Work Plan for:

SOIL VAPOR INTRUSION ASSESSMENT AT THE FORMER CARBORUNDUM FACILITY

VILLAGE OF SANBORN, TOWN OF WHEATFIELD, NIAGARA COUNTY, NEW YORK

Submitted to:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation

Submitted by:

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August 2006

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INTRODUCTION

In a July 6, 2006 letter the New York State Department of Environmental Conservation (NYSDEC) requested that a work plan be developed to investigate the soil vapor pathway. In the response letter to NYSDEC dated August 1, 2006, Mr William B. Barber of Atlantic Richfield provided a general strategy for that work. The following proposed work plan will be used to evaluate the potential for soil vapor intrusion (SVI) into residences to the west of the Former Carborundum facility in Sanborn, New York (Site).

This document is divided into two parts: the work plan, and standard operating procedures (SOPs). The work plan describes the general approach and sampling plan. Attachment 1 provides the SOPs with detailed descriptions of the sampling procedures.

OBJECTIVE

The objective of this investigation is to evaluate the potential for soil vapor intrusion into the residential area west of the former Carborundum facility. The approach incorporates discussion and input from NYSDEC regarding on-site soil vapor data, to determine the need for sample collection in the residential areas west of the facility.

The following elements are incorporated to meet the objective:

- Historical data review
- Community outreach
- Analytical parameters
- Sampling plan
- Risk assessment protocol
- Reporting

HISTORICAL DATA REVIEW

Prior to defining the chemical analytical parameters and implementing the sampling plan, historical information concerning the Site will be reviewed in further detail. Previous correspondence from the NYSDEC, New York State Department of Health (NYSDOH), and other parties, as well as technical and historical documents such as the record-of-decision (ROD), will be reviewed. The results from this review will be used, as appropriate, to tailor the field activities and sampling plan.

COMMUNITY OUTREACH

An updated Fact Sheet has been prepared for distribution as part of normal project communications. In the event that off-site sampling is needed, a community outreach program

will be developed to inform both public and private entities about the SVI investigation. The proposed elements of the community outreach program include a Site contact list, a community relations team, and a Fact Sheet for distribution within the community. The contact list will contain names, addresses, and telephone numbers of individuals and organizations with an interest in the Site. The list will include residents from the neighborhood to the west of the Site, civic and neighborhood groups in the Site vicinity (if any), and regulatory contacts, such as NYSDEC and NYSDOH.

A community relations team will be assembled as contact points to provide information sharing for local residents.

In the event that offsite sampling is necessary a new Fact Sheet will be developed, containing a written summary of important information designed to aid the community in understanding the SVI activities. The Fact Sheet will:

- Describe previous and current remediation work at the Site.
- Notify the community that a proposed SVI investigation will be conducted in the area, in conjunction with the current remediation system.
- Provide additional information on topics associated with SVI.

ANALYTICAL PARAMETERS

In order to evaluate the potential impacts to indoor air, SVI site-specific chemicals of potential concern (COPCs) will be sampled. These COPCs are based on groundwater data, and include:

- trichloroethene (TCE)
- cis-1,2 dichloroethene (DCE)
- vinyl chloride (VC)

These parameters are target analytes due to their specific reference in the NYSDEC and NYSDOH guidance, and their occurrence at the Site. COPCs will be confirmed during the historical data review task.

The vapor samples will be analyzed via method TO-15 as noted in SOP 1. An ELAP certified laboratory will complete the analysis of vapor samples.

SAMPLING PLAN

The initial sampling methodologies will include installation of temporary water table piezometers, and sampling of temporary soil vapor monitoring points and outdoor air sampling. In addition, if off-site sampling is required, sub-slab and indoor air may be sampled.

Both temporary water table piezometers and soil vapor monitoring points will be installed using hand tools or direct-push equipment (e.g. Geoprobe®). Initially, soil vapor samples will be collected from single-point and nested soil vapor points, and submitted to a laboratory for chemical analysis. After the on-site samples have been collected and analyzed, an evaluation will be used to determine the need to sample (if any) at off-site locations.

The sequential steps include on-site soil vapor sampling, off-site soil vapor sampling, off-site sub-slab sampling and indoor/outdoor air sampling. If the on-site soil vapor evaluation determines that off-site sampling is necessary, locations will be selected and sampled. The results from the off-site soil vapor sampling will then be used to evaluate the need to sample off-site sub-slab soil vapor and indoor/outdoor air.

Prior to extending the sampling program off-site, data review discussions will be held with NYSDEC and NYSDOH. The data evaluation will integrate available site-specific information and applicable regulatory guidelines.

On-site soil vapor

Prior to sampling soil vapor, two temporary piezometers will be installed in shallow soil. The piezometers will be used to establish water levels, prior to installing soil vapor monitoring points. The water level information will aid in determining the appropriate depth of the deeper soil vapor points. SOP-5 details the procedure for installing the water table piezometers.

Two types of soil vapor sample points will be implemented during on-site soil vapor sampling: (1) single-point shallow (e.g., approximately 5 to 7 ft. below-ground-surface [BGS]); and (2) nested points. Single-point shallow soil vapor data will be used to assess shallow soil vapor and to estimate the degree of heterogeneity of soil vapor concentrations at the Site boundary. Data from the nested points will provide information regarding the attenuation of COCs in the unsaturated (vadose) zone. Both sets of data will be used in the risk assessment to evaluate the potential impacts of off-site soil vapor.

Single-point soil vapor monitoring point (SVMP) samples will be collected between 5 and 7 ft. BGS, following procedures outlined in SOP-1 (see Attachment 1). Six single-point samples will be located along the western site boundary, as shown on Figure 1. During installation, soil will be sampled and described for characterization of the soil profile. Vertical profiling samples will be taken from nested sample points. A nested location consists of three grouped SVMPs at incremental depths. The proposed depth of the screened intervals at each nested location are 4.5-5, 6.5-7 and 9.5-10 feet BGS, but are subject to change depending on the depth to water table established in the piezometers. The samples in a "nest" will be within five feet of each other, but no closer than two feet, and the deepest sample will target approximately one foot above the water table. The specific depth will be determined after the depth to water is measured in this area. Three nested locations are proposed along the western property line of the Site, shown on Figure 1.

Because there are no current soil vapor criteria values issued by the State of New York, and the current NYSDOH guidance allows for comparison of soil vapor data to background outdoor

levels, outdoor air samples will be collected. The procedures defined in SOP-4 will be followed to collect these samples.

