10653/37211

Work Plan

Pizza Hut Off-Site Site Characterization
Work Assignment #D004090-29
City of Buffalo, Erie County, New York

New York State Department of Environmental Conservation

James R. Heckathorne, P.E.
Vice President

October 2005

O'BRIEN & GERE
ENGINEERS, INC.

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1. Introduction

1.1. General

This document is the Pizza Hut Off-Site Site Characterization Work Plan for off-site characterization activities located in the City of Buffalo, Erie County, New York. A Site location plan is included as Figure 1. The Pizza Hut Off-Site Site Characterization is being performed in accordance with the State Superfund Work Assignment #D004090-29 (Work Assignment).

The scope presented herein was developed based on reviews of previous sampling activities associated with the nearby Pizza Hut site (Site #V00370-9), the Scoping Session, and other discussions with the New York State Department of Environmental Conservation (NYSDEC).

1.2. Project Objectives

The objectives of the Pizza Hut Off-Site Site Characterization are to:

- Evaluate recent and historic off-site property usage to identify possible contaminant source areas;
- Characterize off-site contaminant concentrations and the overall contaminant distribution in subsurface soil through the installation of soil borings;
- Characterize the off-site distribution of contaminants, define limits of the groundwater plume, and identify the source/sources for off-site contamination through the installation of groundwater monitoring wells/micro-wells;
- Perform active soil gas monitoring to evaluate the potential for migration of vapors into nearby businesses and/or residences and to further define the extent of contamination; and
- Evaluate storm and sanitary sewer utilities as a mechanism for contaminant migration.

1.3. Document Format

This document contains the following sections:

Section 1 – Introduction
Section 2 – Background
Section 3 – Pizza Hut Off-Site Site Characterization Work Plan
Section 4 – Pizza Hut Off-Site Site Characterization Report
Section 5 – Project Schedule

2. Background

Under the NYSDEC Voluntary Cleanup Program, the Franchise Finance Corporation of America (FFCA) (now known as GE Capital Franchise Finance Corporation) completed investigation activities and are currently implementing a remediation program at the Pizza Hut site (V00370-9) located in the City of Buffalo, Erie County, New York. During the record search, FFCA determined that the property was historically used as a dry cleaning establishment and possible gasoline filling station. The investigation activities identified soil and groundwater contaminated with tetrachloroethene (PCE) and PCE breakdown products. The presence of PCE, a compound commonly associated with dry cleaning operations, corroborated the results of the earlier records search.

The record search additionally identified three nearby parcels that were historically operated as dry cleaning establishments. The three nearby parcels are within approximately 500 feet of the Pizza Hut site and are shown on Figure 1. The investigation activities completed at the Pizza Hut site included the installation of off-site groundwater monitoring wells. Although PCE was detected in groundwater samples collected from select off-site wells, the off-site contaminant distribution relative to the Pizza Hut site, the groundwater flow direction, and the location of underground utilities, suggest that the Pizza Hut site may not represent the source for the off-site PCE. Instead, the off-site contamination may be associated with the nearby parcels formerly operated as dry cleaners.

2.1. Preliminary conceptual site model

Geology

Based on previous investigations, the site is underlain by variable amounts of fill material that is underlain by fine-grained glacial deposits. The fill thickness varies from approximately 1.5 to 18 feet with the thickest fill encountered off-site to the north of the Pizza Hut site. The underlying native material consists of sand overlying silt and/or clay. With the exception of the north portion of the Pizza Hut site where the lowermost interval is sand, the bedrock unit is overlain by lacustrine clay.

Hydrogeology

Both shallow and deep groundwater monitoring wells were installed as part of the Pizza Hut site investigation. Shallow wells were constructed with a screened interval placed across the saturated fill material and sand. Deep wells were constructed with a screened interval in the overburden material above the bedrock surface. Based on ground water elevation data from the Pizza Hut site, downward hydraulic gradients exist between the shallow and deep water bearing zones. Groundwater

typically occurs at a depth of approximately seven to ten feet below ground surface and appears to flow west to northwest from the Pizza Hut site to Cazenovia Creek. Hydraulic conductivity tests indicate that the shallow groundwater system has a hydraulic conductivity of approximately 2.7x10-3 cm/sec and the deep ground water system has a hydraulic conductivity of approximately 1.4x10-5 cm/sec. The Pizza Hut Site Investigation Report (February 15, 2002) concluded that the storm sewer located along Kingston Place may influence the local groundwater flow direction.

Contaminants of concern
The contaminants of concern for the Pizza Hut Off-Site Site Characterization are PCE and its breakdown products (TCE, cis-1,2-DCE, and vinyl chloride).

Potential sources of off-site contamination
The following properties have been identified as potential sources of off-site contamination due to their previous use as dry cleaning establishments:

- 2137 Seneca Street property
- 2096 Seneca Street at intersection between Kamper and Seneca Street
- 2111 Seneca Street at intersection between Princeton and Seneca Street
- 2124 Seneca Street at intersection between Norman and Seneca Street

Potential migration pathways
PCE is denser than water and in free phase will sink within an aquifer and settle on lower permeability units such as the till or bedrock surface. The slopes of these surfaces will govern the migration direction of the free product. Since the site is located within a surburban area, underground utilities such and water and sewer lines may provide preferential migration pathways for ground water and the PCE plume or possibly free PCE product if present. PCE is volatile and there is the potential for the PCE to volatilize from the ground water migrate horizontally and vertically through the unsaturated soil. These vapors can migrate into overlying or adjacent structures. If PCE and PCE-impacted ground water has migrated to bedrock, further migration within the bedrock may occur through the bedding planes as well as more vertical fractures in the bedrock.

Data gaps in current conceptual understanding
The following are data gaps associated with the current conceptual understanding of the Site:

- Horizontal and vertical extent of the off-site chlorinated ground water plume
- Vertical stratification of off-site chlorinated compounds
- Potential impacts to bedrock ground water
- Source(s) of off-site chlorinated ground water plume

- Plume migration mechanisms (i.e. preferential pathways)
- Extent of potential indoor air impacts

The primary objective of the Pizza Hut Off-Site Site Characterization is to collect data sufficient to address the current data gaps whereby a more complete conceptual site model can be formulated, and appropriate future action considered.

3. Pizza Hut off-site site characterization work plan

3.1. Field activities plan

The Field Activities Plan (FAP) is provided in Appendix A of this Pizza Hut Off-Site Site Characterization Work Plan. The FAP presents the procedures for implementing off-site characterization field investigations. The FAP also provides rationale and detailed procedures for collecting environmental samples including equipment and personnel requirements, drilling and well installation techniques, sampling techniques, and equipment decontamination procedures. Deviations from the FAP will require notification and prior approval of the NYSDEC.

3.2. Quality assurance project plan

The Quality Assurance Project Plan (QAPP) is provided in Appendix B of this Pizza Hut Off-Site Site Characterization Work Plan. The QAPP provides quality assurance/quality control (QA/QC) criteria for work efforts associated with the sampling of environmental media.

The QAPP has been prepared utilizing the guidance and format provided in the following documents:

- New York State Department of Environmental Conservation (NYSDEC), *Draft DER-10 Technical Guidance for Site Investigation and Remediation*, Division of Environmental Remediation, December 2002.
- United States Environmental Protection Agency (USEPA), *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA,* Office of Emergency and Remedial Response, Washington, D.C. (USEPA 1988a).
- United States Environmental Protection Agency (USEPA), *EPA Requirements For Quality Assurance Project Plans For Environmental Data Operations,* EPA QA/R-5 (USEPA 2001a).

This QAPP will assist in generating data of a known and acceptable level of precision and accuracy. The QAPP provides information regarding the project description and personnel responsibilities, and sets forth specific procedures to be used during sampling of relevant environmental matrices, other field activities, and the analyses of data. The procedures in this QAPP will be followed by personnel participating in the field investigation and in the laboratory analyses of environmental samples.

3.3. Health and safety plan

The Health and Safety Plan (HASP) is provided in Appendix C of this Pizza Hut Off-Site Site Characterization Work Plan. The HASP has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere personnel while performing off-site characterization activities.

The HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by O'Brien & Gere personnel to address potential health and safety hazards while in investigation areas. The plan specifies procedures and equipment to be used by O'Brien & Gere personnel during work activities and emergency response to minimize exposures of O'Brien & Gere personnel to hazardous materials.

The HASP also contains a Community Air Monitoring Plan (CAMP).

3.4. Data management and validation

Analytical data from the laboratory will be received in hardcopy and electronic format. The electronic data will be entered into a project database for use in preparation of summary tables.

Analytical data will be validated as discussed in the QAPP. A Data Usability Summary Report (DUSR) will be prepared by a data validator and included as an appendix in the Pizza Hut Off-Site Site Characterization Report.

3.5. Human health risk assessment

O'Brien & Gere will conduct a qualitative human health analysis according to New York State DER-10 guidance. The analysis will consist of evaluation of potential exposures of humans to site constituents based on current and future potential uses of the site and neighboring properties. The analysis will be prepared as table summaries which will be developed consistent with the Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments (USEPA 2001)), referred to as RAGS D. The qualitative human health evaluation will comprise the following:

USEPA RAGS D Table 1 Series will present an evaluation of current and potential future pathways for exposure to soil, ground water, surface water, sediment.

For complete exposure pathways identified in the pathway analysis, USEPA RAGS D Table 2 series will identify constituents of potential concern (COPC) by comparison of maximum exposure point concentrations to appropriate Department screening/guidance:

- Ground water data will be compared to screening values presented in Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Division of Water Technical and Operation Guidance Series (TOGS 1.1.1).
- Soil data will be compared to screening values presented in the Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels. Division of Hazardous Waste Remediation. Technical and Administrative Guidance Memorandum (TAGM 4046).

The results of the qualitative human health exposure analysis will be submitted to the Department for review and comment prior to completion of the Pizza Hut Off-Site Site Characterization Report. The final deliverable will be included in the Pizza Hut Off-Site Site Characterization Report as an appendix.

4. Pizza Hut off-site site characterization report

Upon completion of the tasks detailed in the FAP, the Pizza Hut Off-Site Site Characterization Report will be completed. This report will summarize the data collected during the off-site characterization activities. Conclusions based on this data will be provided, as well as the following information:

- Field investigation results
- Hydrologic interpretation
- Chemical analyses results
- Nature and extent characterization
- Human health exposure assessment results
- Development of a conceptual site model
- Assessment of existing data to establish whether there is the need for supplemental data collection

5. Project schedule

The Pizza Hut Off-Site Site Characterization schedule is presented as Figure 2.

