of Western Remedial Action
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7017

Subject:
National Grid
Schenectady (Broadway) Former MGP
Schenectady, New York
Soil Vapor Sampling Work Plan

Date:
January 9, 2008

Contact:
Jason Brien

Phone:
315.671.9114

Email:
Jason.Brien@arcadis-us.com

Our ref:
B0036657.00019

Dear Mr. Ottaway:

Pursuant to your recent telephone conversation with National Grid and your December 18, 2007 email, this letter summarizes modifications to the September 2007 *Soil Vapor Sampling Work Plan* (Work Plan) for the above-referenced site.

Per your December 18, 2007 email, the NYSDEC requested a total of four additional soil vapor sampling locations including two samples located at the western edge of the site property and two samples located to the west of the railroad tracks. At this time, National Grid is proposing to collect two additional soil vapor samples and one ambient air sample near the western property boundary as shown on Figure 1 of the attached Work Plan. Based on the results obtained for the analysis of the samples to be collected at these locations, National Grid will work with the NYSDEC and New York State Department of Health (NYSDOH) to determine if additional offsite sampling is required.

A revised Work Plan incorporating these modifications is attached. Please do not hesitate to call me at 315.671.9114 or Mr. Brian M. Stearns, P.E., of National Grid at 315.428.5731 if you have any questions or require additional information.

Sincerely,

ARCADIS

Jason D. Brien
Sr. Project Engineer

Copies:
Brian M. Stearns, National Grid
Gardiner Cross, NYSDEC
Maureen Schuck, NYSDOH
Mark Distler, O'Brien & Gere
Margaret Carrillo-Sheridan, ARCADIS

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Imagine the result

National Grid

Soil Vapor Sampling Work Plan

Schenectady (Broadway) Service Center
Former Manufactured Gas Plant Site

January 2008

ARCADIS

Margaret Carrillo-Sheridan, P.E.
Vice President

Jason Brien, P.E.
Senior Engineer I

Soil Vapor Sampling Work Plan

Schenectady (Broadway) Service Center Former Manufactured Gas Plant Site

Prepared for:
National Grid

Prepared by:
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Our Ref.:
0364.36652 #10

Date:
January 2008

1. Introduction

This Soil Vapor Intrusion (SVI) Work Plan presents National Grid's approach for identifying the presence of volatile organic vapors associated with manufactured gas plant (MGP) related materials in soil at the National Grid Schenectady (Broadway) Service Center former MGP site located in Schenectady, New York. This work plan has been prepared in response to a comment presented in the New York State Department of Environmental Conservation's (NYSDEC's) July 6, 2006 letter to National Grid related to the December 2006 *Feasibility Study Report*, prepared by ARCADIS U.S., Inc. (ARCADIS). Additionally, this Work Plan incorporates NYSDEC comments presented in an October 26, 2007 comment letter from NYSDEC and items discussed during a December 2007 conference call between NYSDEC and National Grid.

The proposed SVI sampling activities consist of collecting soil vapor samples near the Garage/Office Building and the Storage Building as shown on Figure 1. The soil vapor sampling will be conducted in accordance with the step-wise approach outlined in National Grid's September 2006 draft *Standard Operating Procedures for Soil Vapor Intrusion Evaluation at National Grid Sites in New York State* (SVI SOP), which includes the NYSDEC/NYSDOH-approved appendices[1]. As presented in the SVI SOP, soil vapor intrusion evaluations are conducted in a phased approach, as needed, consisting of the following:

- Phase 1 – Documentation Review
- Phase 2 – Soil Vapor Sampling
- Phase 3 – Sub-Slab Sampling
- Phase 4 – Indoor Air Sampling

The documentation review has been completed. The data suggests that a Phase 2 investigation is warranted. The following describes the site's potential vapor sources in relation to on-site and off-site buildings as well as proposed locations of soil vapor sampling, sampling and analysis methods, and report contents.

[1] Approved on March 15, 2007

2. Soil Vapor Sampling Program Approach

2.1 Documentation Review

As presented in the Site Remedial Investigation (SRI) Report (SRI Report, ARCADIS BBL, 2005), soil and groundwater sampling results indicate the presence of on-site soil and groundwater that is impacted by the former MGP operations.

Current on-site structures include a Storage Building, a Garage/Office Building, an Open Garage, a Small Garage, and a one-story building associated with the gas-regulating system. The Storage Building is located along the northwestern fence line and is heated by space heaters. The Storage Building consists of a aluminum sided building on a slab-on-grade foundation that serves as a service garage for trucks as well as a break area for some of the Service Center workers. Based on conversations with operations personnel, the building is occupied at times for extended periods. The foundation for the Garage/Office Building is not known, however, the occupied space inside the building is at or above grade. The building is heated and includes office space for Service Center workers as well as an attached Maintenance Shop to the north. None of the other on-site buildings are heated or occupied, nor does National Grid plan to occupy these buildings in the foreseeable future.

The site is bordered along the west and north by CSX and Delaware & Hudson rail lines, intersecting at the northwest corner of the site. Residential properties and a large manufacturing facility are located further to the northwest beyond the rail lines. A municipal transfer facility is located to the north of the site and rail line. The east side of the site is bordered by Weaver Street, and the south side is bordered by Broadway. Residential and commercial structures are located along the site's southern property line.

For the purposes of identifying potential SVI issues, the soil and groundwater results from the remedial investigation activities conducted at the site indicate the following:

- NAPL-impacted soil was identified in the northern, western and central portions of the site (as shown on Figure 13 in Appendix A) primarily below the groundwater table (approximately 5 to 7 feet below ground surface [bgs]) and above a silt and clay unit (located on average 15 feet bgs).

- Benzene, toluene, ethylbenzene, and xylene (BTEX compounds) and polynuclear aromatic hydrocarbons (PAHs) were detected in groundwater samples collected from several on-site monitoring wells, coinciding with NAPL-impacted soil areas. BTEX and PAHs were detected at concentrations above their respective NYS Ambient Water Quality Standard or Guideline.