Off-site soil vapor

If the evaluation of on-site soil vapor indicates the need, off-site soil vapor samples will be collected using the procedures detailed in SOP-1. The number of samples, specific locations and depths will be determined from the results of the on-site soil vapor sampling. If off-site soil vapor samples are collected, outdoor air samples will also be collected using SOP-4. The results will be used to determine the need for sub-slab and indoor air samples in the residences to the west of the Site.

Sub-Slab, Indoor, and Outdoor Air

If necessary, sub-slab and indoor air samples will be collected using the procedures described in SOP-2 and SOP-3, respectively. Sub-slab and indoor air samples will be collected simultaneously to attempt to quantify the attenuation factors (i.e., the rate at which concentrations decrease through a medium). Concurrent outdoor air samples will also be collected during sub-slab and indoor air sampling.

Prior to sampling indoor air, a community newsletter or Fact Sheet will be distributed with a possible town hall meeting. An indoor air survey will be conducted at each location where indoor air samples are collected (See Appendix A of Attachment 1).

DATA EVALUATION AND RISK ASSESSMENT

Development of a site conceptual site model (CSM) will aid in the evaluation of results generated by this work plan and review of historical records. A CSM is a simplified version (picture and/or description) of the Site and is not an analytical or mathematical computer model. The goal for the CSM will be to assemble a three-dimensional picture describing the transport mechanisms, the possible subsurface pathways, potential receptors, as well as historical uses of the Site, and the site remediation program (USEPA, 2002). Data and risk evaluation will be guided by the NYSDOH (2005) document. Other sources that may be consulted include the OSWER Draft Guidance (USEPA, 2002) and relevant research and professional publications.

REPORTING

Due to the sequential nature of this work plan, the data will be used to generate a series of figures and tables for discussions with NYSDEC and NYSDOH. The first set of figures and tables will be generated after the on-site samples are analyzed. After discussions with NYSDEC and NYSDOH, a decision will be made to generate either a final report or continue with off-site sampling. If off-site sampling is required, data will be presented in the same manner for discussion as noted above.

At the conclusion of the work, a Soil Vapor Assessment Report will be submitted. The report will provide the details of each phase of sampling, and the risk evaluation.

Anticipated Schedule

Following NYSDEC approval, the work will implemented according to the following schedule. The schedule may be adjusted depending on agency review times at each step. Pending approval of this work plan the historical data review and community outreach is anticipated to occur during September 2006. Onsite soil vapor sampling will tentatively take place during October 2006. Following the results of the on-site evaluation, a meeting to discuss the evaluation will tentatively occur in December 2006.

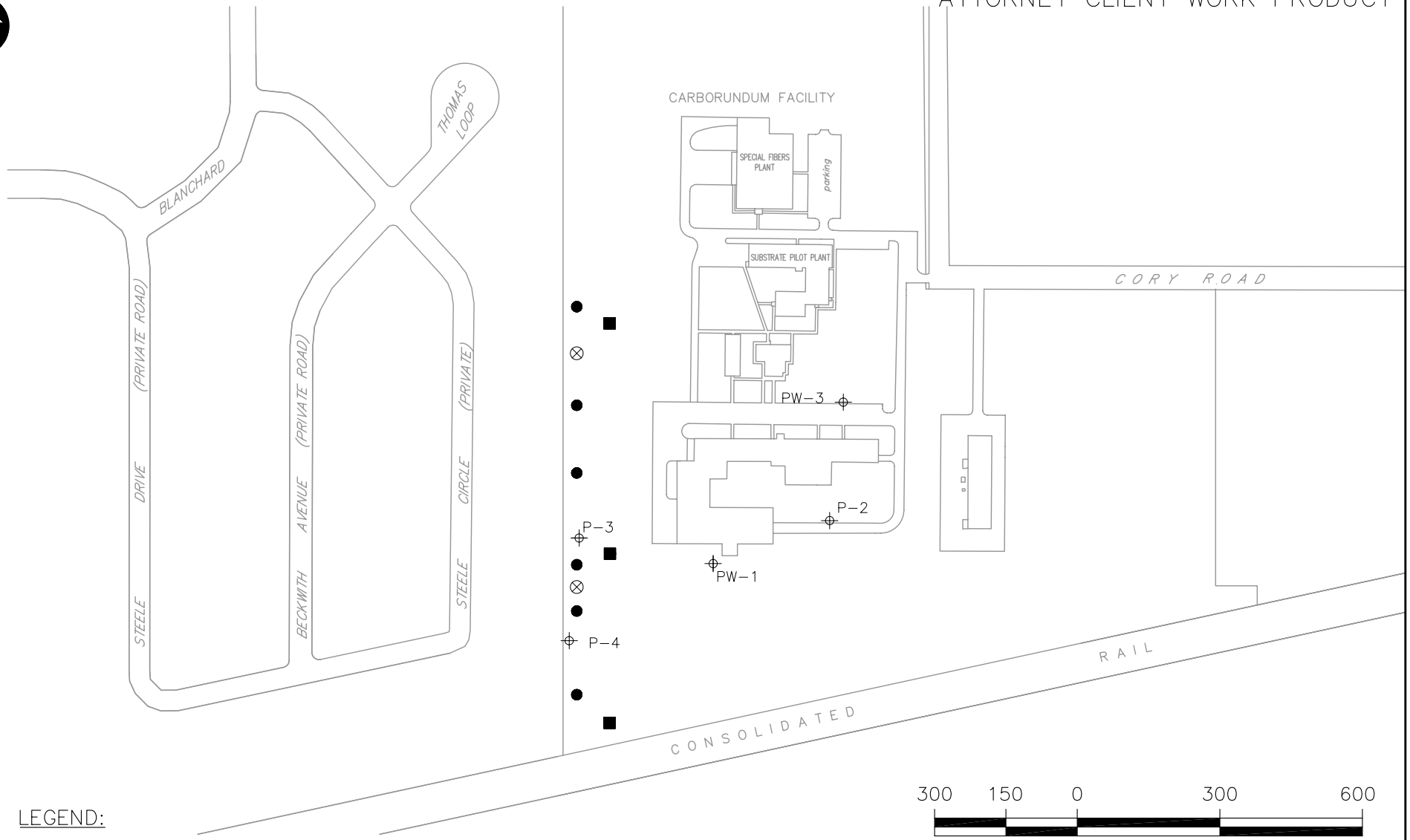
REFERENCES

United States Environmental Protection Agency, *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance),* EPA530-D-02-004, November 2002.