References

NYSDEC. 1994. TAGM 4046. *Technical and Administrative Guidance Memorandum #4046.* New York State Department of Environmental Conservation. Albany, New York.

NYSDEC. 1998. *TOGS 1.1.1. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.* New York State Department of Environmental Conservation. Albany, New York.

NYSDEC. December 2002. *Draft DER-10 Technical Guidance for Site Investigation and Remediation*, Division of Environmental Remediation.

United States Environmental Protection Agency (USEPA), *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA,* Office of Emergency and Remedial Response, Washington, D.C. (USEPA 1988a).

United States Environmental Protection Agency (USEPA), *EPA Requirements For Quality Assurance Project Plans For Environmental Data Operations,* EPA QA/R-5 (USEPA 2001a).

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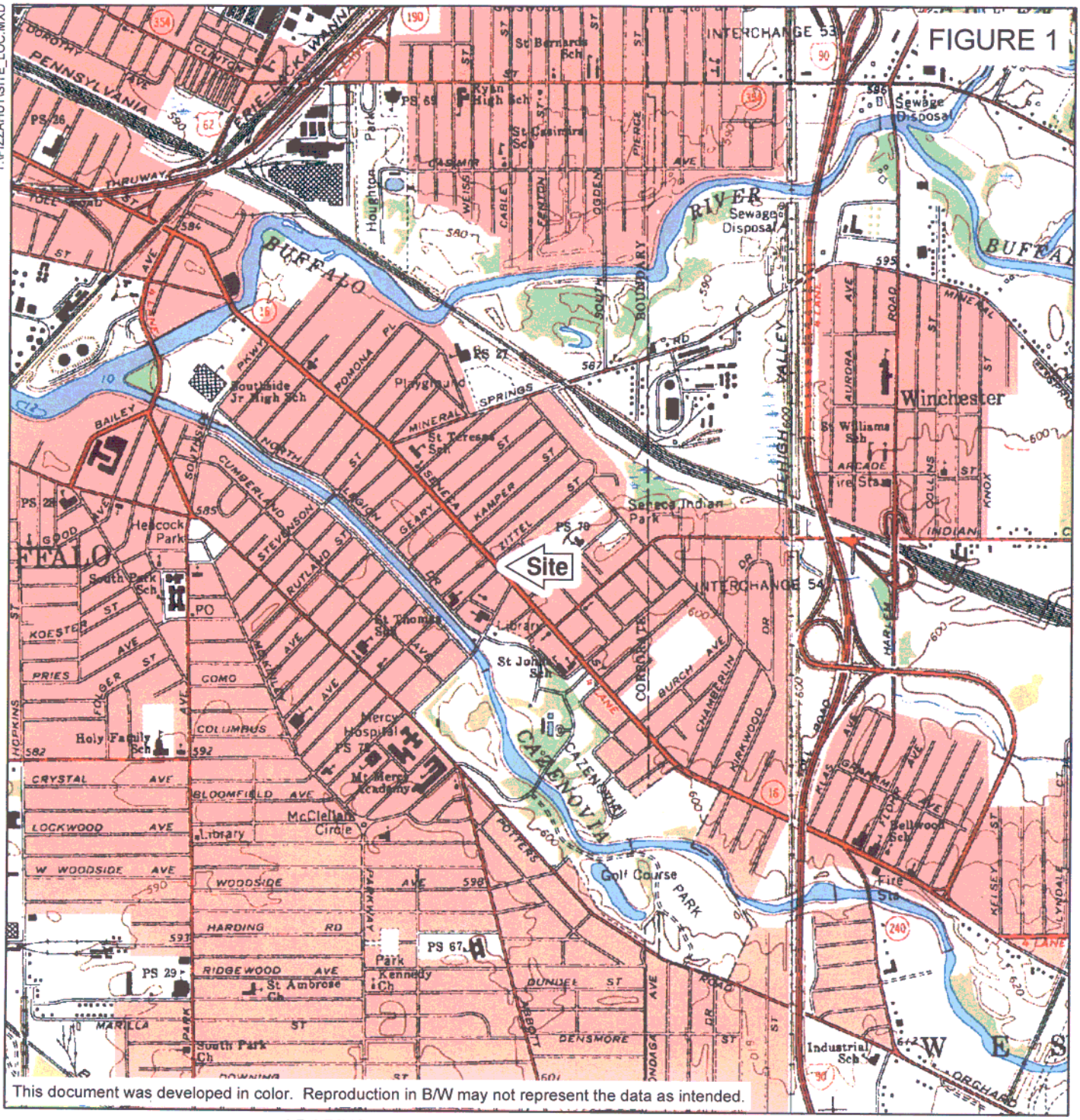
FIGURE 1



This document was developed in color. Reproduction in B/W may not represent the data as intended.

10/28/05

ADAPTED FROM: BUFFALO SE USGS QUADRANGLE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PIZZA HUT OFF-SITE SITE CHARACTERIZATION
CITY OF BUFFALO, NEW YORK

QUADRANGLE LOCATION

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

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10/28/05

1:24,000

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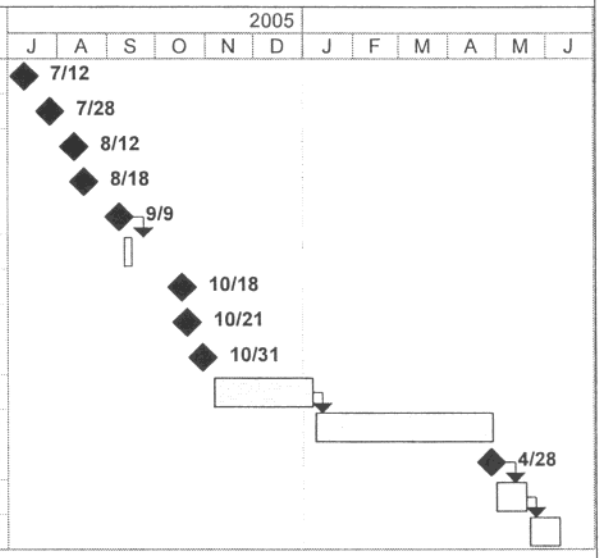
Figure 2

Project Schedule
Pizza Hut Off-Site Site Characterization
Work Assignment #D004090-29

ID	Task Name	Duration	Start	Finish
1	Work Assignment	1 day	Tue 7/12/05	Tue 7/12/05
2	Site Visit	1 day	Thu 7/28/05	Thu 7/28/05
3	Submit Draft Project Management Work Plan (PMWP)	1 day	Fri 8/12/05	Fri 8/12/05
4	Scoping Session	1 day	Thu 8/18/05	Thu 8/18/05
5	Submit Draft Final PMWP	1 day	Fri 9/9/05	Fri 9/9/05
6	NYSDEC Review of Draft Final PMWP	5 days	Mon 9/12/05	Fri 9/16/05
7	Submit Final PMWP	1 day	Tue 10/18/05	Tue 10/18/05
8	Submit Draft Final Site Characterization Work Plan	1 day	Fri 10/21/05	Fri 10/21/05
9	Notice to Proceed	1 day	Mon 10/31/05	Mon 10/31/05
10	Site Characterization Field Implementation	45 days	Mon 11/7/05	Fri 1/6/06
11	Develop Draft Site Characterization Report	80 days	Mon 1/9/06	Fri 4/28/06
12	Submit Draft Site Characterization Report	1 day	Fri 4/28/06	Fri 4/28/06
13	NYSDEC Review of Draft Site Characterization Report	15 days	Mon 5/1/06	Fri 5/19/06
14	Address NYSDEC Comments/Issue Final Site Characterization Report	15 days	Mon 5/22/06	Fri 6/9/06



Project: Pizza Hut Off-Site Characterization
Date: August 9, 2005

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Field Activities Plan

Pizza Hut Off-Site Site Characterization

Work Assignment #D004090-29
City of Buffalo, Erie County, New York

New York State Department of Environmental Conservation

October 2005

O'BRIEN & GERE

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Field Activities Plan

Pizza Hut Off-Site Site Characterization
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City of Buffalo, Erie County, New York

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1. Introduction

Under the NYSDEC Voluntary Cleanup Program, the Franchise Finance Corporation of America (FFCA) (now known as GE Capital Franchise Finance Corporation) completed investigation activities and are currently implementing a remediation program at the Pizza Hut site (V00370-9) located in the City of Buffalo, Erie County, New York. During the record search, FFCA determined that the property was historically used as a dry cleaning establishment and possible gasoline filling station. The investigation activities identified soil and groundwater contaminated with tetrachloroethene (PCE) and PCE breakdown products. The presence of PCE, a compound commonly associated with dry cleaning operations, corroborated the results of the earlier records search.

The record search additionally identified three nearby parcels that were historically operated as dry cleaning establishments. The three nearby parcels are within approximately 500 feet of the Pizza Hut site and are shown on Figure 1. The investigation activities completed at the Pizza Hut site included the installation of off-site groundwater monitoring wells. Although PCE was detected in groundwater samples collected from select off-site wells, the off-site contaminant distribution relative to the Pizza Hut site, the groundwater flow direction, and the location of underground utilities, suggest that the Pizza Hut site may not represent the source for the off-site PCE. Instead, the off-site contamination may be associated with the nearby parcels formerly operated as dry cleaners.

1.1. General plan

This Field Activities Plan (FAP) for the Pizza Hut Off-Site Site Characterization presents the procedures for implementing field investigations described in the Pizza Hut Off-Site Site Characterization Work Plan (O'Brien & Gere, 2005). The location of the Pizza Hut Off-Site Site Characterization area is shown on Figure 1. This FAP provides detailed procedures for collecting environmental samples including equipment and personnel requirements, drilling and well installation techniques, sampling techniques, and equipment decontamination procedures. Deviations from this FAP will require notification and prior approval of the NYSDEC.

1.2. Objectives

The objectives of the Pizza Hut Off-Site Site Characterization are to:

- Evaluate recent and historic off-site property usage to identify possible contaminant source areas;
- Characterize off-site contaminant concentrations and the overall contaminant distribution in subsurface soil through the installation of soil borings;
- Characterize the off-site distribution of contaminants, define limits of the groundwater plume, and identify the source/sources for off-site contamination through the installation of groundwater monitoring wells/micro-wells;
- Perform active soil gas monitoring to evaluate the potential for migration of vapors into nearby businesses and/or residences and to further define the extent of contamination; and
- Evaluate storm and sanitary sewer utilities as a mechanism for contaminant migration.

2. Pizza Hut off-site site characterization field activities

This section describes the field activities to be completed as part of the Pizza Hut Off-Site Site Characterization.