- NAPL has not been encountered in soil samples collected off-site or in any of the off-site groundwater monitoring wells.

- Impacted groundwater (BTEX compounds and PAHs) is present off-site, hydraulically downgradient from the western and northern portions of the site (monitoring well clusters MW-8 and MW-9). None of the other off-site monitoring well locations indicated the presence of dissolved-phase impacts during site investigation activities. Results obtained for the analysis of groundwater samples collected from the MW-8 monitoring well cluster indicated that BTEX and PAHs were present in groundwater collected from the monitoring well screened within the intermediate hydrostratigraphic unit (MW-8I, screened 25 to 35 feet below ground surface [bgs]), but not within the overlying shallow hydrostratigraphic unit (MW-8S, screened 6 to 16 feet bgs).

Figures indicating remedial investigation results including the location of NAPL-impacted soil and groundwater analytical results, as presented in the SRI Report, are included as Attachment 1.

2.2 Rationale for Proposed Sampling Locations

Soil vapor sampling will be conducted near each of the two on-site occupied buildings: storage building and garage/office building. These are the closest occupied buildings to impacted soil and groundwater.

As indicated above, a municipal transfer station is located to the north of the site and approximately 500 feet from the nearest impacted soil and groundwater. A rail line separates the site and the transfer station. Due to the large distance from the impacted soil and groundwater and since the rail line may intercept the horizontal diffusion of soil vapor from the site, no sampling along the northern property line or near the transfer station is proposed at this time.

Residential properties and a large manufacturing facility are located northwest and west of the property in the vicinity of impacted groundwater (monitoring well cluster

MW-8). Impacted groundwater is below a layer of clean shallow groundwater. According to the November 2002 US Environmental Protection Agency (USEPA) *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (USEPA, 2002), only volatile contaminants in the uppermost portions of a given aquifer are likely to volatilize into the vadose zone and subsequently have the potential to migrate into indoor air spaces. Furthermore, as indicated in the October 2006 New York State Department of Health (NYSDOH) document entitled, "*Guidance for Evaluating Soil Vapor Intrusion in the State of New York*" (NYSDOH, 2006), vapor phase migration or partitioning of volatile chemicals in impacted groundwater is unlikely if the impacted groundwater is overlain by non-impacted groundwater. Based on historical water level measurements (presented in the SRI Report [BBL, 2005]), a minimum of eight feet of non-impacted shallow groundwater is overlying the impacted intermediate groundwater unit in the vicinity of the monitoring well MW-8 cluster. The approximately eight feet of "clean" water likely serves as an effective barrier to potential soil vapor diffusion into the vadose zone. However, as requested by NYSDEC, National Grid will conduct soil vapor sampling along the western site boundary.

Residences and commercial buildings (including an automotive repair garage) are located southwest of the site on the north side of Broadway and south side of Schermerhorn Creek. These buildings are approximately 100 feet from NAPL-impacted soils. However, the culverted section of Schermerhorn Creek is between the impacted soils and the buildings, providing a barrier to the potential horizontal diffusion of soil vapors from the site buildings. Therefore, no soil vapor sampling is proposed near these buildings.

An off-site commercial building is located to the east of the garage/office building (northwest corner of the Broadway/Weaver Street intersection). Sampling is not proposed at this location because the garage/office building is between this off-site location and on-site areas of soil and groundwater impacts. Additionally, results obtained for groundwater samples collected from the closest shallow groundwater monitoring well (monitoring well MW-14S) have never indicated the presence of volatile organic compounds at concentrations greater than laboratory detection limits.

3. Proposed Soil Vapor Sampling

Soil vapor sampling activities will be conducted in general conformance with the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, October 2006) and National Grid's SVI SOP.

Soil vapor sampling will be conducted at the following locations:

- One location near the Storage Building
- Two locations adjacent to the western property line
- One location west of the Garage/Office Building in an asphalt-covered area
- One location north of the Garage/Office Building near a maintenance garage in a grass covered area
- One location immediately south of the Storage Building in an asphalt-covered area that serves as a common vapor cap with the Storage Building's slab-on-grade foundation.

Preliminary sampling locations are shown on Figure 1 but may be relocated in the field based on accessibility and subsurface utilities. Samples will be collected a minimum of three feet below ground surface (bgs) and a minimum of one foot above the water table. The depth to the water table in this area of the site ranges from approximately 5 to 7 feet bgs.

In conjunction with the soil vapor sampling, at least two ambient air samples will be collected (one collected upwind and one collected downwind) of the on-site gasoline distribution island (indicated as "Concrete Platform with Metal Overhang" on Figure 1). An ambient air sample will also be collected near the two soil vapor sampling locations along the western property line.

4. Sampling Methodology

Six temporary soil vapor probes will be installed at the locations described above. Detailed procedures for installing soil vapor probes and collecting soil vapor and ambient air samples are presented in the standard operating procedures included as Appendices A and B to National Grid's SVI SOP, as approved by NYSDEC on March 15, 2007. The soil vapor and ambient air sampling protocols are included as Attachments 2 and 3 to this Work Plan.

Samples will be submitted to an NYSDOH-certified laboratory capable of completing the laboratory analysis in accordance with the USEPA Compendium Method TO-15, entitled, *Determination of VOCs in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*. Samples will be analyzed for each of the compounds identified in Table 2 of National Grid's SVI SOP (included as Attachment 4 to this Work Plan) as well as for Tentatively Identified Compounds (TICs). Analytical results will be reported in an Analytical Services Protocol Category B equivalent package to facilitate preparation of a Data Usability Summary Report (DUSR).