New York State Department of Environmental Conservation, *DER-XX / Evaluating the Potential for Vapor Intrusion at Past, Current, and Future Sites*, DEC Program Policy.

New York State Department of Health, *Guidance for Evaluating Soil Vapor Intrusion in the State of New York,* Public Comment Draft, February 2005.

ATTORNEY CLIENT WORK PRODUCT



LEGEND:

P-2 / PW-1 — PUMPING WELL

■ PROPOSED NESTED SOIL VAPOR LOCATION

● PROPOSED SINGLE SOIL VAPOR LOCATION

⊗ PROPOSED WATER TABLE PIEZOMETER

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FIGURE 1

ATLANTIC RICHFIELD COMPANY
FORMER CARBORUNDUM FACILITY
SOIL VAPOR INTRUSION WORK PLAN
ON-SITE SAMPLE LOCATIONS

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Attachment 1

SOIL VAPOR INTRUSION ASSESSMENT
STANDARD OPERATING PROCEDURES (SOPS)
FORMER CARBORUNDUM FACILITY

VILLAGE OF SANBORN, TOWN OF WHEATFIELD, NIAGARA COUNTY, NEW YORK

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INTRODUCTION

These Standard Operating Procedures (SOPs) will be used for soil vapor intrusion (SVI) assessment activities conducted at the Former Carborundum Facility in Sanborn, NY (Site). These SOPs are an attachment to the SVI work plan. This attachment also includes the Quality Assurance Project Plan (QAPP) items not included in the current Site QAPP. The SOPs were derived, in part, from the NYSDOH document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (February, 2005). The following SOPs are included:

SOP-1 – Soil Vapor Sampling.

SOP-2 – Sub-Slab Sampling.

SOP-3 – Indoor Air Sampling

SOP-4 – Outdoor Air Sampling

SOP-5 – Temporary Piezometer Installation

SOP-6 – Quality Assurance and Project Plan

SOP-1
SOIL VAPOR SAMPLING

This SOP describes the methods, in accordance with NYSDOH guidelines (2005), to be used to collect the soil vapor samples described in SVI project work plan.

1.1 Installation

Temporary soil vapor monitoring points (VMPs) will be installed using a hand auger and/or Geoprobe® sampling tools. Due to the potential for underground utilities, a hand auger (or other soft-dig techniques, excluding the use of compressed air or vacuum extraction) will be used to dig to 5 feet below the ground surface. For the nested VMPs deeper than five feet a Geoprobe rig will be used to advance to the appropriate depth. A detail of the soil vapor sampling string is provided as Figure A-1.

Once the desired depth is reached the VMP string will be constructed. The VMP string will consist of a 6-inch long soil gas sampling implant connected to ¼-inch Teflon® tubing. The Teflon® tubing will extend to near surface, where it will be fitted with a Teflon® port where sampling connections can be made. The annulus around the implant will be backfilled with coarse sand pack to the extent possible. Bentonite chips will be placed starting at approximately 3 inches above the top of the implant and provide a minimum 3 foot seal. Bentonite chips will be placed in 6-inch increments and hydrated during construction. Natural fill material will be allowed to fill in the void to the top of the sampling string. The sample tube will be labeled with a unique identification marker. A small-diameter flush mount well cover (approximately 6 inches) will be used to complete the VMP at surface. The flush mount cover will be positioned over the sampling port and held in place by natural fill material. No activities will be conducted at the VMP for period of at least 24 hours so the bentonite will seal and the VMP can equilibrate with soil conditions.

1.2 Leak Test

A leak test will be conducted on each VMP before collecting samples to ensure there is no dilution of the sample by surface air. These procedures are as follows:

Leak Test

1) A leak test enclosure (5-gallon pail, or equivalent) will be constructed which will fit over the completed VMP and above-ground sampling equipment (see Figure A-2)

2) Helium gas will be released inside the pail from Regulator Valve 1. A helium detector with a minimum rated sensitivity of 0.01% will be used to ensure helium gas is present at minimum concentration of 10% in the helium chamber by connecting detector to the Helium Sampling Port 1. Upon confirmation, Helium Sampling Port 1 will be closed and the helium detector will be connected to Helium Sampling Port 2. The concentration of helium in the chamber shall be recorded in the field log book.

3) There will be a minimum of three purge volumes of vapor extracted from each sampling point during the leak test. The purge volume is calculated by summing the volume if the boring and the volume of the tubing. Assuming an 8 inch deep boring from the bottom of the bentonite seal and using 48 inches of 0.170 inch inner diameter (ID) PTFE tubing the calculation for one purge volume would be as follows:

(5/8 inch)/2 = radius, r = 0.3125

πr^2 = area = $(3.141)(0.3125)^2$ = 0.3068 inches square

volume = (inches square)(length) = (0.3068)(8) = 2.454 cubic inches

1 cubic inch = 16.39 mL

2.454 cubic inches = 40 mL

(0.170 inch)/2 = radius, r = 0.085”

πr^2 = area = (3.141)(0.085 inch)^2 = 0.02270 inch square

volume = (inches square)(length) = (0.02270)(48) = 1.090 cubic inches = 18 mLs

volume of boring + volume of tubing = one purge volume = 58 mLs

The volume purged, purge start time, purge stop time, and purge flow rate shall be recorded in the field log book or field sampling log.

4) The VMP will be purged the required volume with flow rates between 30 to 50 milliliters per minute (mL/min) (estimated flow rates for sampling assuming a 1-liter SUMMA®).

5) The extracted gas will be monitored for any measurable detection of helium, which would indicate short-circuiting of the borehole. The helium concentration shall be recorded in the field log book.

6) If helium gas is detected in the extracted gas, additional bentonite will be applied to the top of the borehole and the leak test performed again to verify the integrity of the VMP construction. If helium is still detectable in the extracted gas, the VMP will be abandoned.

7) Care will be taken to prevent pressure build-up in the enclosure.

8) Vapor will be extracted from the VMP and through the sampling equipment at a similar rate and vacuum that could be expected during sampling

After the above testing is completed, the entire set of samples can be collected as follows:

Sample Collection

1) At a minimum, the VMP will be purged the required volume with flow rates between 30 to 50 milliliters per minute (mL/min) (estimated flow rates for

sampling assuming a 1-liter SUMMA®). If the leak test was performed immediately prior to sampling, no purging is necessary.