2.1. Comprehensive background search

The first element of the Pizza Hut Off-Site Site Characterization will include a Comprehensive Background Search to evaluate historic off-site property usage and the potential that nearby properties are contributing to known off-site contamination. The Background Search will place emphasis on three nearby parcels known to have historically operated as dry cleaning facilities. These parcels include the following and are shown as purple-shaded parcels on Figure 2:

1) 2096 Seneca Street - at intersection between Kamper and Seneca Street
2) 2111 Seneca Street - at intersection between Princeton and Seneca Street
3) 2124 Seneca Street - at intersection between Norman and Seneca Street

The Background Search will generally be conducted in accordance with the procedures outlined in ASTM Standard E1527 for the completion of Phase I Environmental Site Assessments (ESAs). At a minimum, the Background Search will include review of the following resources, if available:

- Regulatory and compliance data including records of regulatory inspections, warning letters, enforcement actions, consent orders, etc. for state, county and local regulatory agencies;
- Environmental property audits;
- City directory searches to determine historical land use and potential contaminant source areas in the site vicinity;
- Occupational licenses and business permits
- Review of historical aerial photographs;
- Review of topographical maps;
- Historical maps and fire insurance records (such as Sanborn maps);
- Review of assessment/remedial work at nearby sites (particularly service stations); and
- Review of facility as-built drawings.

For the three parcels listed above that were formerly used for dry cleaning purposes, the Background Search should at a minimum attempt to define the following pieces of site information:

- Approximate dates of operation;
- Suspect source areas per parcel;
- Dry cleaning solvents and chemicals used;
- Historical information on other businesses that occupied the parcel;
- How the dry cleaning chemicals were delivered to the facilities; and
- How were the dry cleaning solvents stored and managed at the facilities.

The results of the Background Search will be used to optimize the placement of soil gas points (Subtask 2.2) and shallow soil borings and groundwater monitoring wells/micro-wells (Subtask 2.3). The results of the Background Search will be provided in the form of one Phase I ESA report that combines Phase I ESA conducted for the three subject parcels. The Phase I ESA report will be included as an attachment to the Pizza Hut Off-Site Site Characterization Report.

2.2. Soil gas investigation

A soil gas investigation will be conducted to evaluate the extent of volatile organic compounds (VOCs) particularly tetrachloroethene (PCE) in shallow soil vapor, as well as to identify potential off-site source(s) of VOCs relative to the property located at 2137 Seneca Street (former Pizza Hut.

The results of the soil vapor survey will also be used as a preliminary indication of the extent of VOCs in shallow ground water at off-site locations relative to the 2137 Seneca Street property.

2.2.1. Locations

Soil vapor samples will be collected from up to fifty locations at the approximate locations shown on Figure 2. The samples will be collected from depths between 4-ft to 6-ft below grade in order to keep the soil vapor sample interval above the water table.

The soil vapor sample locations identified on Figure 2 were selected to provide an areal distribution of data collection points near three former dry cleaning businesses located near the 2137 Seneca Street property, which may potentially be contributing to known off-site ground water impacts. Also, sample locations were distributed to evaluate potential vapor migration to businesses and/or residences near the 2137 Seneca Street property and the three former dry cleaning businesses.

2.2.2. Procedures

For each sample, a soil vapor sample probe will be installed either manually or by a small direct-push drill system. The probe will consist of a hollow steel rod driven by a slide hammer or powered tool. A slotted aluminum sampling point will be inserted into the vapor point holder at the end of the hollow rod. The vapor point will be fitted to polyethylene tubing, which runs through the hollow steel rod. The hollow rod will be removed after it has been advanced to the selected sampling depth, leaving the point and tubing in the ground.

To prevent infiltration of ambient air and dilution of the sample, the probe-hole will be packed with permeable filter material and sealed. After removal of the hollow rod, a minimum of 12-inches of permeable backfill material consisting of coarse-sand or glass beads will be placed to cover the vapor point. Approximately 6-inches of granular bentonite will be placed atop the permeable backfill material. The remaining annular space will be filled with a pre-hydrated bentonite slurry extending to the ground surface.

Tracer gas testing

To evaluate the integrity of the bentonite seal, and the potential for short-circuiting, tracer gas testing will be conducted prior to sample collection. Helium gas will be used as the tracer gas. Initially, tracer gas tests will be conducted at the first five sample locations. If the method of sealing the sample points is found to be sufficient to prevent short-circuiting, additional tracer testing will be restricted to approximately 10 percent of the remaining sample locations.

Soil gas sample collection

After installation, and prior to sampling, each soil vapor sample point will be allowed to equilibrate for approximately 30 minutes. Following the equilibration period, one sample-string volume (consisting of the vapor point, filter material, and tubing) will be purged prior to sample collection to remove stagnant or ambient air from the sample string and to provide samples that are representative of subsurface conditions. Sampling points may be purged using a syringe.

Each sample will be collected into dedicated 5-liter Tedlar® bags using a peristaltic pump and a Masterflex tubing. Use of a peristaltic pump will ensure that the sampled air does not circulate through a pump causing potential cross-contamination and leakage. All tubing will be discarded between sampling locations to eliminate the possibility of cross-contamination. Sample flow rates will be adjusted to 200 milliliters per minute or less using an in-line rotometer. Once collected, the samples will be immediately transported to the on-site laboratory, or if the field sampler proceeds to collect samples from additional locations, the previously collected samples will be temporarily placed in a cooler or cardboard box to prevent potential photo-degradation of the sample until those samples are transported to the on-site laboratory.

Following sample collection, a part per billion sensitive photoionization detector (PID) will be connected to the sample string to measure total VOCs. The PID screening will provide a preliminary evaluation on the distribution of contaminants.

Decontamination of sampling equipment will be in accordance with Section 2.8.

2.2.3. Analyses

Quantitative analyses of soil gas samples will be conducted by Buck Environmental Laboratories, Inc. using an on-site laboratory. The soil gas samples will be analyzed by gas chromatography or gas chromatography/mass spectrometry for VOCs using an adaptation of USEPA Method 8260B. For this screening application, the detection limits for each compound will be provided within a range of 10 to 200 parts per billion volume (ppbv), or less. Quality Assurance/Quality Control (QA/QC) samples associated with the soil vapor sampling are specified in the Quality Assurance Project Plan (QAPP) provided in Appendix B of the Pizza Hut Off-Site Site Characterization Work Plan.

2.2.4. Data use

Soil vapor data will be utilized to select additional soil gas sample locations, and to aid in the placement of soil borings/monitoring wells. The data will also be used to evaluate the potential for vapor migration to businesses and or residences in the investigation area.

2.3. Direct-push drilling program

A drilling program will be implemented to evaluate the overburden unit, groundwater quality, ground water flow patterns, and the influence of the underground utilities on ground water flow and contaminant migration. A total of approximately 20 shallow soil borings will be advanced and a subset of these borings subsequently completed as ground water micro-monitoring wells (Figure 3). It is anticipated that the shallow soil borings will be advanced to the top of the native clay unit encountered during the Pizza Hut site investigation and that a minimum of fifteen of the soil borings will be completed as ground water micro-monitoring wells.

2.3.1. Soil borings

As previously mentioned, data suggests that three nearby parcels were historically operated as dry cleaning establishments. To better understand if these properties are contributing to the off-site contamination, shallow soil borings will be installed according to the following schedule as access to each property allows:

1) One soil boring hydraulically upgradient of the former facility;
2) One to two soil borings hydraulically downgradient of the former facility; and
3) Two soil borings cross-gradient on either side of the former facility.

The actual placement of the soil borings will be selected based on the results of the Background Search (Section 2.1) and the Soil Gas Investigation (Section 2.2). Specifically, information related to the location of dry cleaning machines, service doors, USTs/ASTs, storm sewers, floor drains, and dumpsters/trash receptacles, etc. will be used to select the actual soil boring locations. Figure 3 shows the estimated soil boring locations near the three known parcels formerly operated as dry cleaners.

As shown on Figure 3, additional soil borings/micro-wells will be installed to establish a relationship between ground water data collected as part of the Pizza Hut site (V00370-9) investigation and the off-site characterization activities included as part of this Work Assignment. These wells will be used to better understand contaminant concentrations and groundwater flow patterns in the area that includes the Pizza Hut site and the three off-site properties historically operated as dry cleaners.

To evaluate the off-site preferential migration of contaminants along the storm sewer and sanitary sewer lines, a series of shallow soil borings/micro-wells will additionally be advanced adjacent to the underground utility trenches. This data will be compared to underground utility information and maps acquired from the City of Buffalo. The soil borings will either be advanced using a direct-push technique or using hand-driven or hand-auguring techniques. As previously mentioned the data collected as part of the Pizza Hut site investigation suggests that the underground utilities may influence groundwater flow and the migration of contaminants.

It is anticipated that approximately 4-5 of the shallow soil borings will be advanced adjacent to the underground utilities located on Seneca Street, Kingston Place, and Princeton Place. These soil borings will be advanced to a depth representing the bottom of the utility trench. If saturated conditions are encountered, groundwater samples will be collected using a stainless steel screen point and analyzed for VOCs. If saturated conditions are not encountered, then a composite soil sample representing the lower one-foot of the utility trench will be collected and analyzed for VOCs. It is anticipated that at a minimum, one groundwater or one soil sample will be collected per shallow soil boring installed near

the underground utilities. The soil and/or ground water samples will be analyzed by Mitkem Corporation for VOCs using USEPA Method 8260. Associated QA/QC samples will be collected in accordance with the Quality Assurance Project Plan (QAPP) provided in Appendix B of the Pizza Hut Off-Site Site Characterization Work Plan.

During the drilling program, subsurface soil samples will be collected continuously from each of the soil borings until the native lacustrine clay unit is encountered. Each soil sample will be described and logged relative to its color, moisture content, grain-size, and any observed staining or odors. An example boring log form is provided as Exhibit A. The soil will be screened visually for evidence of contamination. In addition, soil samples will be collected at two-foot intervals for headspace analysis. Field screening will involve placing the soil sample in a closed container (e.g. driller jars) and analyzing the headspace with a photoionization detector (PID) for the presence of volatile compounds. All or some part of any subsurface soil interval extracted from a specific soil boring may be collected as a soil sample for laboratory analysis at the discretion of the NYSDEC representative. Attention will be given to examining the sand/fill and lacustrine clay interface/low permeability zones for the presence of dense non-aqueous phase liquids (DNAPL).

