April 12, 2002

Ref: 06392.00025

Mr. Joseph White
Environmental Engineer II
NYS Dept. of Environmental Conservation
Bureau of Hazardous Site Control
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, New York 12233-7014

**Re: Former Far Rockaway MGP Site**
**NYSDEC Site Number 2-41-032**

Dear Mr. White:

Enclosed please find four (4) electronic copies and one (1) hardcopy of the Final Preliminary Site Assessment Work Plan prepared for the referenced site by Vanasse Hangen Brustlin, Inc.

Please do not hesitate to contact Ted Leissing with any questions or comments.

Very truly yours,

***VANASSE HANGEN BRUSTLIN, INC.***

Christopher B. Poole, P.G.
Project Manager

Enclosure

CC: Director, NYSDEC-Region 2 – (One Report)
Director, NYSDOH-BEEI – (Two Reports & One CD)
T. Leissing, KeySpan – (Two Reports & One CD)
T. Campbell, KeySpan – (One Report)
L. Liebs, KeySpan – (One CD)
F. Murphy, KeySpan – (One CD)
S. Ostrow, O&P – (One CD)
D. Elkind, DSM&O – (One Report)
J. Bastedo, VHB – (One Report & One CD)
Project File – (One Report & One CD)

**Preliminary Site Assessment Work Plan,**
**Order on Consent D1-0001-99-05**
**NYSDEC Site Number 2-41-032**

# *Former Far Rockaway MGP Site*

Far Rockaway,
Queens County,
New York


Prepared for **KeySpan Corporation**
**One MetroTech Center**
**Brooklyn, New York 11201-3850**

Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**
**Environmental Risk Management**
**54 Tuttle Place**
**Middletown, Connecticut 06457**



**April 2002**

# Table of Contents

# List of Figures



# List of Tables



# List of Appendices

# 1 Introduction

This work plan is being prepared for KeySpan Corporation (KeySpan) by Vanasse Hangen Brustlin, Inc. (VHB) to perform a Preliminary Site Assessment (PSA) at the former Far Rockaway Manufactured Gas Plant (MGP) Site, hereinafter referred to as the "Site".

KeySpan executed an Order on Consent (OC), Index # D1-0001-99-05 effective September 30, 1999, with the New York State Department of Environmental Conservation (NYSDEC) for the development and implementation of a PSA for the Site. The Site is a former MGP facility that has since been redeveloped.

This work plan is intended to meet the requirements of the OC, Paragraph II, Subparagraph B.1, governing requirements of a PSA Work Plan. The purpose of this document is to provide NYSDEC with methods and procedures to be implemented in performing the PSA. Specifically, this work plan shall include:

- Objective;
- Location, history, and description of the Site;
- Major tasks including record review, field investigation, and report;
- Chronological description of PSA activities including a schedule;
- A generic Quality Assurance Project Plan (QAPP) for sampling and analytical procedures; and
- A site-specific and generic Health and Safety Plan (HASP).

# 2
# Objective

The objective of this document is to define the specific field activities to be conducted in the performance of a PSA for the Site. The end result from execution of this work plan is to provide NYSDEC with a complete PSA report. The PSA report will enable NYSDEC to characterize MGP-related chemical constituents, which may be present at the Site, and determine whether additional investigation and possible remediation is necessary.