5. Schedule and Reporting

National Grid is prepared to implement this work plan within four weeks following NYSDEC and NYSDOH approval. Sampling activities are expected to require one day to complete. National Grid will notify the NYSDEC no less than one week prior to conducting the sampling. Analytical results are expected to be available approximately four weeks after the samples are submitted to the laboratory. In accordance with the SVI SOP, these preliminary (i.e., non-validated) results will be submitted to NYSDEC and NYSDOH within 48 hours after receipt along with a site plan showing the locations of the samples.

Following receipt of the laboratory analytical results and completion of the DUSR, a summary letter report will be prepared. The letter report will include:

- A summary of work activities performed and results obtained for the analysis of the soil vapor samples
- Data table(s) presenting validated laboratory analytical results
- Figure(s) showing the sampling locations
- Copy of the DUSR
- Recommendations for follow-up actions, if any

The summary letter report will be submitted to the NYSDEC and NYSDOH approximately six weeks after receipt of final laboratory data packages. Since the work activities will be conducted on National Grid property, there is no 30-day requirement to provide data to private property owners and the final report will serve as internal National Grid notification.

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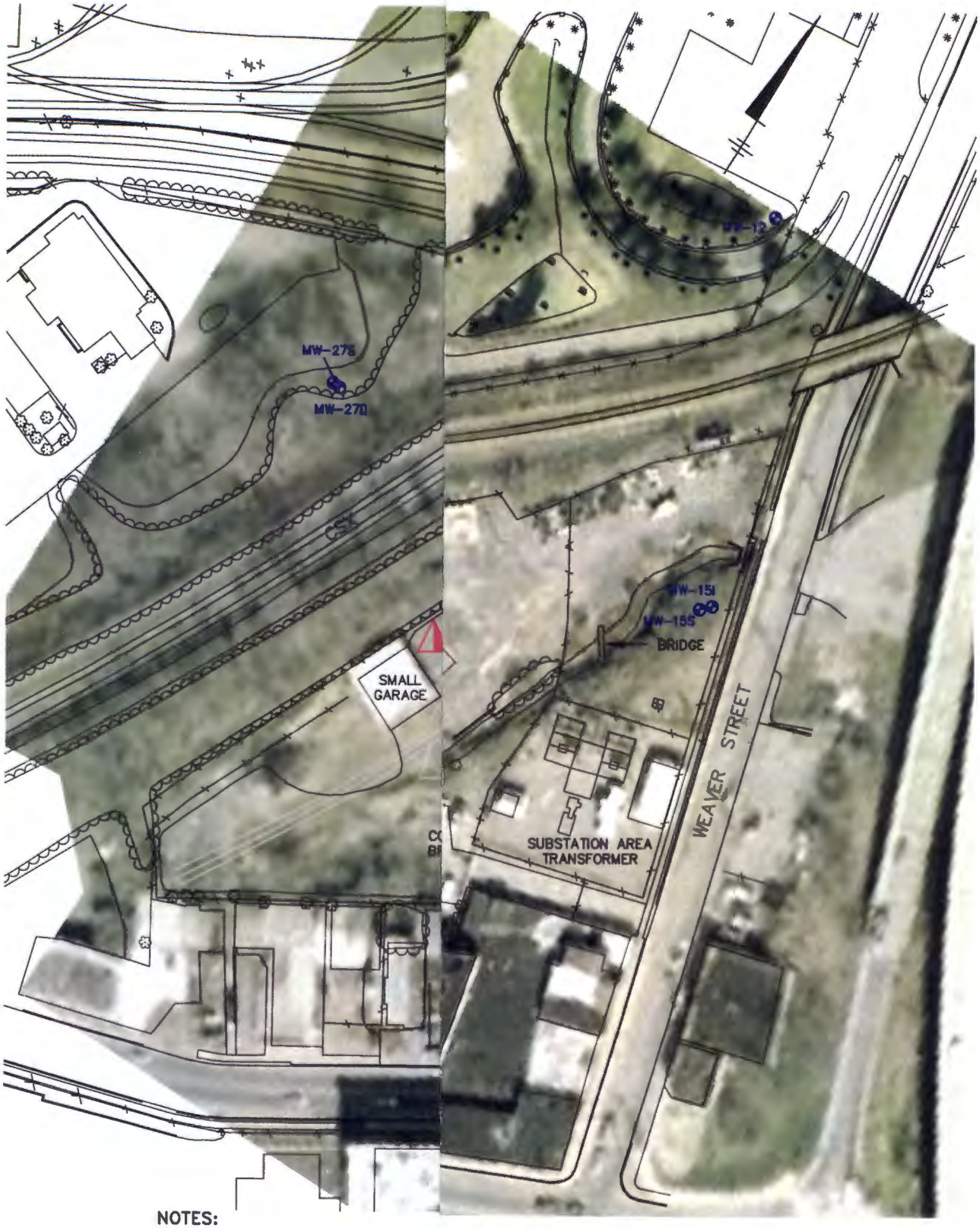
Figures



NOTES:

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NATIONAL GRID
SCHENECTADY (BROADWAY) SERVICE CENTER
SCHENECTADY, NEW YORK
SOIL VAPOR SAMPLING WORK PLAN

PROPOSED SOIL VAPOR SAMPLING LOCATIONS

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FIGURE
1

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36657X01 Schenectady aerial.jpg