It is anticipated that up to sixteen subsurface soil samples may be collected for laboratory analysis. The selection of subsurface soil materials for laboratory analysis will be made in consultation with the NYSDEC field representative and will be based on:

1) Subsurface soil materials that show visual signs of contamination; or
2) Subsurface soil materials that cause a sustained response above the measured background response on a calibrated flame or photo ionization screening instrument; or
3) The need to characterize site specific areas (e.g., a PCE above ground storage tank area, underground utility area, filter cleaning area); or
4) A combination of these situations.

Decontamination of sampling equipment will be conducted in accordance with Section 2.8. Drill cuttings will be managed in accordance with Section 4.

2.3.2. Mirco-well installations

The exact placement of the micro-wells will be based upon the information collected during the background review, existing distribution of contaminants, results of the soil gas investigation, and field observations recorded during completion of the soil borings. At a minimum, fifteen of the soil borings will be converted to micro-wells.

It is expected that the monitoring wells will be constructed similar to the construction of the existing shallow monitoring well network. The majority of the existing shallow monitoring wells are constructed with a screened interval placed across the saturated fill material and sand at depths of approximately 15 to 20 feet below grade.

It is anticipated that each micro-well will be constructed of a 5-ft length of 1.5-inch inside diameter pre-packed PVC well screen with 0.010-inch slots. The screen will be flush-threaded to PVC riser casing extending to the ground surface. The well head will be completed flush to grade in an approximate 1-ft by 1-ft concrete well pad. Each well will be fitted with a lockable expansion plug.

2.3.3. Well development

The newly installed monitoring wells will be developed no sooner than 24 hours following installation. Well development will consist of alternately surging and pumping each well to remove the fine material which may have settled in the monitoring wells, to remove introduced drilling fluids, and to provide better hydraulic communication with the surrounding formation. A development goal where temperature, conductivity, and pH have stabilized and a turbidity of 50 Nephelometric Turbidity Units (NTUs) has been achieved will be established. If this goal cannot be achieved within a reasonable timeframe, the O'Brien & Gere Project Manager will be notified, and discussions will be implemented with NYSDEC to establish a mutually agreeable development volume.

Development water will be managed in accordance with Section 3.

2.4. Ground water sampling

The NYSDEC will be responsible for the collection of groundwater samples. Groundwater samples will be collected during two separate sampling events by NYSDEC personnel from a total of approximately 20 wells that includes a network of existing monitoring wells and monitoring wells installed as part of the off-site characterization. Groundwater samples will be collected using passive diffusion bags (PDBs). Prior to the start of both groundwater sampling events, water levels will be collected from the monitoring well network to prepare a groundwater contour map and evaluate groundwater flow patterns.

Following ground water sampling, the laboratory analytical reports and water level measurements will be forwarded to O'Brien & Gere for inclusion in the Pizza Hut Off-Site Site Characterization Report.

Ground water samples will be collected in accordance with the following procedures.

2.4.1. Procedures

Ground water samples will be collected using passive diffusion bags (PDBs) from 20 monitoring wells on two occasions as part of the Pizza Hut Off-Site Site Characterization. The PDB samplers will be 24-inches in length and 1.25-inches in diameter. The PDB samplers will hold approximately 220-mL of certified, laboratory-grade, analyte-free, deionized water. The positioning of the PDBs will be dependent on the ground water level in each well. In cases where the ground water level is within the screened interval, the PDBs will be positioned midway between the water level and the bottom of the well. In cases where the water level is above the top of the screened interval, the PDBs will be positioned at the midpoint of the screened interval.

Pre-sampling

Prior to initiation of the ground water sample collection, a complete set of ground water elevations will be recorded from the monitoring wells. An electronic water level probe will be used to measure the depth to water in each well. The depth to water will be measured to the nearest 0.01 foot from the surveyed points on the well casings. The depth to water measurements will be recorded in the field log book. In addition to the depth to water measurements, the condition of the well pad, the protective casings and locks, and the well head will also be recorded in the field log book.

Passive Diffusion Bag Sampler Installation

Step 1 - Don appropriate new pair of gloves.

Step 2 - Measure the depth to water.

Step 3 - Remove the appropriate passive diffusion bag sampler from the shipping container. Passive diffusion bag samplers will be purchased from a licensed commercial supplier.

Step 4 - Attach the deionized water-filled polyethylene bags to the line of the passive bag holder using the stainless-steel snap hooks.

Step 5 - Slowly lower the passive bag sampler down the well until the stainless-steel weight reaches the bottom of the well indicating that the sampler is properly positioned in the screened interval.

Step 6 - Secure the line extending above the top of the well riser pipe either to the steel casing or the locking cap.

Step 7 - Close and lock the well.

Step 8 - Record the date and time of placement of the passive bag sampler in the well in the field log book.

Step 9 - Allow an equilibration period of 14 days or more before retrieving the passive diffusion bag.

Passive-Diffusion Bag Sampler Retrieval and Sample Collection

Step 1 - After the equilibration period, unlock and open the well and slowly remove the passive diffusion bags from the monitoring well.

Step 2 - As each bag is retrieved from the stainless-steel snap hooks, dry with a clean paper towel. Cut a small hole in the sample-filled polyethylene bag using a decontaminated knife or decontaminated stainless-steel scissors. Pour water from the bag directly into appropriate laboratory sample containers.

Step 3 – Sample bottles for VOC analyses will be filled completely so that there is no headspace or bubbles. The VOC sample vials will be examined for proper filling by inverting the vials immediately after filling to check for the presence of headspace or bubbles. If headspace or bubbles are observed, the sample vial(s) will be discarded and additional sample(s) will be collected.

Step 4 - Complete the sample label and place sample container in a cooler containing ice.

2.4.2. Analyses

The ground water samples collected will be submitted to Mitkem Corporation to be analyzed for VOCs using USEPA Method 8260.

Associated QA/QC samples will be collected in accordance with the Quality Assurance Project Plan (QAPP) provided in Appendix B of the Pizza Hut Off-Site Site Characterization Work Plan.

2.5. Indoor air monitoring program

Depending upon the results of the Soil Gas Investigation (Section 2.2) and upon the NYSDEC Project Manager authorization, an indoor air monitoring program may be completed as part of the off-site characterization activities. If conducted, the indoor air monitoring program will be completed in accordance with the NYSDOH Indoor Air Sampling and Guidance document.

It is estimated that indoor air samples will be collected from 15 buildings as follows. Indoor air samples will be collected within the three

buildings formerly operated as dry cleaning establishments and within three buildings immediately near each of the three former dry cleaners. In addition, indoor air samples will be collected from three buildings near the former Pizza Hut property (2137 Seneca Street); however, indoor air samples are not anticipated to be collected within the former Pizza Hut building as it is currently unoccupied.

Prior to initiating the air sampling, the homeowners will be contacted through a telephone call and then through a ten-day written notice consistent with NYSDEC TAGM 4053. The NYSDEC Project Manager will contact the homeowners, discuss the sampling program, and schedule the sampling. The NYSDEC Project Manager will provide O'Brien & Gere with a copy of the correspondence and indoor air sampling schedule.

During the indoor air monitoring program, at a minimum one ambient sample will be collected per day. It is estimated that a total of 5 ambient air samples will be collected. The ambient air samples will be collected at the same time as the indoor air samples and from evenly spaced locations which are considered representative of outdoor air quality conditions for the entire sampling area. Quality assurance/quality control samples including duplicates and MS/MSD samples will also be collected during the indoor air monitoring program.

Prior to collecting the sub-slab and indoor air samples, a pre-sampling inspection will be conducted to evaluate the physical layout and conditions of the residential buildings, to identify conditions that may affect or interfere with the sampling, and to prepare the building for sampling. In addition, the pre-sampling inspection will include completion of an inventory of products that contain VOCs. Information related to the building survey and product inventory will be documented on the forms included in Exhibit B.

2.5.1. Sub-slab sampling

For each sample, an approximate one-quarter to one-half inch hole will be drilled in the concrete slab to a depth just beneath the slab and a one-eighth inch tube will be inserted into the bored hole. To prevent infiltration of ambient air and dilution of the samples, the holes will be sealed with 100% pure beeswax around the tubing. Similar to the procedure used for soil vapor survey collection method, the sample collection strings will be purged. After purging, the sample tubing will be capped, and the sample point will be allowed to equilibrate for a minimum of 24-hours prior to sample collection. After the 24-hour equilibration time, the sample tubing will be uncapped and connected to either a 1L or 6L stainless steel vacuum extracted canister to collect the samples. The vacuum extracted canisters will be equipped with vacuum gauges and flow control valves. Prior to sample collection, the vacuum gauge reading will be recorded in the field log book. The flow controller will be set to collect the samples over a minimum time period of 24-

hours. At the end of the sample draw, the vacuum gauge reading will be recorded in the field log book. The sample will be collected so that a vacuum is maintained in the canister.

2.5.2. Basement and first floor air sampling

Basement and first floor air samples will be collected concurrently with the sub-slab sampling described above. The air samples will be collected using either 3M-3500 Organic Vapor Passive Air Monitoring badges or vacuum extracted canisters.

If used, the vacuum extracted canisters will be equipped with vacuum gauges and flow control valves. Prior to sample collection, the vacuum gauge reading will be recorded in the field log book. Flow controllers will be calibrated to collect the sample over a 24-hour period. At the end of the sample draw, the vacuum gauge reading will be recorded in the field log book.

2.5.3. Ambient air samples

One ambient air sample will be collected per day concurrent with the sub-slab and indoor air sampling. It is assumed that 5 ambient samples will be collected. The ambient air samples will be collected using either a 1L or 6L stainless steel vacuum extracted canister. The vacuum extracted canisters will be equipped with vacuum gauges and flow control valves. Prior to sample collection, the vacuum gauge reading will be recorded in the field log book. Flow controllers will be calibrated to collect the sample over a 24-hour period to account for any daily activities that might influence VOC concentrations in ambient air. At the end of the sample draw, the vacuum gauge reading will be recorded in the field log book.

2.5.4. Analyses

The air samples collected using vacuum extracted canisters will be analyzed for VOCs by Columbia Analytical Services through subcontract to Mitkem Corporation using USEPA Method TO-15. The detection limits for each compound from samples collected using vacuum extracted canisters will be 0.25 $\mu g/m^3$ for trichloroethene and 1 $\mu g/m^3$ or less for the remaining analyzed compounds. Quality Assurance/Quality Control (QA/QC) samples associated with the soil vapor and indoor air sampling are specified in the Quality Assurance Project Plan (QAPP) provided in Appendix B of the RI Work Plan.