2) During purging, field measurements of oxygen, carbon dioxide, methane, and VOCs will be collected and recorded. Measurements will be used to assess consistency among sequential purge volumes to ensure representative samples are being collected. This will be used as a secondary quality assurance and quality control (QA/QC) measure.

3) Once purging is complete, samples for laboratory analyses will be collected directly into pre-cleaned, 1-liter, flow-controlled, evacuated SUMMA® canisters. The use of the 1-liter SUMMA canister assumes that the detection limits will be sufficient for the objectives of the sampling program. The SUMMA® canisters will be shipped to the field by the analytical laboratory with certificates that verify their cleanliness.

4) Prior to sampling, each canister will be checked to verify that the vacuum in the canister is greater than 22 inches of mercury. If the vacuum is less than 22 inches, the SUMMA® canister will not be used.

5) The initial vacuum will then be recorded on the chain-of-custody form.

6) For SUMMA® canister sampling, the valve cap will be removed from the canister and a sampling line will be attached between the canister. The valve on the SUMMA® canister will be opened (rotated counter-clockwise 3 to 4 turns). Rushing air should be heard.

7) The sample will be collected over a predetermined time (possibly 30-minute interval). After sample collection, the sample port will be closed and the sample line will be removed. The final pressure of the SUMMA® canister will be

recorded on the chain-of-custody form. The gauge will read zero or a slight vacuum.

8) The valve caps on the SUMMA® canister will be put back on.

9) The sample canisters will be packed with foam pellets, or bubble wrap in rigid containers for shipment to the laboratory. Samples will be sent at ambient temperature to prevent condensation of vapors. A chain-of-custody form describing the contents of the shipment will be filled out and placed in the shipping container.

10) The samples will be analyzed via standard EPA Method TO-15.

When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling:

- If sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified.
- Outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north).
- Weather conditions (e.g., precipitation, outdoor temperature, wind speed and direction) should be noted for the past 24 to 48 hours.
- Any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additionally, the field sampling team will maintain a sample log sheet summarizing the following

- Sample identification.
- Date and time of sample collection.
- Sampling depth
- Identity of samplers.
- Sampling methods and devices.
- Purge volumes.
- Volume of soil vapor extracted.
- If canisters used, the vacuum before and after samples collected.
- Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone,

SOP-2
SUB-SLAB SAMPLING

2.1 Pre-sampling Evaluation

A pre-sampling inspection will be performed prior to each sampling event to identify and minimize conditions that may interfere with the proposed testing. The pre-sampling evaluation will consist of a walk-through of the structures (primarily basement and first floor) during which time observations will be made concerning potential indoor sources of the COCs and about other influencing factors. In addition, a questionnaire will be administered to the occupants of each structure to obtain basic information about the structure and potential sources of COCs within the structure. An "Indoor air quality questionnaire and building inventory" (NYSDOH, 2005) form will be completed by the evaluator using visual observations and information obtained from the occupants. A copy of the "Indoor air quality questionnaire and building inventory" form is provided in Appendix A.

The inspection will evaluate the type of structure, floor layout, air flows and physical conditions of the building(s) being studied. This information, along with information on sources of potential indoor air contamination will be identified on a building inventory form (included in Appendix A). Items to be included in the building inventory include the following

- Construction characteristics, including foundation cracks and utility penetrations or other opening that may serve as preferential pathways for vapor intrusion.
- Presence of an attached garage.
- Recent renovations or maintenance to the building (e.g., fresh paint, new carpet or furniture).
- Mechanical equipment that can affect pressure gradients (e.g., heating

systems, clothes dryers or exhaust fans).

- Use or storage of petroleum products (e.g., fuel containers, gasoline operated equipment and unvented kerosene heaters).

- Recent use of petroleum-based finishes or products containing volatile chemicals. Each room on the floor of the building being tested and on lower floors, if possible, should be inspected. This is important because even products stored in another area of a building can affect the air of the room being tested.

2.2 Installation

If necessary, sub-slab VMPs will be installed within the interior of the buildings through the existing floor material (see the workplan for location details). Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal. Sub-slab implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies.

A minimal amount of floor covering material will be displaced prior to VMP installation. A detail of the sub-slab sampling string is provided as Figure A-3. Once the floor covering is removed, a rotary hammer will be used to make a hole for VMP construction through the slab on grade.

A rotary hammer will be used to make a 2-inch diameter hole 2 inches deep into the slab. Then the bit will be changed and a 5/8-inch diameter hole will be extended through the slab, for each VMP. The implant should be sealed to the surface with non-VOC-containing and non-shrinking products. Once completed, the floor covering material will be put back into place and only disturbed as needed. The sampling port of the VMP will be constructed with a threaded stainless steel union and threaded cap which will allow for

sealed equilibration and connection of the sample tubing. The VMP will be allowed to equilibrate at least 24 hours prior to leak testing and sampling. This period will also allow sub-slab vapors to re-equilibrate following VMP installation. Installation will be documented photographically, and using a field log book.

2.3 Sample Collection

Prior to collecting the initial set of samples, a leak test will be preformed to ensure the construction and sampling techniques are adequate. See SOP-1 for details regarding the leak test.

After the leak testing is completed, the samples can be collected as follows:

1) At a minimum, the VMP will be purged of three volume with flow rates between 30 to 50 milliliters per minute (mL/min) (estimated flow rates for sampling assuming a 1-liter SUMMA®). If a leak test was performed immediately prior then no purging will be conducted.

2) During purging, field measurements of oxygen, carbon dioxide, methane, and VOCs will be collected and recorded. Measurements will be used to assess consistency among sequential purge volumes to ensure representative samples are being collected. This will be used as a secondary quality assurance and quality control (QA/QC) measure beyond the purge volume test.

3) Once purging is complete, samples for laboratory analyses will be collected directly into pre-cleaned, 1-liter, flow-controlled, evacuated SUMMA® canisters. The use of the 1-liter SUMMA canister assumes that the detection limits will be sufficient for the objectives of the sampling program. The SUMMA® canisters will be shipped to the field by the analytical laboratory with certificates that verify their cleanliness.

4) Prior to sampling, each canister will be checked to verify that the vacuum in the canister is greater than 22 inches of mercury. If the vacuum is less than 22 inches,

the SUMMA® canister will not be used.

5) The initial vacuum will then be recorded on the chain of custody form.