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Attachments

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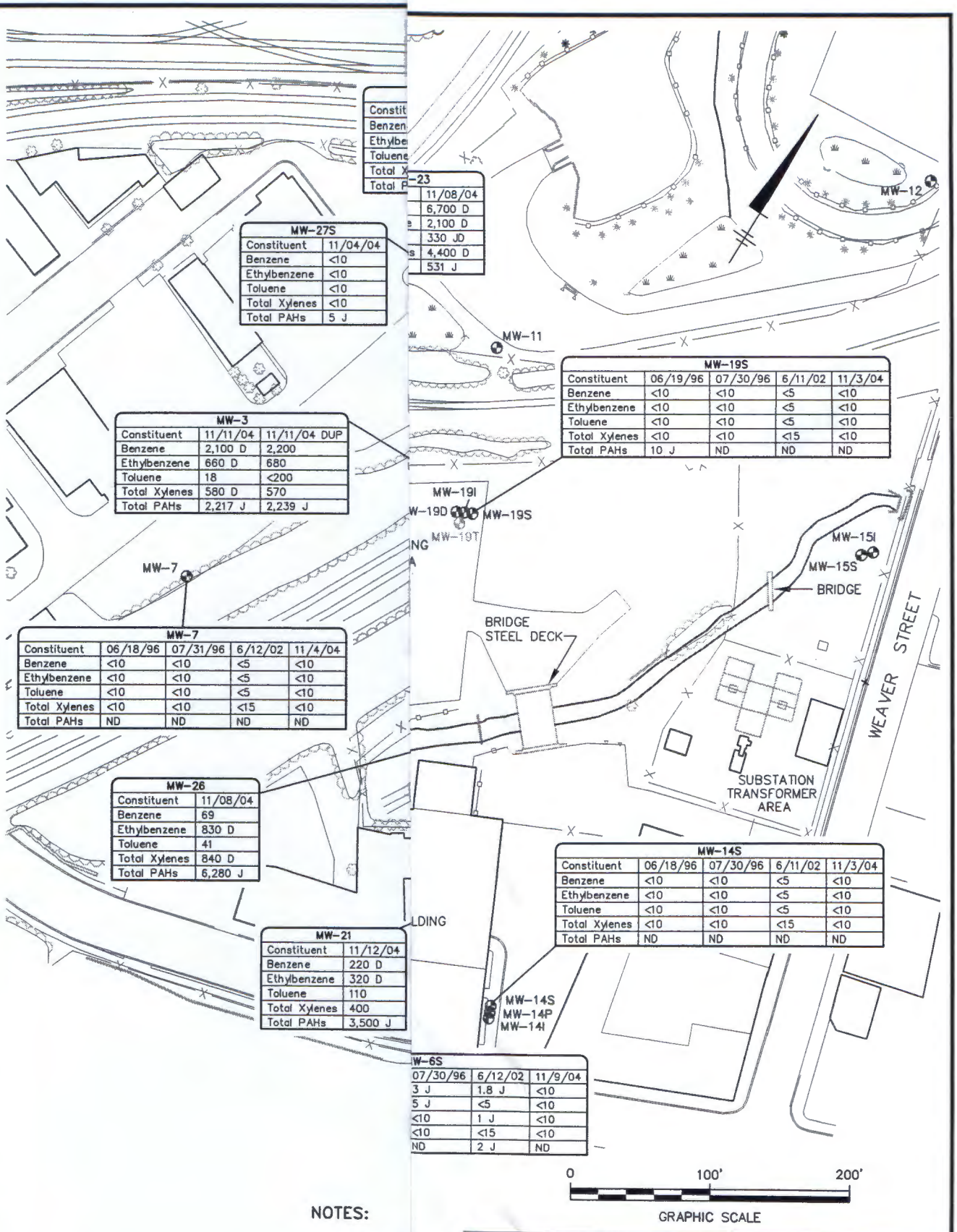
Attachment 1

Relevant Site Remedial Investigation Report Figures



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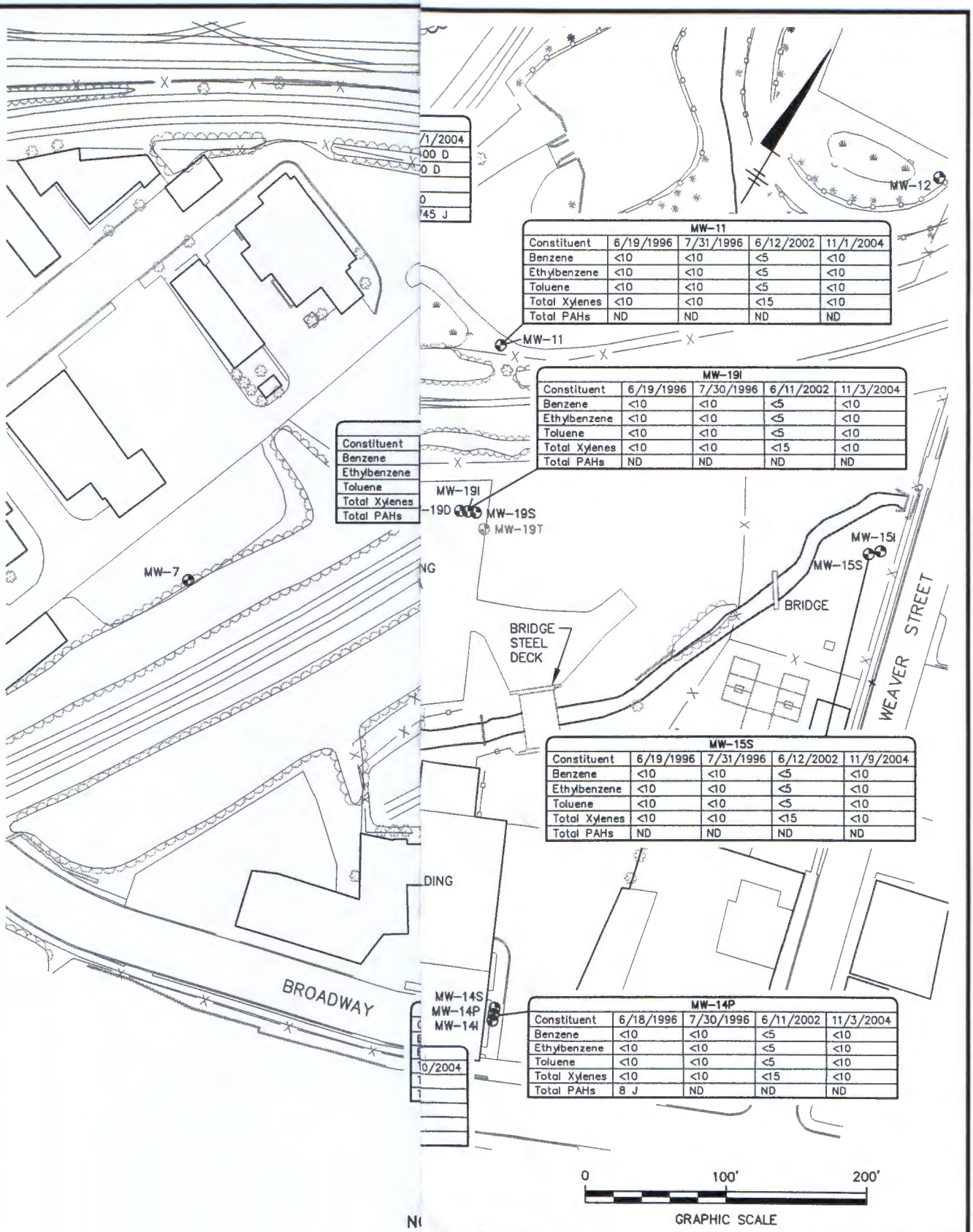
NATIONAL GRID
SCHENECTADY (BROADWAY) SERVICE CENTER
SCHENECTADY, NEW YORK
SITE REMEDIAL INVESTIGATION REPORT