2.5.5. Data use

The sub-slab and indoor air data will be used to evaluate potential exposure levels of building occupants to VOCs identified during the soil gas investigation (Section 2.2) and ground water sampling program (Section 2.4).

2.6. Survey

Each of the newly-installed soil gas monitoring points and soil borings/monitoring wells will be surveyed for horizontal and vertical control and will be incorporated into the site base map. The survey will be conducted by a New York State licensed surveyor.

Horizontal positions will be tied into the New York State Plane Coordinate System. Horizontal accuracy will be 0.01-ft. Vertical elevations will be relative to mean sea level, 1929 General Adjustment. Monitoring wells will be surveyed to the nearest 0.01 feet at the top of the wells riser pipe (measuring point) and top of protective steel casing. Ground surface at each location will be surveyed to the nearest 0.1 feet.

2.7. Sample and field equipment handling

Sampling personnel will inspect the sample equipment to ensure that it is in working order and will decontaminate sampling equipment, as appropriate prior to use. Equipment or materials that are in short supply or are showing indication of wear will be noted and replaced as necessary.

Upon receipt of the sampling containers from the laboratory, inventory the containers to make sure appropriate containers were delivered, check if preservatives have been added, if necessary, and assess the general condition of containers.

Samples will be handled and standard chain of custody procedures will be applied according to procedures presented in the QAPP. Upon collection, samples will be placed in appropriate containers. Samples will be assigned a sample designation identifying sample location, date, and time. Labeled sample containers will be chilled to approximately 4°C, and transported to the analytical laboratory for analysis within 48 hours of sample collection.

For each sample collected, field notes will be completed by field personnel to document details of the sampling event. Photographs of the site taken during the remedial investigation will include date, and time.

A sample may be further labeled matrix spike (MS) or matrix spike duplicate (MSD) if the sample is to be used by the laboratory as a MS or MSD. Blind field duplicate samples will be labeled X-1, X-2, etc. Trip blank samples obtained from the laboratory will be dated and identified as a trip blank. The trip blank sample will accompany those samples collected on that particular date and submitted to the laboratory for VOC analysis. The field notes will identify the blind field duplicate samples as well as where they were obtained.

In addition to the sample identification, each sample container will be labeled with the following information:

- Site name;
- Date and time of sample collection;
- Analysis requested;
- Preservative(s); and
- Client name.

All information should also be entered in the field notes in waterproof ink. Sample container labels should be completed with ink containing no organic solvents. Specific details on chain-of-custody protocols and shipping requirements are provided in the QAPP.

2.8. Equipment documentation procedures

Drive rods used for installation of the soil gas points, and split spoon and/or direct-push samplers used for soil sampling during soil boring/monitoring well installations will be decontaminated after each use using a non-phosphate detergent wash followed by a potable water rinse. The decontamination water will be periodically changed during the drilling program. These decontamination fluids will be transferred to 55-gallon drums.

2.9. Quality assurance/quality control

Quality assurance/quality control issues associated with this project are addressed in the Quality Assurance Project Plan (QAPP) developed for this program. The QAPP is provided in Appendix B of the Pizza Hut Off-Site Site Characterization Work Plan.

2.10. Health and safety

Health and safety issues associated with this project are addressed in the Health and Safety Plan (HASP) developed for this program. The HASP

is provided in Appendix C of the Pizza Hut Off-Site Site Characterization Work Plan.

3. Handling of Investigation-Derived Wastes

3.1. General

The off-site characterization activities will produce investigation-derived wastes (IDW) which will require appropriate management. IDW may include the following:

- Drill cuttings;
- Ground water resulting from development of new monitoring wells;
- Decontamination fluids resulting from decontamination of the sampling equipment; and
- Personnel protective equipment (PPE) and associated refuse resulting from the execution of field activities.

The management of these materials will be in accordance with Section IV of Technical and Administrative Guidance Memorandum (TAGM) 4032 (NYSDEC, November 21, 1989). Specific IDW handling is discussed below.

3.1.1. Drill cuttings

Unless there are obvious signs of impacts, such as staining or strong odors, or presence of free-product, drill cuttings generated during the installation of soil borings and monitoring wells will be placed back into the boreholes from which they were generated. If obvious impacts are observed, those impacted drill cuttings will be temporarily placed in 55-gallon drums. If drill cuttings are drummed, drummed drill cuttings will be transported to the property located at 2137 Seneca Street and temporarily staged within a small steel storage container until the drum contents are characterized and can be properly disposed.

3.1.2. Ground water

Unless there are obvious signs of impacts, such as strong odors or presence of free-product, ground water produced during development will be discharged to the ground surface near the well from which it was generated. Caution will be used to prevent discharged ground water from entering any storm or sanitary sewer. If obvious impacts are observed, those ground waters will be temporarily placed in 55-gallon drums as the water is generated. The drummed ground water will be transported to the property located at 2137 Seneca Street and temporarily staged within a

small steel storage container until the drum contents are characterized and can be properly disposed.

3.1.3. Decontamination fluids

Decontamination of sampling equipment will take place at the work location, with the decontamination fluids being in 5-gallon buckets. Decontamination fluids produced during the decontamination of sampling equipment will be discharged to the ground surface. Caution will be used to prevent discharged fluids from entering any storm or sanitary sewer.

3.1.4. PPE and general refuse

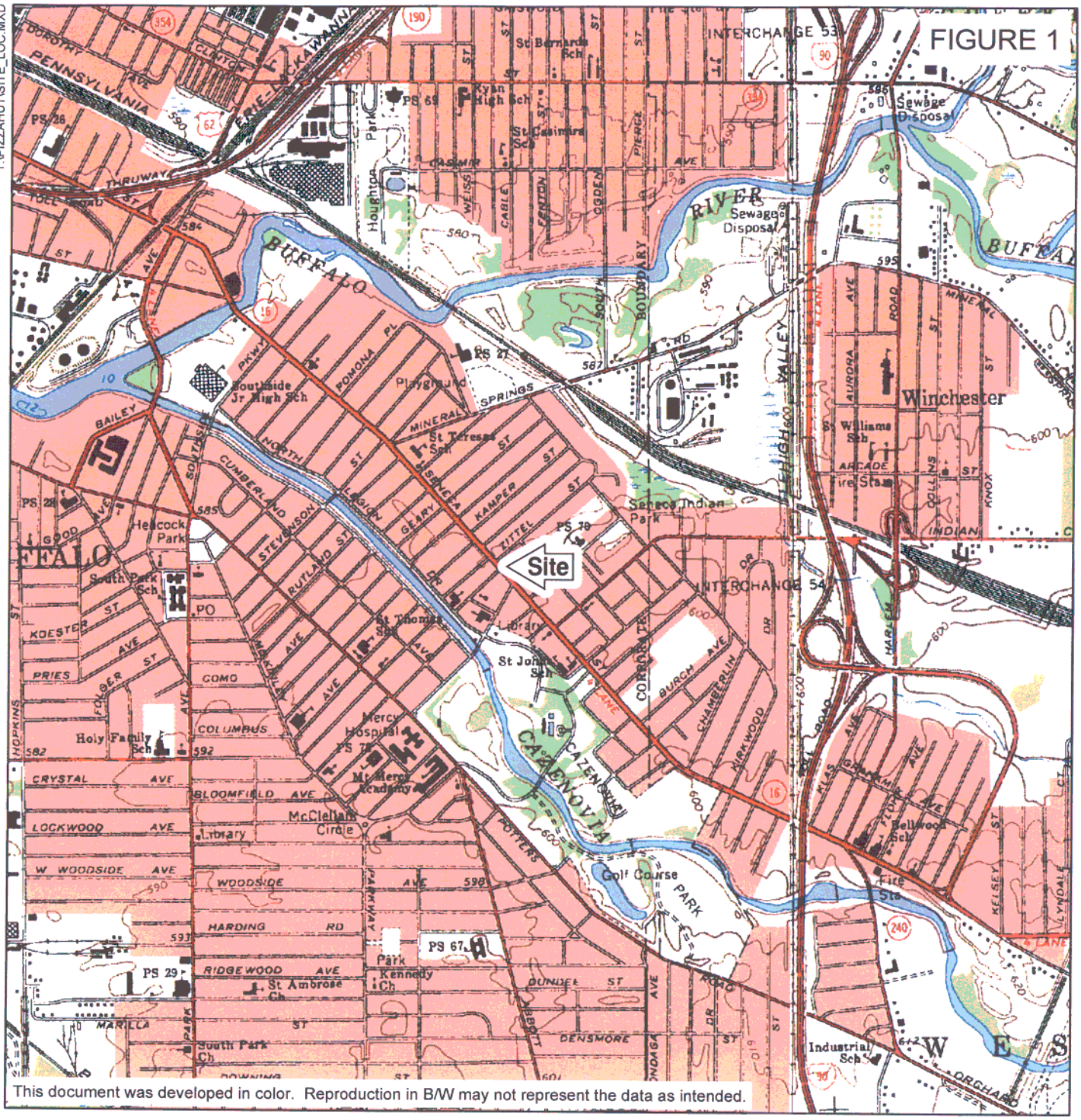
Used PPE and other general refuse will be placed in trash bags and disposed of in appropriate waste receptacles.

3.1.5. Waste characterization analyses

If it is necessary to containerize wastes generated during the field activities, such wastes will be appropriately characterized and, after receiving the necessary approvals, will be transported for treatment and/or disposal at a permitted facility. If necessary, characterization will include Toxicity Characteristic Leaching Procedure (TCLP) VOCs, reactivity, corrosivity, and flashpoint. In addition, paint filter analysis will be conducted on the solid samples.

T:\PIZZAHUT\SITE_LOC.MXD

FIGURE 1



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10/28/05

ADAPTED FROM: BUFFALO SE USGS QUADRANGLE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PIZZA HUT OFF-SITE SITE CHARACTERIZATION
CITY OF BUFFALO, NEW YORK

QUADRANGLE LOCATION

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

10653/37211
10/28/05

1:24,000

O'BRIEN & GERE ENGINEERS, INC.

T:\10653\37211\PROPOSED_SG_LOCS.MXD

FIGURE 2

Legend

Active Soil Gas Points

NYSDEC

PIZZA HUT OFF-SITE SITE
CHARACTERIZATION
2137 SENECA STREET
BUFFALO, NEW YORK

PROPOSED SOIL GAS SAMPLE LOCATIONS

0 50 100 200
Feet

OCTOBER 2005
10653.37211

O'BRIEN & GERE ENGINEERS, INC.

This document was developed in color. Reproduction in B/W may not represent the data as intended.