6) For SUMMA® canister sampling, the valve cap will be removed from the canister and a sampling line will be attached between the canister and the sample port on the exhaust side of the blower. The sample port will be opened, then the valve on the SUMMA® canister will be rotated counter-clockwise 3 to 4 turns. Rushing air should be heard.

7) The sample will be collected over a 30-minute interval. After sample collection, the sample port will be closed and the sample line will be removed. The final pressure of the SUMMA® canister will be recorded on the chain-of-custody form. The gauge will read zero or a slight vacuum.

8) The valve caps on the SUMMA® canister will be put back on.

9) The sample canisters will be packed with foam pellets in rigid containers for shipment to the laboratory. Samples will be sent at ambient temperature to prevent condensation of hydrocarbons. A chain-of-custody form describing the contents of the shipment will be filled out and placed in the shipping container.

10) It is anticipated that the samples will be analyzed via standard EPA Method TO-15.

11) All measurements and field conditions will be recorded in the field log.

SOP-3
INDOOR AIR SAMPLING

If required, indoor air samples will be collected using the procedures outlined in this SOP. Indoor air samples will be collected simultaneously with sub-slab and outdoor air samples. Samples will be collected during the colder months while the building's heating system is active. Heating systems should be operating to maintain normal indoor temperatures for at least 24 hours prior to sampling.

The objective for sample duration will be a time-weighted sampling of 24 hours. The actual duration may be less than 24 hours, to account for sampler accessibility and Summa® canister flow controller performance. In addition to the time weighted 24-hour samples, short duration time-discrete samples may be used to supplement the characterization effort.

3.1 Pre-sampling Evaluation

A pre-sampling inspection will be performed prior to each sampling event to identify and minimize conditions that may interfere with the proposed testing. See SOP 2 for further details

3.2 Indoor Air Sampling Procedures

Indoor air samples will be collected in the following manner:

1) Time-weighted indoor air samples for laboratory analyses will be collected directly into pre-cleaned, 6-liter, flow-controlled, evacuated SUMMA® canisters. The SUMMA® canisters will be shipped to the field by the analytical laboratory with certificates that verify their cleanliness.

2) An apparatus or table will be used so the sample will be taken from a height of approximately three feet above the floor.

3) Prior to sampling, each canister will be checked to verify that the vacuum

in the canister is greater than 22 inches of mercury. If the vacuum is less than 22 inches, the SUMMA® canister will not be used.

4) The initial vacuum will then be recorded on the chain of custody form.

5) The sample port will be opened, then the valve on the SUMMA® canister will be rotated counter-clockwise 3 to 4 turns.

6) The sample will be collected over a 24 hour interval (if possible). The final pressure of the SUMMA® canister will be recorded on the chain-of-custody form. The gauge will read zero or a slight vacuum.

7) The valve caps on the SUMMA® canister will be put back on.

8) The sample canisters will be packed with foam pellets in rigid containers for shipment to the laboratory. Samples will be sent at ambient temperature to prevent condensation of hydrocarbons. A chain-of-custody form describing the contents of the shipment will be filled out and placed in the shipping container.

9) It is anticipated that the samples will be analyzed via standard EPA Method TO-15.

3.3 Field Documentation

In support of the samples, the following actions will be taken

1) Indoor Air Quality Building Survey and product inventory survey will be completed use the field forms in SOP – Appendix A.

2) The use of heating or air conditioning systems during sampling should be noted.

3) Floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building

foundations, HVAC system supply and return registers, compass orientation (north),and any other pertinent information should be completed.

4) If possible, photographs should accompany floor plan sketches.

5) Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), compass orientation (north), footings that create separate foundation sections, and paved areas.

6) Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) should be reported.

7) Al measurements and field conditions will be recorded in the field log

8) Any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID), should be recorded.

The field sampling team must maintain a sample log sheet summarizing the following:

- sample identification;
- date and time of sample collection;
- sampling height;
- identity of samplers;
- sampling methods and devices;
- depending upon the method, volume of air sampled;
- If canisters are used, vacuum of canisters before and after samples collected; and
- Chain-of-custody protocols and records used to track samples from sampling point to analysis.

SOP-4
OUTDOOR AIR SAMPLING

Upwind outdoor ambient air samples, away from windshields such as trees or bushes, will be taken during indoor air sampling activities to provide information on ambient concentrations of VOCs. The outdoor samples represent the baseline quality of the indoor air, excluding any effects from groundwater and indoor air. Since low, detectable concentrations of VOCs are typically present in the ambient air, the outdoor air samples represent the minimum concentrations expected in indoor air in the same area.

Outdoor air sampled will be collected in a similar manner as the indoor air samples, see SOP-3 for details.

The following actions will be taken to document conditions during outdoor air sampling

- Outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), the location of potential interferences(e.g., gasoline stations, factories, lawn movers, etc.), compass orientation (north), footings that create separate foundation sections, and paved areas.

- Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) should be reported

- Any pertinent observations, such as odors, readings from field instrumentation, and significant activities in the vicinity (e.g., operation of heavy equipment or drycleaners) should be recorded.

SOP-5
TEMPORARY PIEZOMETERS

This SOP describes the methodology to be used to collect the water table measurements.

1.1 Installation

Temporary piezometers will be installed using a hand auger and Geoprobe® sampling equipment. Due to the potential for underground utilities, a hand auger (or other soft dig techniques) will be used to dig to 5 feet below the ground surface.

The purpose of the piezometer is to measure water level in the soils therefore the piezometer will constructed so that the bottom of the sand pack will be at least three feet above the anticipated top of rock. Boring logs from previous well installation will assist in estimating the depth to top of rock, approximately 12 to 22 feet below ground surface.

Once the desired depth is reached the piezometer will be constructed. The piezometer will consist of a one inch diameter 0.10 inch slotted PVC screen 5 to 10 feet in length. Above the screen one inch diameter riser will extend approximately 2-feet above the ground surface. The annulus around the screen will be backfilled with coarse sand pack. Bentonite chips will be placed starting at approximately one foot above the screen and provide minimum 3 foot seal. Natural fill material will be allowed to fill in the void to the ground surface. No activities will be conducted at the piezometer. Once sufficient information has been collected the piezometer will be removed by pulling out and backfilling the hole with soils. The piezometers will not be sampled for groundwater.

1.2 Measurements

Following a 24-hour period of equilibration, the piezometers will be measured using a water level indicator and standard water table measurement techniques. Water levels will be recorded as depth below ground surface.