SHALLOW GROUNDWATER SAMPLING RESULTS - BTEX AND TOTAL PAHs (ppb)

BBL®
BLASLAND, BOUCK & LEE, INC.

FIGURE



MW-11

Constituent	6/19/1996	7/31/1996	6/12/2002	11/1/2004
Benzene	<10	<10	<5	<10
Ethylbenzene	<10	<10	<5	<10
Toluene	<10	<10	<5	<10
Total Xylenes	<10	<10	<15	<10
Total PAHs	ND	ND	ND	ND

MW-19I

Constituent	6/19/1996	7/30/1996	6/11/2002	11/3/2004
Benzene	<10	<10	<5	<10
Ethylbenzene	<10	<10	<5	<10
Toluene	<10	<10	<5	<10
Total Xylenes	<10	<10	<15	<10
Total PAHs	ND	ND	ND	ND

MW-15S

Constituent	6/19/1996	7/31/1996	6/12/2002	11/9/2004
Benzene	<10	<10	<5	<10
Ethylbenzene	<10	<10	<5	<10
Toluene	<10	<10	<5	<10
Total Xylenes	<10	<10	<15	<10
Total PAHs	ND	ND	ND	ND

MW-14P

Constituent	6/18/1996	7/30/1996	6/11/2002	11/3/2004
Benzene	<10	<10	<5	<10
Ethylbenzene	<10	<10	<5	<10
Toluene	<10	<10	<5	<10
Total Xylenes	<10	<10	<15	<10
Total PAHs	8 J	ND	ND	ND

NATIONAL GRID
SCHENECTADY (BROADWAY) SERVICE CENTER
SCHENECTADY, NEW YORK

SITE REMEDIAL INVESTIGATION REPORT

INTERMEDIATE GROUNDWATER SAMPLING RESULTS - BTEX AND TOTAL PAHs (ppb)

BBL® BLASLAND, BOUCK & LEE, INC. engineers, scientists

FIGURE 4b

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L: ON=*, OFF=REF*
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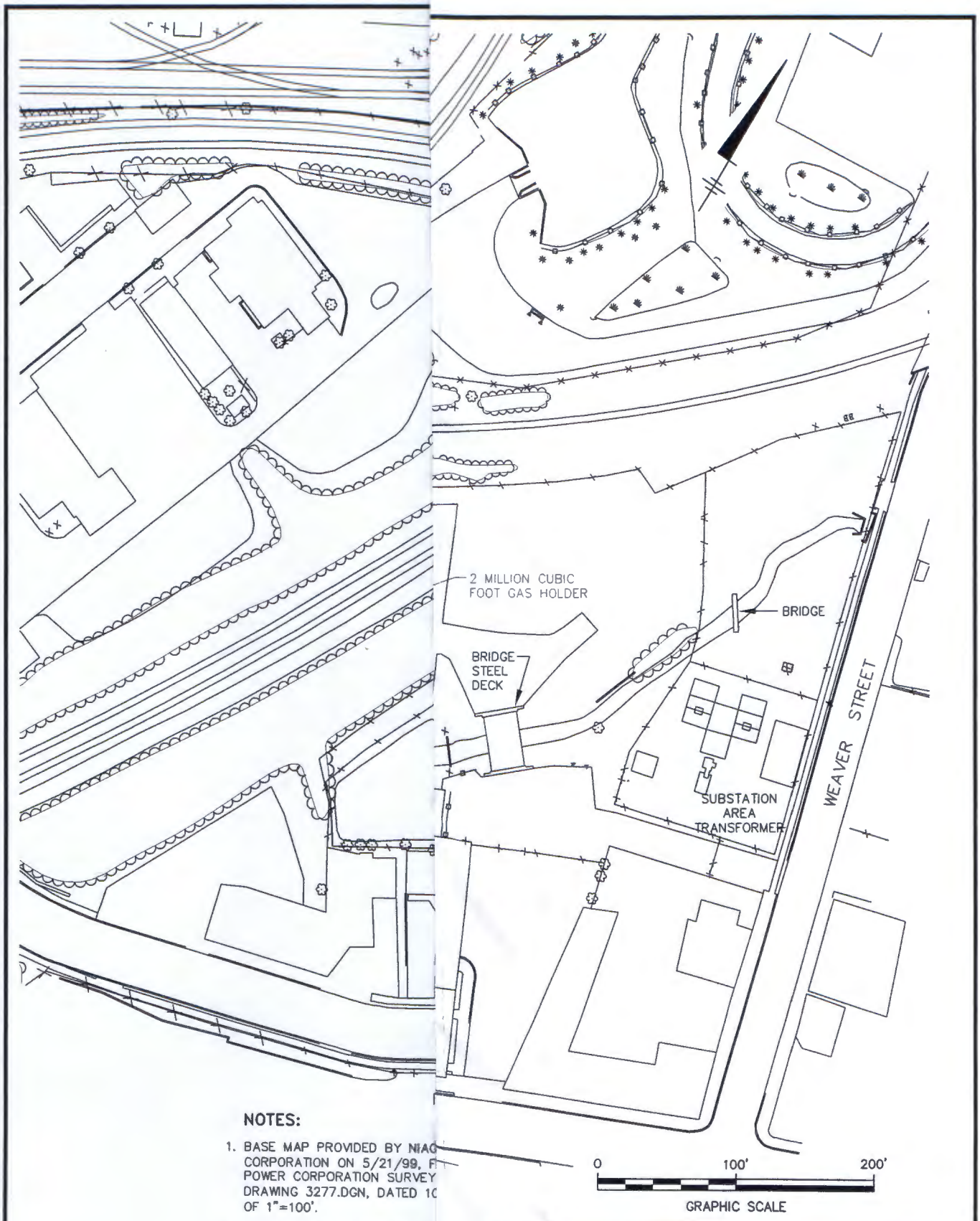