10/28/05

T:\10653_NYSDEC\PIZZA HUT\PROP_MICRO_MW.MXD

This document was developed in color. Reproduction in B/W may not represent the data as intended.

PLOT DATE: 08/15/05 DIV. 71 DJC

FIGURE 3

LEGEND

PROPOSED MICRO-WELLS

NYSDEC

PIZZA HUT OFF-SITE SITE CHARACTERIZATION
2137 SENECA STREET
BUFFALO, NEW YORK

PROPOSED SOIL BORING/ MONITORING WELL LOCATIONS

0 50 100 200
Feet

SEPTEMBER 2005
10653.37211

O'BRIEN & GERE ENGINEERS, INC.

Exhibit A

Soil Boring Log

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING
Client: Proj. Loc: File No.:	Sampler: Hammer: Fall:	Page 1 of Location: Start Date: End Date:
Boring Company: Foreman: OBG Geologist:		Screen = \ Grout Riser ▒ Sand Pack ▓ Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	UV

Exhibit B

Indoor Air Quality Building Survey

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

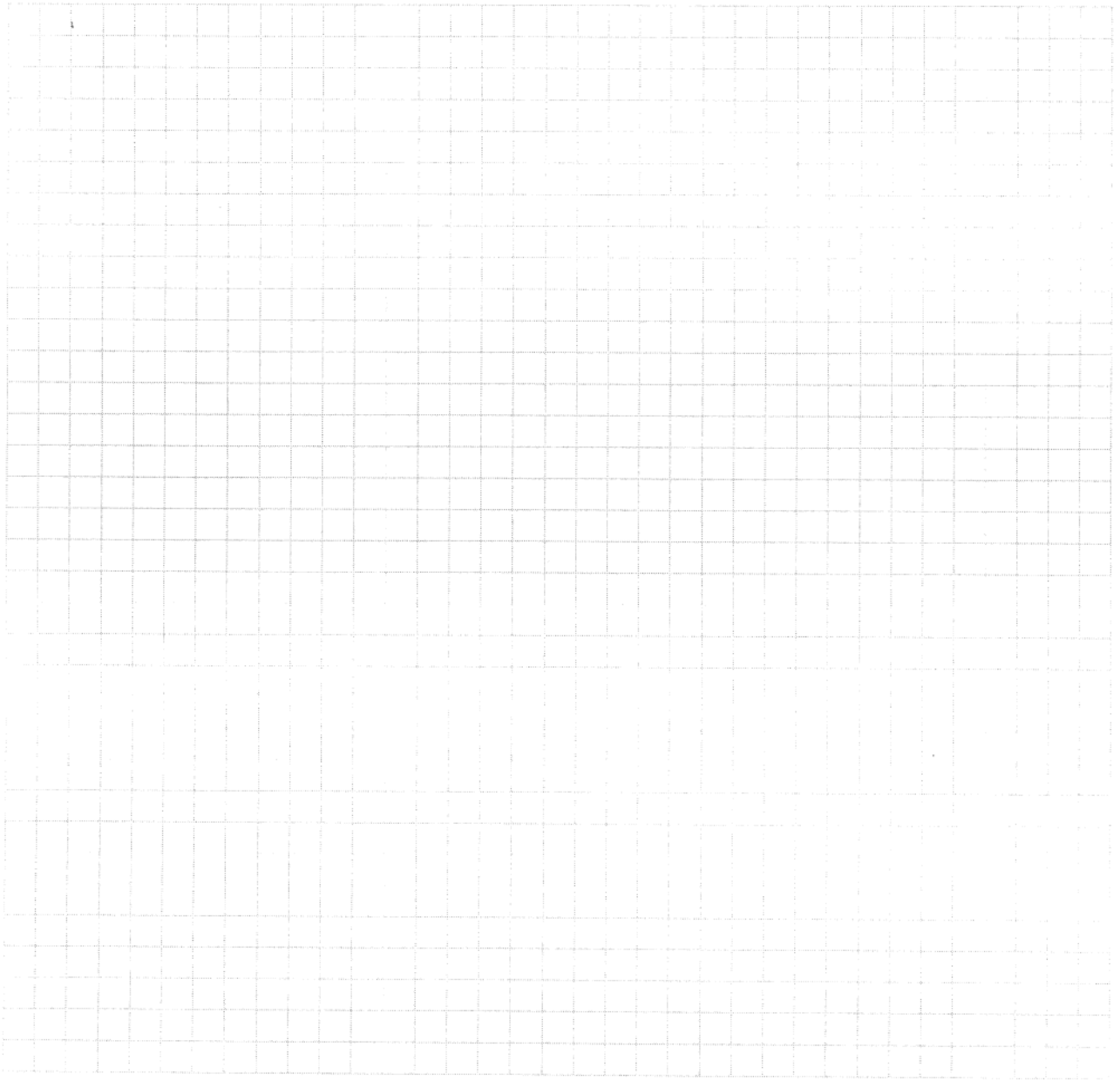
Type of Building: (Circle appropriate response)

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

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.



Appendix B

Quality Assurance Project Plan

Quality Assurance Project Plan

The Quality Assurance Project Plan provided below presents the seven elements of site-specific information required by DER-10 *Technical Guidance for Site Investigation and Remediation* (DER-10 QAPP, NYSDEC 2002). A *Generic QAPP* prepared for Standby Contract #D004090 (Standby Contract QAPP, O'Brien & Gere 2005) is attached. The Standby Contract QAPP provides supplemental and more detailed laboratory information, including corrective action tables for laboratory analyses associated with investigation activities. The combination of the DER-10 QAPP and the Standby Contract QAPP address data quality assurance and management of those data associated with the Pizza Hut Off-Site Site Characterization.

1. **Project scope and goals**:

   How project relates to overall site investigation or remediation strategy:

   The principal data quality objectives (DQOs) and project objectives of this investigation include the following:

   - Evaluate the nature and extent of constituents in the ground water, soil, and air media at off-site locations relative to the Pizza Hut site.
   - Evaluate environmental data, including comparison to New York State screening values:
     - Water data will be compared to applicable screening values provided in *TOGS 1.1.1* (NYSDEC 1998).
     - Soil data will be compared to applicable screening values provided in *TAGM 4046* (NYSDEC 1994).
     - Air data will be compared to applicable screening values specified by the New York State Department of Health and the USEPA's Office of Solid Waste and Emergency Response (OSWER) *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Ground water to Soils.*
   - Provide documentation of laboratory data that will allow for complete data validation. Data validation results will be reported in a data usability summary report (DUSR) and incorporate results into data summaries.
   - Develop a Site Conceptual Model describing the occurrence of constituent source(s) and potential migration pathways.
   - Develop a qualitative exposure pathway analysis describing potential human contact with constituents identified during the Pizza Hut Off-Site Site Characterization.

2. **Project organization**: Personnel assigned to the project are listed in Table 1.

3. **Sampling procedures and equipment decontamination procedures** are provided in the Field Activities Plan (FAP).

4. **Sampling locations** are provided on figures in the FAP.

5. The **Analytical Methods/Quality Assurance Summary** table is presented as Table 2. The environmental samples will be submitted to Mitkem Corporation for analyses as listed in Table 2. NYSDEC Analytical Services Protocol (ASP) Exhibit E quality control requirements will be used to perform the sample analysis, including the non-contract laboratory program (CLP) analyses, utilizing the laboratory interpretation of the requirements as they apply to USEPA Methods.

On-site analysis of air samples will be conducted by Buck Environmental Laboratories, Inc. in accordance with their attached Standard Operating Procedure (SOP Number MS-3b (field)).

6. **Site specific sampling methods, sample storage in the field and sample handling time requirements** are presented in the FAP.

7. **Provision of laboratory data in electronic format** is discussed in the Standby Contract QAPP (O'Brien & Gere 2005).

Table 1. Project organization & responsibilities		
New York State Department of Environmental Conservation (NYSDEC)		
Project Manager	Jason Pelton	• Overall responsibility for all phases of Work Assignment #D004090-29.
O'Brien & Gere Engineers, Inc. (Engineers)		
Project Officer	James R. Heckathorne, P.E.	• Responsible for overall corporate management of Work Assignment #D004090-29. • Provide for the allocation of staff and other resources required to complete the project within the specified schedule and budget. • Verify that technical, financial, and scheduling objectives are achieved successfully. • Sing final reports submitted to NYSDEC.
Project Manager	David J. Carnevale	• Responsible for implementation and completion of each task identified in the Field Activities Plan (FAP). • Manage technical and administrative aspects of the project and function as the principle contact to the NYSDEC Project Manager. • Define project objectives and schedule. • Apply technical and corporate resources. • Develop and meet ongoing project staffing requirements. • Review work performed on each task to verify quality, responsiveness, and timeliness. • Review overall task performance with respect to scope and authorizations. • Approve reports prior to submission to NYSDEC. • Represent the project team at meetings.
Technical Advisor	Guy Swenson	• Assist O'Brien & Gere Project Manager in defining project objectives. • Assist in preparation and review of reports prior to submission to NYSDEC. • Report to the O'Brien & Gere Project Officer.
Quality Assurance (QA) Officer	Karen Storne	• Review project plans and revisions to verify that QA is maintained. • Responsible for performance and system audits, if necessary. • Report to the O'Brien & Gere Project Manager.

Table 1. Project organization & responsibilities		
Field Coordinator	To Be Determined	• Oversee field and related activities as described in the FAP. • Responsible for leading, coordinating, and supervising day-to-day field activities of the sampling personnel. • Coordinate with O'Brien & Gere Project Manager on technical issues. • Coordinate with laboratory prior to collection and shipment of samples. • Develop and implement field-related sampling plans and schedule. • Supervise or act as the field sample custodian. • Implement quality control (QC) of technical data including field measurements. • Implement QC of project-specific chain of custody documentation. • Adhere to work schedules. • Authorize and approve text and graphics required for field efforts. • Coordinate and oversee technical efforts of subcontractors. • Identify and resolve problems at the field team level in consultation with the O'Brien & Gere Project Manager. • Implement and document corrective action procedures and provide communication between the sampling personnel and upper management.
Sampling personnel	To be determined	• Responsible for documentation of proper sample collection protocols, sample collection, field measurements, equipment decontamination, and chain of custody documentation. • Report to O'Brien & Gere Field Coordinator.
Data management	To Be Determined	• Responsible for assisting with the development of data collection documentation procedures (*e.g.* chain of custody) to support data management needs. • Responsible for data management activities including execution of electronic data deliverables (EDD) to develop a project database and verification of data QC. • Coordinate with laboratory to resolve data quality issues, as necessary. • Development of a geographical information system (GIS) database. • Assist in the coordination of QA/QC efforts between Engineers and the laboratory.
Nancy Potak		
Data Quality Reviewer	Nancy Potak	• Validate data. • Prepare a Data Usability Summary Report (DUSR) describing overall data quality and usability for intended uses.