SOP-6
QUALITY ASSURANCE AND PROTECTION PLAN

A number of QA/QC steps will be incorporated into the program to ensure the data collected will meet the objectives of the study.

1. One field duplicate sample will be collected for every 10 samples. The field duplicate sample will be a split sample taken from the same vapor flow of its accompanying standard sample through application of a T in the tubing directly below Valve 2 on the canister.

2. A leak test as detailed in SOP 2, will be conducted to ensure there are no leaks or short circuiting occurring during VMP sampling.

3. An ambient blank sample will be colleted from outdoor air during each day of fieldwork. This sample will serve an indication of background conditions.

4. Standard analytical and method QA/QC procedures will be followed by the laboratory during sample prep and analysis.

5. Sample custody and integrity procedures, detailed below will be followed.

Sample Custody and Integrity

Procedures to ensure the custody and integrity of the samples begin at the time of sampling and continue through transport, sample receipt, preparation, analysis and storage, data generation and reporting, and sample disposal. Records concerning the custody and condition of the samples are maintained in field and laboratory records.

The contractor shall maintain chain-of-custody records for all field and field quality control (QC) samples. A sample is defined as being under a person's custody if any of the following conditions exist: (1) it is in their possession; (2) it is in their view after being in their possession; (3) it was in their possession and they locked it up or; (4) it is in a designated secure area.

All sample containers shall be sealed in a manner that shall prevent or detect tampering if it occurs.

The following minimum information concerning the sample shall be documented on the chain of custody (COC) form:

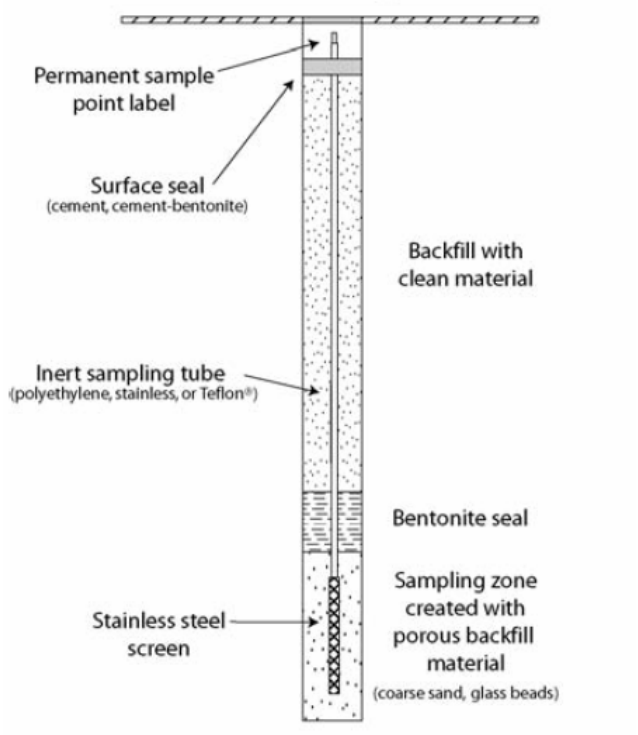
- Unique sample identification;
- Date and time of sample collection;
- Source of sample (including name, location, and sample type);
- Designation of matrix spike / matrix spike duplicate (MS/MSD);
- Preservative used;
- Analyses required;
- Name of collector(s);
- Pertinent field data (e.g., pH, temperature);
- Serial numbers of custody seals and transportation cases (if used);
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory or laboratories; and
- Bill of lading or transporter tracking number (if applicable).

All samples shall be uniquely identified, labeled, and documented in the field at the time of collection in accordance with the FSP.

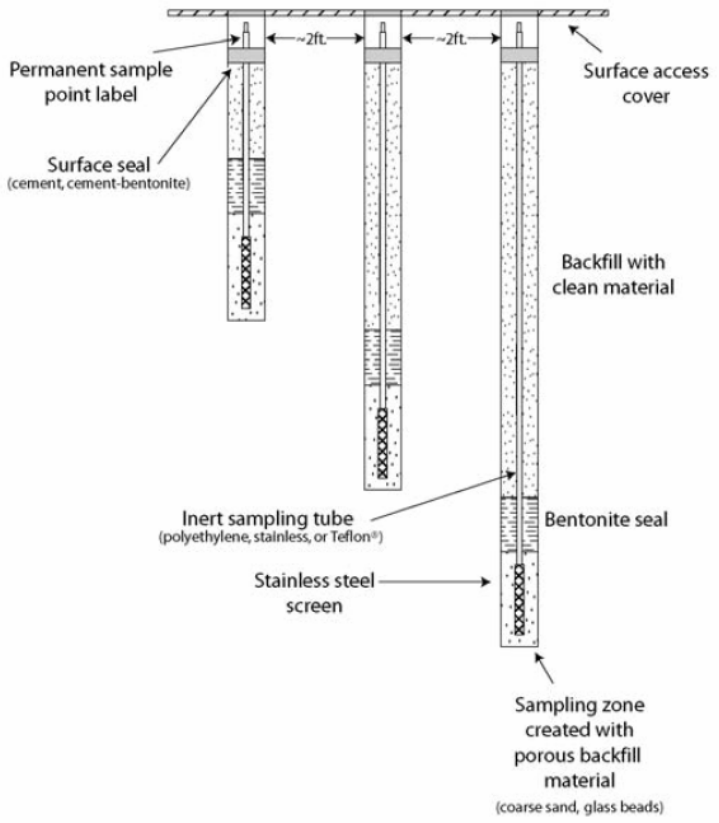
Samples collected in the field shall be transported to the laboratory or field-testing site as expeditiously as possible. As a general rule, storage at low temperature is the best way to preserve most samples. When a 4°C requirement for preserving the sample is indicated, the samples shall be packed in ice or chemical refrigerant to keep them cool during collection and transportation. During transit, it is not always possible to rigorously control the temperature of the samples.