NOTES:

1. BASE MAP PROVIDED BY NIAG
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4. DELINEATION OF POTENTIAL NA
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11/8/05 SYR-85-RCB RCB WLJ
36657011/36657B15.0WG

NATIONAL GRID
SCHENECTADY (BROADWAY) SERVICE CENTER
SCHENECTADY, NEW YORK
SITE REMEDIAL INVESTIGATION REPORT

EXTENT OF NAPL-IMPACTED *SOILS*

BBL

FIGURE

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Attachment 2

Soil Vapor Sampling Procedures
(Appendix A to National Grid's SVI SOP)

APPENDIX A

SOIL VAPOR SAMPLE COLLECTION PROCEDURES

(NYSDEC and NYSDOH Approved, March 15, 2007)

This set of procedures outlines the general steps to collect soil vapor samples. The site-specific Sampling and Analysis Work Plan should be consulted for proposed sample locations, sample depths, and sampling duration.

Soil Vapor Probe Installation

Permanent and temporary soil vapor probes will be installed using the procedure outlined below:

- Record weather information (temperature, barometric pressure, rainfall, wind speed, and wind direction). Record substantial changes to these conditions that may occur during the course of the probe installation. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).

- Install soil vapor probes using a direct-push drill rig (e.g., GeoProbe® or similar) or manually using a slide hammer. Probes will consist of stainless-steel drive points with stainless steel screens attached to food-grade (inert) Teflon® or polyethylene tubing through which the soil vapor sample will be drawn.

- Attach the drive points to a drive rod (stainless-steel tube) and drive the rod to the target depth, as define in the site-specific work plan.

- Withdraw the drive rods from the hole, leaving the drive point and tubing.

- Place filter pack material, such as glass beads or clean silica sand, in the annular space surrounding the tubing directly above the sample point to a height of approximately 1 to 2 foot. The depth of the filter pack material should always be adequate to prevent the bentonite slurry above from going over the drive point and sample inlet screen.

- Place bentonite slurry in the annulus above the filter pack material to provide a seal in the borehole. Ideally, place the bentonite annular seal at least 3 feet thick, although adjustments

to this thickness may be required based on site-specific conditions. The entire borehole must be filled to the ground surface with either entirely bentonite or with natural fill between two bentonite seals (one above the filter pack material and one at the ground surface). Permanent installations must have a surface seal made of cement or cement/bentonite grout.

- For permanent installations, install flush-mounted protective covers to protect the probe and the tubing.

- Cut the end of the tubing to allow proper closure of the flush-mounted protective cover, but with a sufficient length of tubing exposed at the surface to facilitate connection of sampling equipment.

- Close or cap the sample tubing following installation and following collection of each sample.

Collection of Soil Vapor Samples

Collecting soil vapor samples will be accomplished by using the following procedure:

- Record weather information (i.e., temperature, barometric pressure, rainfall, wind speed, and wind direction) at the beginning of the sampling event. Also, record substantial changes to these conditions that may have occurred over the past 24 to 48 hours and that do occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).

- Sampling personnel must avoid activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, fueling vehicles, etc.).

- Identify sampling locations on a plot plan that also identifies buildings, other landmarks, and potential sources of VOC contamination to both the surface and outdoor air. Record the depth of the probe screen below grade.

- If necessary, connect additional tubing to the tubing extending from the soil vapor probe to allow for connection to sample collection equipment.

- Calculate the volume of air in the probe, tubing (volume = $\pi r^2 h$), including any additional tubing added in the step above and the annular space between the probe and the native material if sand or glass beads were used.

- Connect a vacuum pump or gas-tight syringe (~60 cubic centimeters [cc]) to the sample tubing. At a flow rate of no more than 0.2 liter per minute (lpm), purge air from the tubing until one to three of the above-calculated air volumes are removed.

- During purging, evaluate the potential for ambient air to be introduced in the soil vapor sample through the annulus of the soil vapor probe or tubing connections using a tracer gas such as helium. The procedures for the tracer gas evaluation are described below. Note that the bentonite used in the probe installation should have sufficient time to seal before the samples are collected. The tracer gas evaluation will verify if the seal is sufficient.

- Use an evacuated Summa® passivated (or equivalent) stainless-steel canister to collect the soil vapor sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection, as identified in the project-specific work plan. The sampling flow rate should always be less than 0.2 lpm. The canisters will be batch certified as clean by the laboratory.

- Remove the protective brass plug from the canister. Connect the pre-calibrated flow controller to the canister.

- Record the identification numbers for the canister and flow controller. Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of-custody form for each sample.

- Connect the tubing from the soil vapor probe to the flow controller.

- Completely open the valve on the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.