Table 1. Project organization & responsibilities		
Mitkem Corporation		
Project Supervisor	To Be Determined	• The project supervisor is the point of contact between Engineers and O'Brien & Gere Laboratories.
Laboratory QA Coordinator(s)	To Be Determined	• Responsible for laboratory QA/QC activities associated with the project. • Verify that analyses are conducted within the appropriate holding times. • Verify that laboratory custody procedures are followed. • Monitor daily precision and accuracy records. • Maintain detailed copies of procedures. • Reschedule analyses based upon unacceptable data accuracy or precision • Identify and implement corrective actions necessary to maintain QA standards. • Conduct initial validations and assessments of analytical results and report the findings directly to the O'Brien & Gere Laboratories Project Supervisor. • Perform final QC of laboratory EDD prior to submittal to Engineers. • Approve final laboratory reports prior to delivery to Engineers.
Laboratory Sample Custodian	To Be Determined	• Verify proper sample entry and sample handling procedures by laboratory personnel. • Set up sampling coolers and containers. • Receive and inspect incoming sample containers. • Sign appropriate documentation. • Verify accuracy of chain-of-custody forms. • Notify Laboratory QC Coordinator of sample receipt and inspection. • Assign each sample a unique identification number and enter each into the sample receiving log. • Control and monitor access and storage of samples.

Table 2. *Analytical methods, sample containers, preservation, holding times, and QC sample frequencies*

Parameter (method)	Instrument Or Technique	Matrix	Sample containers	Preservation	Holding times	Number of samples	QC sample frequency			
							Field duplicate	Trip Blank	MS/MSD or Duplicate	Equipment Blank
VOCs (USEPA Method 8260B)[1]	GC/MS	Aqueous	3 40-milliliter glass vials with Teflon® lined septum caps	4°C, HCl to pH<2	10 days VTSR	See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	1 per cooler containing samples for VOCs	One MS/MSD per 20 samples or one per matrix (for less than 20 samples)	Per sampling event, one per 20 samples, as required.
VOCs (USEPA Method TO15)[2]	GC/MS	Air	Canisters as prepared in Method TO-15.	None	14 days from collection	See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	NA	NA	Canisters Blank test met and sampling system certified as per Method TO-15 per the QAPP.
VOCs (USEPA Method 8260B)[1]	GC/MS	Solid	4-ounce glass container with Teflon® lined septum caps	4°C, Fill with minimal headspace without compaction	10 days VTSR	See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	NA	One MS/MSD per 20 samples or one per matrix (for less than 20 samples)	Per sampling event, one per 20 samples, as required.

Note:
* Indicates that the Work Plan and FAP are to be consulted for samples that will be collected for each specific site.
VTSR indicates verified time of sample receipt at the laboratory
MS/MSD indicates matrix spike/matrix spike duplicate sample.
VOCs indicates volatile organic compounds.
NA indicates not applicable.
GC/MS indicates Gas chromatograph/mass spectrometer
GC indicates gas chromatography

References:
1- New York State Department of Conservation 2000. *Analytical Services Protocol (ASP),* June 2000 Revision. Albany, NY.
2- United States Environmental Protection Agency. 1999b. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition Compendium Method TO-15 Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS).* Cincinnati, Ohio

Source: O'Brien & Gere Engineers, Inc.

BUCK ENVIRONMENTAL LABORATORIES STANDARD OPERATING PROCEDURE

TOPIC: GC/MS VOLATILES IN AIR BY FIELD SCREENING

SOP NUMBER MS-3b (field) DATE 09-26-05 REV 5.0
APPROVED

I. PURPOSE

This method is a proprietary method for analysis of soil gas samples that has been adapted from EPA SW-846 method 8260B. The method utilizes gas chromatography/mass spectrometry for the determination of the analytes below. With injections of 1.0 ml of gaseous sample, IDL's and PQL's will be approximately 20 and 100 mg/m^3 (respectively) for the standard TCL analytes (except for ketones and alcohols and gases). Ketones, alcohols, and gases will have approximately 5-10 times higher IDL's and PQL's.

A variation of this method involves using the GC/MS in SIM mode. The SIM protocol allows PQLs of approximately 200 ppbv, but must be used with a shorter analyte list (typically 17 compounds maximum) and TICs are not possible in SIM mode.

Scan compound list:

Acetone
Benzene
2-Butanone (MEK)
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethane
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
2-Hexanone
Methylene Chloride
4-Methyl-2-Pentanone (MIBK)
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl Chloride
m,p-Xylene
o-Xylene

SIM compound list:

Vinyl chloride
1,1-Dichloroethene
trans-1,2-Dichloroethene
MTBE
1,1-Dichlorroethane
Toluene
1,1,2-Trichloroethane
m,p-Xylene
o-Xylene
cis-1,2-Dichhloroethene
1,1,1-Trichloroethane
Benzene
1,2-Dichloroethane
Trichloroethene
Tetrachloroethene
Ethylbenzene
1,1,2,2-Tetrachloroethane

II. PERSONNEL RESPONSIBILITIES

Because data will be generated, reviewed, and released in the field by the analyst without benefit of independent laboratory QA/QC review, the analyst must be an experienced chemist with at least 3 years of ELAP experience. It is recommended that the analyst maintain periodic communications with the Laboratory QA/QC Officer and Laboratory Director during field operations.

III. PROCEDURE

This method is utilized to detect and quantify gas-phase analytes from the list above in a soil gas or other air samples.

Material & Reagents

a. Microsyringes - Gastight
   10 ul, 25 ul, 100 ul, 500 ul, 1000 ul, & 5000 ul.

b. Tedlar bags – Bags of 1-4 l size are suitable for transporting the sample from the field to the field laboratory. Tedlar bags will be equipped with a rotational valve and (optionally) a syringe septum.

c. Standard vials - two sizes: 2 ml. amber screw top and 6 ml. clear screw top.

d. Pipettes - three sizes: 1ml., 8 ml., and 9 ml.

e. Class A volumetric flasks – four sizes: 1 ml., 10 ml., 50 ml. 100 ml.

f. Purge and trap sampling system – No purge and trap apparatus is used in this method.

g. GC/MS system - The GC/MS system is comprised of a gas chromatograph interfaced with a mass spectrometer both of which are controlled by a computer data system. Either of two GC/MS systems may be used for analytical work under this method. The first system consists of a Hewlett Packard 5890 GC which provides temperature programming and on-column injection. The column is manufactured by J&W, model DB-624. The mass spectrometer is a Hewlett Packard 5971, which is capable of scanning from 30 to 300 a.m.u. every three seconds or less, using seventy volts (nominal) electron energy in the electron impact mode. This mass spectrometer is capable of meeting the required tuning compound criteria.

The second system consists of a Hewlett Packard 5890 GC with temperature programming, electronic pressure control, and on-column injection. A twenty meter capillary column is used with a 0.18 mm. ID, 1.0 DF. The column is manufactured by J&W, model DB-624. The mass spectrometer is a Hewlett Packard 5972 which is capable of scanning from 30 to 300 a.m.u. every three seconds or less, using seventy volts (nominal) electron energy in the electron impact mode. This mass spectrometer is capable of meeting the required tuning compound criteria.

The computer data system used for field screening is a Hewlett Packard Vectra PC with HP Chem-Station software. The data system provides for

storage of all mass spectral data obtained during analysis on a machine-readable media. The software system used for data analysis allows for the searching of ions of a specified mass and for the plotting of ion abundance versus time or scan number. .

h. Reagent water – Carry water (at least 8 liters) obtained from a Barnstead Nanopure water purification system in the Laboratory.

i. Wash water – Carry water (at least 30 gallons) of tap water for general glassware washing.

j. Methanol - HPLC grade or better.

k. Methanol - purge and trap grade.

l. Stock standard solutions - Prepared standard solutions are purchased from Restek (and other suppliers) and come with a certificate of analysis. Internal standard, surrogates, and matrix spike are also purchased and come with a certificate of analysis.

m. Secondary dilution standards - Working standards are prepared from the stock standard solutions.

n. Internal standard/surrogate solution - A solution containing Fluorobenzene (IS1), Chlorobenzene-d5 (IS2), and 1,4-Dichlorobenzene-d4 (IS3) is obtained at 2500 mg/l from the Restek Corporation ("8260A internal standard mix"). A solution containing Dibromofluorometrhane (surr1), 1,2-Dichloroethane-d4 (surr2), Toluene-d8 (surr3), and 4-Bromofluorobenzene (sur4) is obtained from Restek Corporation at 2500 mg/l ("8260A surrogate mix").

o. Internal standard and surrogate spiking solution - This solution, 1 ul of 250 mg/l, is introduced into all samples and standards by syringe injection into the heated inlet ahead of the Valco gas sampling valve.

p. Tuning standard - a standard solution of bromofluorobenzene prepared in purge and trap grade methanol at a concentration of 50 ug/ml.

Sample Collection, Preparation, Preservation, and Storage

a. The sample is obtained by filling a Tedlar sample bag. A minimum of 1 liter of sample is collected to facilitate repeat analysis or dilution if necessary. No preservation is used, but the sample must be processed within one hour of collection or held at <4°C.