SOP FIGURES

Single Point Sampling Location



Nested Sampling Location



Source: NYSDOH (2005)

Figure A-1
Soil Vapor Monitoring Point

Former Carborundum Facility Sanborn, NY
SVI - SOP

PARSONS
180 Lawrence Bell Drive, Suite 104, Williamsville, N.Y. 14221, Phone: (716) 633-7195

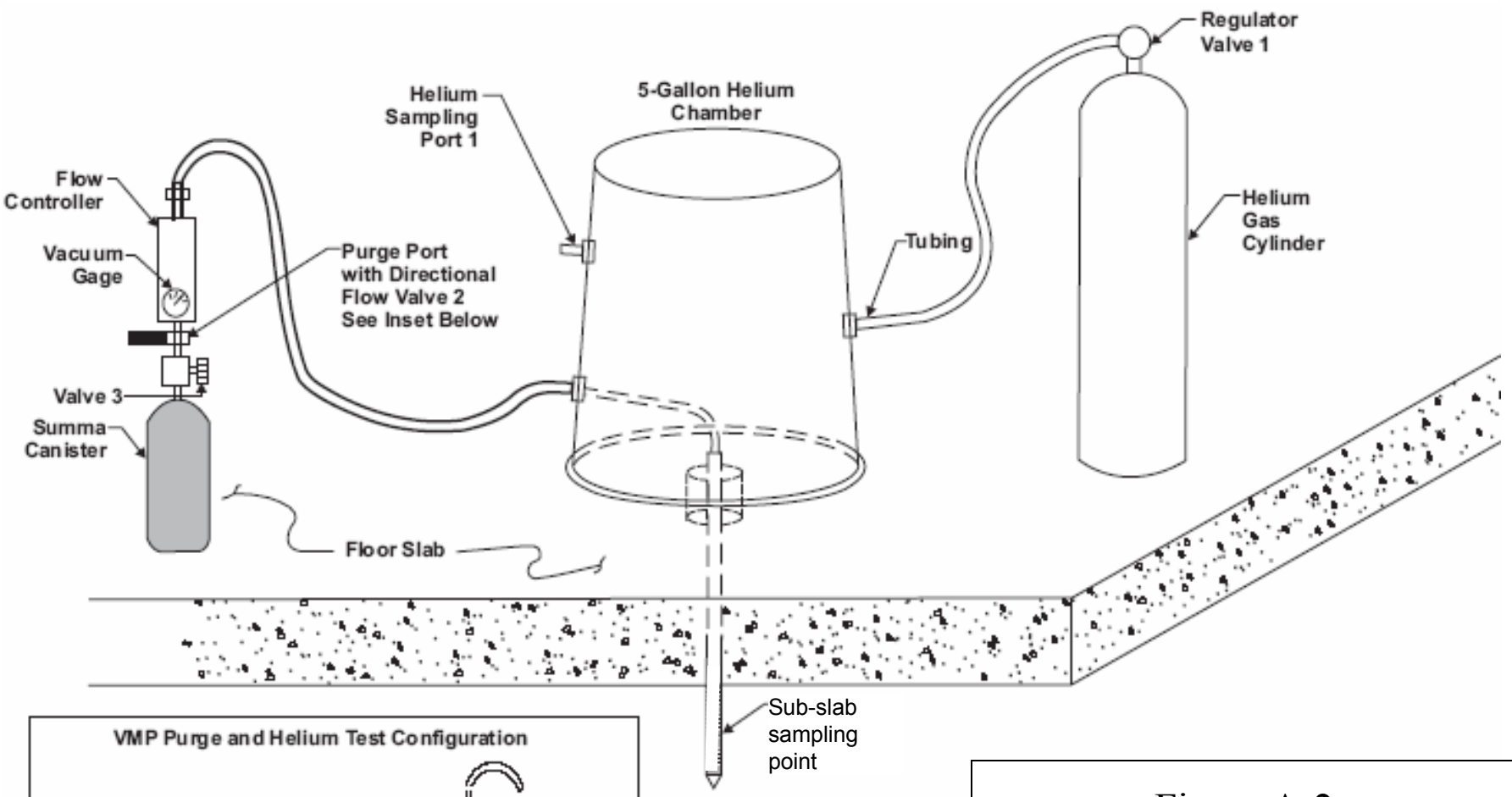
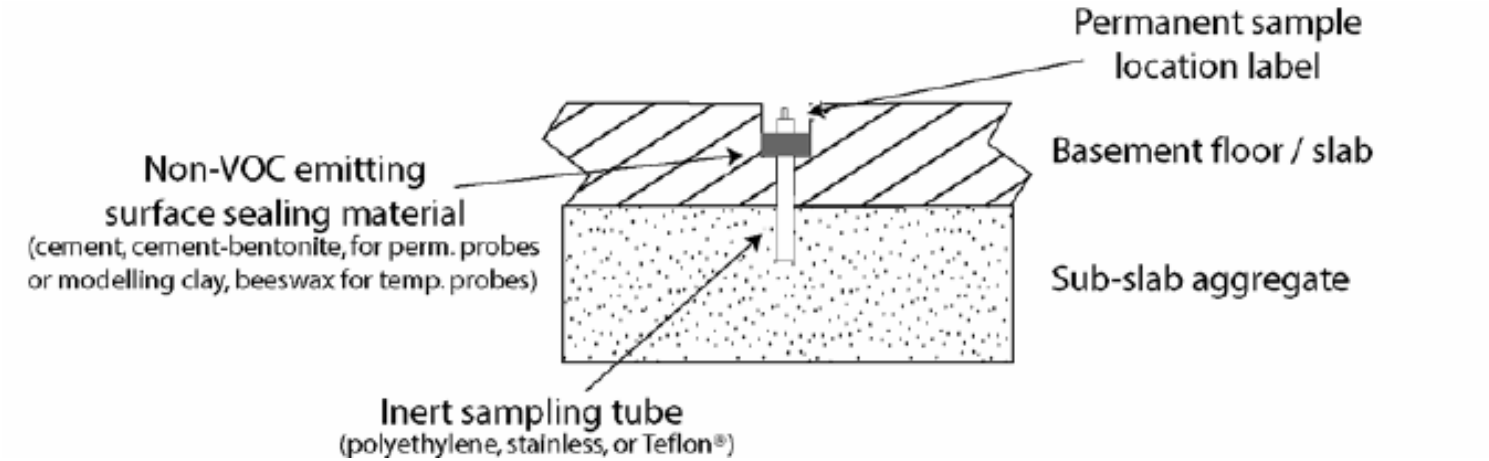


Figure A-2
Leak Test Configuration

Former Carborundum Facility Sanborn, NY
SVI - SOP

PARSONS
180 Lawrence Bell Drive, Suite 104, Williamsville, N.Y. 14221, Phone: (716) 633-7195



Source: NYSDOH (2005)