- Photograph the canister and the area surrounding the canister.

- Monitor the vacuum pressure in the canister routinely during sampling.

- Stop sample collection when the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.

- Record the final vacuum pressure and close the canister valve. Record the date and time that sample collection was stopped.

- Remove the flow controller from the canister and replace the protective brass plug.

- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.

- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.

- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.

- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.

- Deliver or ship the samples to the laboratory within one business day of sample collection and via overnight delivery (when shipping).

- Provided that no additional sampling is expected to be conducted, either pull out (if practical) or abandon in place the sampling probe. When abandoning, cut the tubing back as far down as practical and cover to surface with native soil.

Tracer Gas Evaluation

The tracer gas evaluation provides a means to evaluate the integrity of the soil vapor probe seal and assess the potential for introduction of ambient air into the soil vapor sample. A tracer gas evaluation should be conducted on all soil vapor probes. After the initial round of sampling and with the approval of the regulating agency, the use of tracer gas may be reduced to a minimum of 10 percent for permanent and semi-permanent probes if the initial round results showed installations with competent seals.

The following tracer gas evaluation procedure uses in-field tracer gas measurements and tracer gases (e.g., helium) that can be measured by portable detectors.

- Retain the tracer gas around the sample probe by filling an air-tight chamber (such as a plastic bucket) positioned over the sample location.

- Make sure the chamber is suitably sealed to the ground surface.

- Introduce the tracer gas into the chamber. The chamber will have tubing at the top of the chamber to introduce the tracer gas into the chamber and a valved fitting at the bottom to let the ambient air out while introducing tracer gas. A tracer gas detector will be attached to the valve fitting at the bottom of the chamber to verify the presence of the tracer gas. Close the valve after the chamber has been enriched with tracer gas at concentrations >50%.

- The chamber will have a gas-tight fitting or sealable penetration to allow the soil vapor sample probe tubing to pass through and exit the chamber.

- After the chamber has been filled with tracer gas, attach the sample probe tubing to a pump that will be pre-calibrated to extract soil vapor at a rate of no more than 0.2 lpm. Purge the

tubing using the pump. Calculate the volume of air in the tubing and probe and purge one to three tubing/probe volumes prior measuring the tracer gas concentration.

- Use the tracer gas detector to measure the tracer gas concentration in the pump exhaust.

- Record the tracer gas concentrations in the chamber and in the soil vapor sample.

If the evaluation indicates a high concentration of tracer gas in the sample (>10% of the concentration of the tracer gas in the chamber), then the surface seal is not sufficient and requires improvement via repair or replacement prior to commencement of the sample collection. A non-detectable level of tracer gas is preferred; however, if the evaluation indicates a low potential for introduction of ambient air into the sample (<10% of the concentration of the tracer gas in the chamber), then proceed with the soil vapor sampling. While lower concentrations of tracer gas are acceptable, the impact of the detectable leak on sample results should be evaluated in the sampling report.

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Attachment 3

Ambient Air Sample Collection Procedures (Appendix B to National Grid's SVI SOP)

APPENDIX B

AMBIENT AIR SAMPLE COLLECTION PROCEDURES

(NYSDEC and NYSDOH Approved, March 15, 2007)

This set of procedures outlines the general steps to collect ambient air samples. The site-specific Sampling and Analysis Work Plan should be consulted for proposed sample locations and sampling duration.

The following procedures will be followed for the collection of ambient air samples:

- Sampling personnel must avoid activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, fueling vehicles, etc.).

- Select a location upwind of the building or other area that is being evaluated. If possible, select a location upwind or near the HVAC air intake for the building being sampled.

- Record weather information (i.e., temperature, barometric pressure, relative humidity, wind speed, and wind direction) at the beginning of the sampling event. Record substantial changes to these conditions that may occur during the course of sampling. The information may be measured with on-site equipment or obtained from a reliable source of local measurements (e.g., a local airport).

- Use an evacuated Summa® passivated (or equivalent) stainless-steel canister to collect the ambient air sample. The canister will be provided by the laboratory, along with a flow controller equipped with an in-line particulate filter and a vacuum gauge. The flow controller will be pre-calibrated by the laboratory for the desired flow rate or duration of sample collection, as defined in the site-specific work plan. The sampling flow rate should always be less than 0.2 lpm. The canisters will be individually certified as clean by the laboratory.

- Place the canister at the sampling location. If the sample should be collected from breathing height (e.g., 3 to 5 feet above ground), then mount the canister on a stable platform such that the sample inlet will be at the proper height.

- Remove the protective brass plug from canister. Connect the pre-calibrated flow controller to the canister.

- Record the identification numbers for the canister and flow controller. Record the initial canister pressure on the vacuum gauge (check equipment-specific instructions for taking this measurement). A canister with a significantly different pressure than originally recorded by the testing laboratory should not be used for sampling. Record these numbers and values on the chain-of custody form for each sample.

- Completely open the valve on the vacuum pressure in the canister. Record the time that the valve was opened (beginning of sampling) and the canister pressure on the vacuum gauge.

- Photograph the canister and the area surrounding the canister.

- Document on a field form an outdoor plot sketch that indicates the building being sampled, streets, sampling location, location of potential outdoor air sources, north direction and paved areas. Also record pertinent observations such as odors, readings from field instrumentation, and significant activities in the vicinity that result in air emissions.

- Monitor the vacuum pressure in the canister routinely during sampling, when practical (sometimes the canister will sample over a 24-hour period and routine monitoring is not practical). During monitoring, note the vacuum pressure on the gauge.

- Stop sample collection after the scheduled duration of sample collection but make sure that the canister still has a minimum amount of vacuum remaining. Check with the laboratory supplying the canister and flow controller for the ideal final vacuum pressure. Typically, the minimum vacuum is between 2 and 5 inches of mercury, but not zero. If there is no vacuum remaining, the sample will be rejected and collected again in a new canister.