Method

a. The GC/MS operating conditions are as follows:
   Electron energy - 70 volts (nominal)
   Scan Range - 30 - 300 a.m.u.
   Scan Time - at least five scans per peak, not exceeding three seconds per scan.

b. Vacuum pump, diffusion pump, and GC oven must be operated at least 3 hours prior to analysis to equilibrate system. Instrument tuning is conducted prior to the analysis of the tuning criteria compound. The tuning compound perfluorotributylamine (PFTBA) is utilized to adjust ion ratios, calibrate mass axis and adjust peak width.

c. The instrument performance evaluation compound bromofluorobenzene (BFB) is then directly injected in the amount of fifty nanograms onto the column and analyzed. The resulting mass spectrum is then checked against the specified tuning criteria (see Table 1). If the spectrum does not meet the required tuning criteria, the system is checked for malfunctions and retuned. The tuning compound is then reanalyzed. If the spectrum does meet the tuning criteria, then the total ion chromatogram is inspected for quality of chromatography and any extraneous peaks.

d. An initial calibration is then analyzed consisting of at least three points. The calibration standards are prepared from secondary working standards at gaseous concentrations of 5, 20, and 50 ppmv. Selected analytes (e.g. gases, ketones, alcohols) may be calibrated at 2-5 times the normal concentration. For SIM acquisition mode, the calibration is at 0.2, 0.5 and 2.0 ppmv.

e. The analysis is continued with a temperature program run by the gas chromatograph. The compounds are separated by retention time and introduced into the mass spectrometer. The mass spectrometer is used to identify the compounds and provide areas for identification ions for each compound. These areas are used to calculate the relative response factor (RRF) for each compound. An average relative response factor is determined for each compound using each calibration standard value. The percent relative standard deviation (%RSD) of the response factors for each compound is then calculated (See Calculation C). The criteria for acceptance of the initial calibration is that RRF's must be less than 30% RSD. If RSD criteria cannot be met, the initial calibration must be repeated.

f. If the initial calibration has been previously analyzed, a continuing calibration check standard is used to evaluate the accuracy of the initial calibration. The standard is analyzed in the same manner as the initial calibration standards. Upon completion of the temperature program, the relative response factors for each compound are calculated and then compared to the average relative response factors of the initial calibration. The % difference must be less than 35% for acceptance of the continuing calibration. If RSD criteria cannot be met, the initial calibration must be repeated.

g. Either an initial calibration or a continuing calibration must be performed at least once each working day.

h. Upon successful completion of instrument calibration, a method blank is analyzed prior to any sample analysis to demonstrate that the system is free of contamination. The method blank is analyzed under the same conditions which will be used for sample analysis.

Identification And Quantitation

a. The target compounds of this method are identified by retention time and mass ion criteria. When the compounds are identified, they are quantified using the internal standard method.

b. The internal standard responses and retention times for all data must be evaluated during or immediately after acquisition. If any of the internal standard retention times shift by more than thirty seconds from the most recent daily calibration standard, the analysis is not valid and the analytical

system needs to be inspected for malfunctions and adjusted if deemed necessary.

c. The integrated areas for the quantitation ions of the internal standards in the samples must not change by more than a factor of two (-50% to + 100%) as compared to the daily calibration standard responses. If this results, the analytical system should be inspected for malfunctions and adjusted if deemed necessary. If no adjustments are made, analysis may continue. If adjustments are performed, it must be demonstrated that the system is operating properly through the analysis of a standard, which meets the internal standard requirements.

d. The concentration of all target compounds is calculated using the relative response factor from the daily calibration standard. If any compound's concentration is greater then the highest level of the calibration range, a dilution of the sample is required.

IV. QUALITY CONTROL

a. At the start of any analytical sequence, an injection of fifty nanograms of bromofluorobenzene must be performed resulting in a solitary peak with minimal tailing. An average spectrum across the peak (with background correction) must meet the criteria listed in Table 1. In the event that tuning criteria are not met, the instrument must be re-tuned and bromofluorobenzene re-injected until an acceptable spectrum is obtained.

b. An initial calibration is required before any further analysis. After the calibration has been analyzed, the percent relative standard deviation is calculated for every target compound. The RSD must be less than or equal to 30% for all target analytes. If RSD criteria cannot be met, the initial calibration must be repeated. Under field conditions, the client's Project QA/QC Officer may waive calibrations not meeting RSD requirements for a specific analyte providing the laboratory report or narrative fully annotates the non-calibrated analyte.

c. An initial calibration report is generated showing the data files and dates for each point of the calibration along with all response factors, percent deviation for the response factors and relative response time for all compounds. This report is then filed in the appropriate calibration log book.

d. When a continuing calibration standard is utilized, the following criteria must be met. The calibration check compounds must have a percent difference of less than or equal to 35% in comparison to the average relative response factors from the initial calibration. Upon a successful continuing calibration, a report is generated showing the data file, date and related initial calibration information. The average response factor from the initial calibration, the response factor from the continuing calibration, and the percent difference are also shown. This report is also filed in the appropriate calibration log book. If RSD criteria cannot be met, the initial calibration must be repeated. Under field conditions, the client's Project QA/QC Officer may waive calibrations not meeting RSD requirements for a specific analyte providing the laboratory report or narrative fully annotates the non-calibrated analyte.

e. Following a successful demonstration of calibration and prior to any sample analysis, a method blank must be performed. This blank must be analyzed in the same manner as the samples to follow and must be free of contamination which would interfere in the determination of any analyte. The contamination must not be greater than the method detection limit for any compound. Upon the successful completion of a method blank, a report is generated showing the data file, date and detection limits for all compounds. This report is filed in the method blank log book.

f. All samples, standards, and blanks are spiked with internal standard and surrogates by injection of 250 ng into the heated inlet downstream from the Valco sampling valve to demonstrate successful transfer of analytes from matrix to instrument. All internal standard recoveries must be within -50% to +100% when compared to the daily calibration standard. The calculated surrogate recovery must fall within the limits expressed in Table 2. In the event that either the internal or surrogates fail these criteria, the following steps should be taken:

i. check instrument performance.
ii. check calculations for accuracy.
iii. check internal standard and surrogate spiking mix for signs of contamination or degradation.

If the above steps fail to produce an explanation, the sample should be reanalyzed. If the reanalysis is successful, then the reanalysis is reported. If the reanalysis again fails the same criteria, the sample matrix is assumed to be interfering and the first set of data is reported with a notation that the sample was reanalyzed and similar results were obtained.

g. A mid level standard and sample duplicate are analyzed at the frequency of once every twenty samples. The sample chosen for duplicate analysis should have measurable target analytes (if possible) and the two measurements should agree within the limits given in Table 3. In the event that duplicate acceptance criteria are not met, the analysis may proceed, but the laboratory report or narrative should note the lack of precision.

h. All analytes must be identified by an analyst competent in the interpretation of mass spectra. The identification must be performed by the comparison of the sample spectrum to a reference spectrum created from a standard of the compound. In order to identify the compound, two criteria must be met:

i. The component in the sample must elute within +/- 0.06 relative retention time (RRT) units of the RRT in the standard. If there are interfering compounds which coelute with the analyte preventing an accurate retention time, an extracted ion profile should be utilized to obtain the proper RRT.

ii. All ions which are present in the standard spectrum with an abundance greater than ten percent normalized to the most abundant ion, must be present in the sample spectrum. Any ions which are present in the sample spectrum but not present in the standard spectrum must be considered and accounted for when comparing the spectrum. The intensities of the common ions must agree within +/- twenty percent between the sample and standard spectra.

If the above criteria cannot be met, the compound may still be reported if the technical judgment of the mass spectral interpretation specialist is that the identification is correct.

Note: Because no purge and trap apparatus and no sample transfer line is used in this method, there are no minimum RRF requirements under this protocol as are typically found in VOC analytical methods such as EPA 8260B or ASP 95-1.

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.

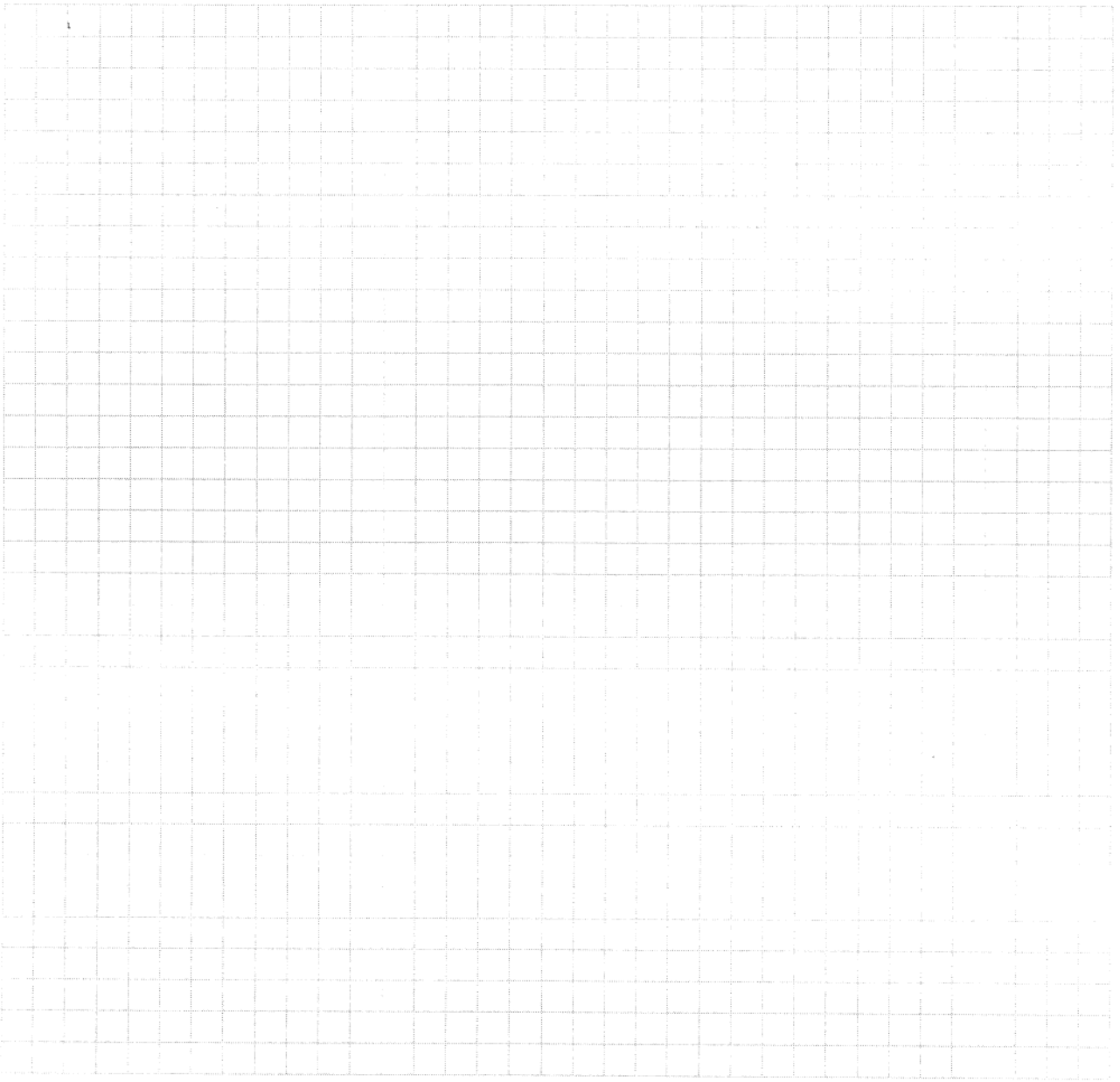
Basement:

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.