Figure A-3
Sub-slab Monitoring Point

Former Carborundum Facility Sanborn, NY
SVI - SOP

PARSONS
180 Lawrence Bell Drive, Suite 104, Williamsville, N.Y. 14221, Phone: (716) 633-7195

SOP 1 - APPENDIX A

FIELD FORMS

VAPOR MONITORING POINT (VMP) SAMPLE RECORD

Site Name _____ Sample ID _____

Samplers _____

Type of VMP _____

Depth of sampling point _____ feet

Method of sampling _____

Purging Data

Method _____ Date/Time _____

Purge Rate _____

Purge Volume _____

Tracer Leak Test Information

Type of tracer: _____

Time and date of start

Tracer monitoring				
Time	Concentration	Time	Concentration	

Sampling Data

Method _____ Date/Time _____

Vacum before _____

Vacuum after _____

Parameters	Bottle	Pres.	Method

Field Parameters

	1 Volume	*2 Volume*	*3 Volume*	*Sample*
Oxygen				
Carbon Dioxide				
Methane				
VOCs				

Comments: _____

PARSONS

INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY (FROM NYSDOH GUIDANCE, 2005)

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in: Basement Outdoors Main Floor Other_____

Air conditioning: Central Air Window units Open Windows None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

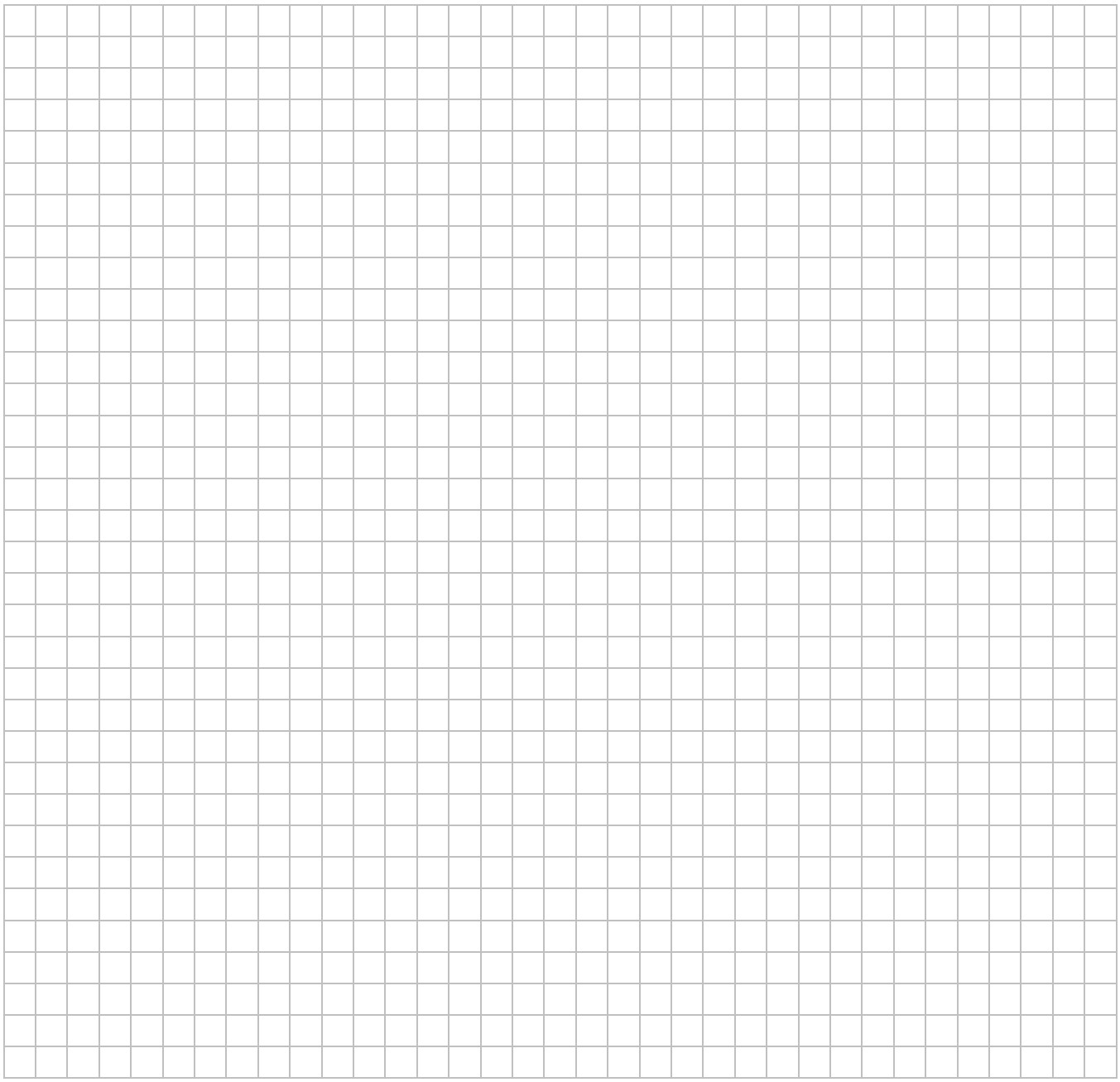
Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

SOP 1 - APPENDIX B

EQUIPMENT LIST

Item	Vendor
VMPs	
1/4" OD PTFE Tubing (0.170” ID)	Geotech or local source
SS implant screen	Geoprobe
1/4" union	Swagelok or other or other
1/4" plug (cap)	Swagelok or other or other
Benseal (8-mesh)	Baroid or other
Quick setting portland cement	local source
Sand	local source
Sodium silicate solution	local source
Syringe	local source
HELIUM LEAK TEST & CHAMBER	
1/4" bulkhead reducer	Swagelok or other or other
Helium	local supplier
Regulator for helium tank	local supplier
PTFE tubing	Geotech or local source
5-gallon plastic bucket	local supplier
SAMPLING	
Sampling pump	US Environmental, or equivalent
Helium detector Mark Products Model 9860, or equivalent	US Environmental, or equivalent
Tedlar bags 1-liter	SKC, LSS
3-way valve	Swagelok or other
Tee	Swagelok or other
1/4" union	Swagelok or other
Port connector	Swagelok or other
Female nut 6L pre-cleaned, evacuated summa 8-hour flow controller Pressure guage Gas flow rate gauge (if not included on pump) **GENERAL** Digital Camera Field Log book Tool Kit COC Forms	Swagelok or other laboratory laboratory laboratory local supplier Parsons Parsons Parsons Parsons