- Record the final vacuum pressure and close the canister valves. Record the date and time that sample collection was stopped.

- Remove the flow controller from the canister and replace the protective brass plug.

- Attach labels/tags (sample name, time/date of sampling, etc.) to the canister as directed by the laboratory.

- Place the canister and other laboratory-supplied equipment in the packaging provided by the laboratory.

- Enter the information required for each sample on the chain-of-custody form, making sure to include the identification numbers for the canister and flow controller, and the initial and final canister pressures on the vacuum gauge.

- Include the required copies of the chain-of-custody form in the shipping packaging, as directed by the laboratory. The field crew will retain a copy of the chain-of-custody for the project file.

- Deliver or ship the samples to the laboratory within one business day of sample collection and via overnight delivery (when shipping).

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Attachment 4

TO-15 Target Analytes and Reporting Limits (Table 2 to National Grid's SVI SOP)

Table 2
TO-15 Target Analtyes and Reporting Limits
National Grid Vapor Intrusion Investigation Guidance

Compound	CAS Number	Reporting Limit (ppbv)	Reporting Limit (ug/m^3)
Acetone (2-propanone)	67-64-1	5.0	12
Benzene	71-43-2	0.20	0.64
Bromodichloromethane	75-27-4	0.20	1.3
Bromoethene	593-60-2	0.20	0.87
Bromoform	75-25-2	0.20	2.1
Bromomethane (Methyl bromide)	74-83-9	0.20	0.78
1,3-Butadiene	106-99-0	0.20	0.49
2-Butanone (Methyl ethyl ketone)	78-93-3	0.50	1.5
Carbon disulfide	75-15-0	0.50	1.6
Carbon tetrachloride	56-23-5	0.20	1.3
Chlorobenzene	108-90-7	0.20	0.92
Chloroethane	75-00-3	0.20	0.53
Chloroform	67-66-3	0.20	0.98
Chloromethane (Methyl chloride)	74-87-3	0.20	0.41
3-Chloropropene (allyl chloride)	107-05-1	0.20	0.63
2-Chlorotoluene (o-Chlorotoluene)	95-49-8	0.20	1.04
Cyclohexane	110-82-7	0.20	0.69
Dibromochloromethane	124-48-1	0.20	2.0
1,2-Dibromoethane	106-93-4	0.20	1.5
1,2-Dichlorobenzene	95-50-1	0.20	1.2
1,3-Dichlorobenzene	541-73-1	0.20	1.2
1,4-Dichlorobenzene	106-46-7	0.20	1.2
Dichlorodifluoromethane (Freon 12)	75-71-8	0.20	0.99
1,1-Dichloroethane	75-34-3	0.20	0.81
1,2-Dichloroethane	107-06-2	0.20	0.81
1,1-Dichloroethene	75-35-4	0.20	0.79
1,2-Dichloroethene (cis)	156-59-2	0.20	0.79
1,2-Dichloroethene (trans)	156-60-5	0.20	0.79
1,2-Dichloropropane	78-87-5	0.20	0.92
cis-1,3-Dichloropropene	10061-01-5	0.20	0.91
trans-1,3-Dichloropropene	10061-02-6	0.20	0.91
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	0.20	1.4
Ethylbenzene	100-41-4	0.20	0.87
4-Ethyltoluene (p-Ethyltoluene)	622-96-8	0.20	0.98
n-Heptane	142-82-5	0.20	0.83
Hexachlorobutadiene	87-68-3	0.20	2.1
n-Hexane	110-54-3	0.20	0.70
Methylene chloride	75-09-2	0.50	1.7
4-Methyl-2-pentanone (MIBK)	108-10-1	0.50	2.05
MTBE (Methyl tert-butyl ether)	1634-04-4	0.50	1.8
Styrene	100-42-5	0.20	0.85
Tertiary butyl alcohol (TBA)	75-65-0	5.0	15
1,1,2,2-Tetrachloroethane	79-34-5	0.20	1.4
Tetrachloroethene (PCE)	127-18-4	0.20	1.4
Toluene	108-88-3	0.20	0.75
1,2,4-Trichlorobenzene	120-82-1	0.50	3.7
1,1,1-Trichloroethane	71-55-6	0.20	1.1
1,1,2-Trichloroethane	79-00-5	0.20	1.1
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon TF)	76-13-1	0.20	1.5
Trichloroethene (TCE)	79-01-6	0.20	1.07
Trichlorofluoromethane (Freon 11)	75-69-4	0.20	1.1
1,2,4-Trimethylbenzene	95-63-6	0.20	0.98
1,3,5-Trimethylbenzene	108-67-8	0.20	0.98
2,2,4-Trimethylpentane	540-84-1	0.20	1.08
Vinyl chloride	75-01-4	0.20	0.51
Xylenes (m&p)	1330-20-7	0.20	0.87
Xylenes (o)	95-47-6	0.20	0.87
1,2-Dichloroethene (total)	540-59-0	0.20	0.79
1,4-Dioxane	123-91-1	5.0	18
Isopropyl Alcohol	67-63-0	5.0	12.5
Methyl Butyl Ketone	591-78-6	0.50	2.05
Additional Compounds to be Requested			
1,2,3-Trimethylbenzene	80-62-6	0.20	0.98
Naphthalene	91-20-3	0.50	2.9
1-Methylnaphthalene	90-12-0	TBD	TBD
2-Methylnaphthalene	91-57-6	TBD	TBD
Tetramethylbenzene	25619-60-7	TBD	TBD
Indene	95-13-6	TBD	TBD
Indane	496-11-7	TBD	TBD
Thiopenes	109-99-9	TBD	TBD

Notes:

a. Actual reporting limits of field samples may be higher due to sample dilution by the laboratory to quantify compounds at elevated concentrations.(see note b)

b. The laboratory must notify National Grid prior to sample dilution.

c. ppbv = part per billion by volume

d. ug/m3 = microgram per cubic meter

e. TBD = to be determined