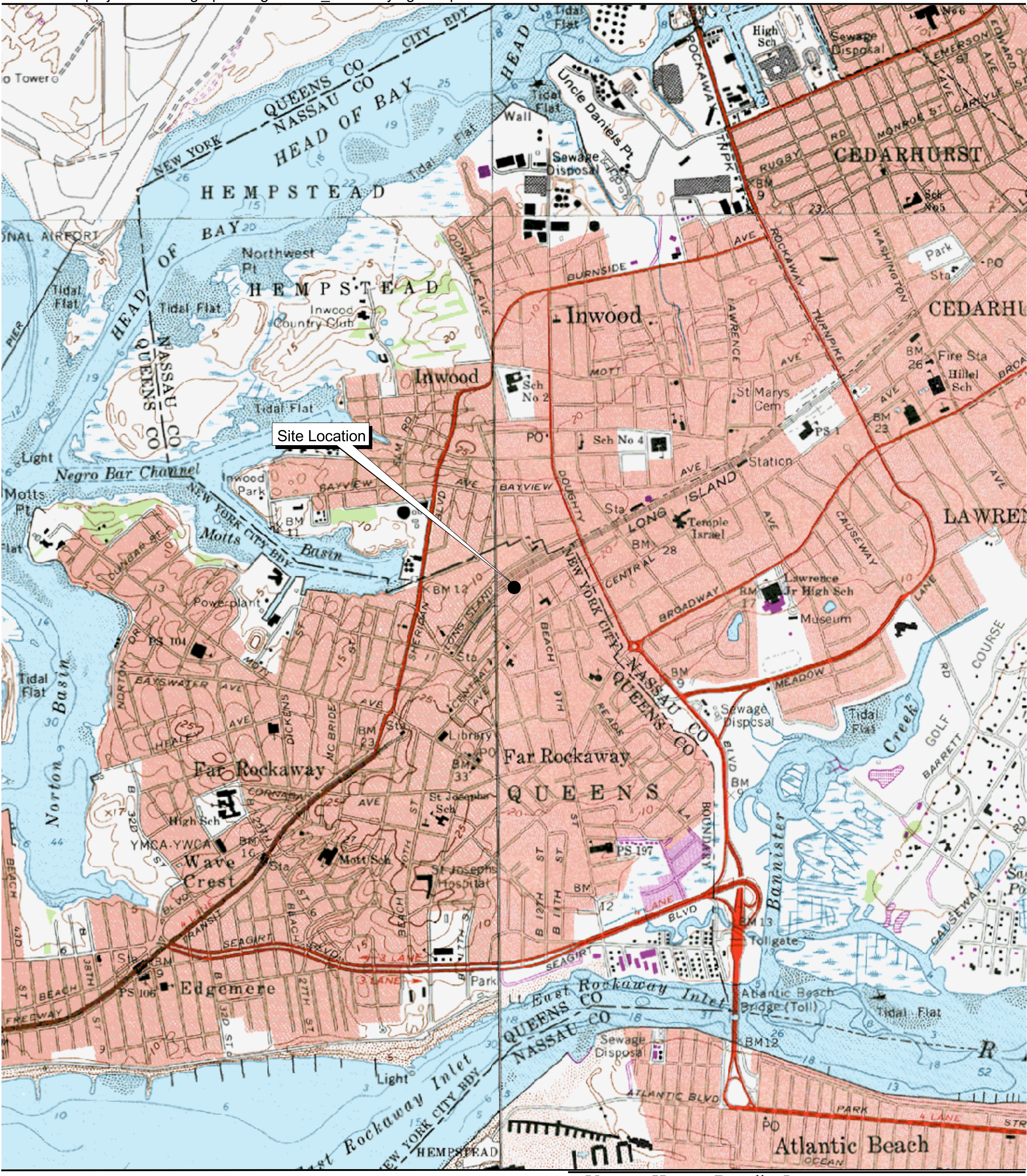
# 3

# Site Location, Description, and History

The Site is located in a densely populated, mixed commercial/residential area of Far Rockaway, Queens County, New York (lat: 40° 36′ 33″; long: -73° 45′ 2″). Refer to Figure 1 for the site location map. The Site elevation is approximately 25 feet MSL. It is located near the intersection of Brunswick Avenue and 12th Street, about 1,000 feet east of Mott Basin. The topography of the Site is flat. The Site is now used for import/export warehousing and an office.

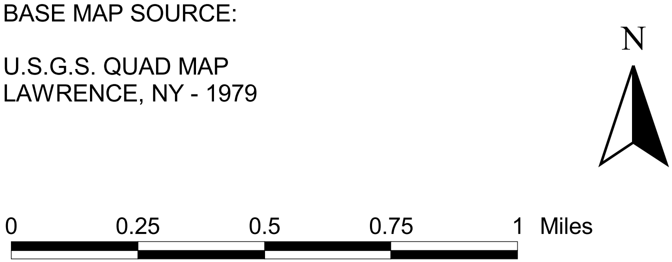
According to records in *Brown's Directory*, a "gas works" operated in Far Rockaway between 1900 and 1909. Thereafter, Far Rockaway was described as an "office" location. Owned in 1900 by the Town of Hempstead Gas and Electric Light Company, Queensborough Gas and Electric Company acquired ownership in 1902. Queensborough Gas and Electric Company and the Town of Hempstead Gas and Electric Light Company consolidated after this, and the Long Island Lighting Company acquired control of the former by a stock purchase during 1923.

No separate record of production at the Site was reported in *Brown's Directory*. As presented in the available records for seven different years during the 1900 through 1909 interval, two plants could have existed: the Rockaway Beach works and the Far Rockaway works. All gas production attributed to the Far Rockaway works was based on the Lowe water gas process. A large seasonal difference in population existed (8,000 winter; 75,000 summer). Therefore, two facilities with different gas production capacities might have been rationalized. Another reason for the lack of clarity could be that Queensborough Gas and Electric, operator of the Rockaway Beach gas plant, also operated an electric generating station at Far Rockaway. With the record for 1909, Queensborough Gas and Electric identified only one gas works: Rockaway Park (formerly named the Rockaway Beach works).




BASE MAP SOURCE:

U.S.G.S. QUAD MAP
LAWRENCE, NY - 1979




Vanasse Hangen Brustlin, Inc.

Figure 1
Site Location Map
Former Far Rockaway Manufactured Gas Plant Site
Borough of Queens
New York City, New York

One of the assessments that will be required under the OC, involves the identification and characterization of the source(s) of MGP-related chemical constituents. There are no typical MGP-related waste sources above ground level at the Site. In addition, there is no information currently available regarding the presence of underground and/or covered structures, or disposal areas at the Site which could potentially be acting as ongoing sources.

The surrounding area consists of mixed-use residential, commercial, and industrial parcels. Refer to Figure 2a for the site plan. Single-family residences are located directly south and east of the Site. Apartments are located west of the Site. A commercial/industrial area and the Long Island Railroad (LIRR) are located north of the Site. The Site is expected to remain in its current state.

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SOURCES:
- Aerial photograph dated 1998
- Historic map of site and approximate locations of former MGP structures based on 1901 Sanborn Fire Insurance Maps

40 0 40 80 120 Feet

KEYSPAN ENERGY

Map Key

Historic Structures

Approximate Location of Former MGP Structure (1901 Sanborn Map)

NOTE: Linework is not survey quality. Due to the varying scales and accuracies of the data sources, all location representations are approximate.

Map Compiled By:

VHB

Vanasse Hangen Brustlin, Inc.

April 2002

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Figure 2a
Site Plan

Former Far Rockaway
Manufactured Gas Plant Site
Borough of Queens
New York City, New York

# 4

# Major Tasks

The project has been broken down into three major tasks as described in Table 4-1.

**Table 4-1 – Major Tasks**

| TASK NUMBER | TASK | DESCRIPTION |
|---|---|---|
| 1 | Record Review | Initiate communications with site owners, review as-built or record drawings, review city records (city engineer, building inspector, historical society, library), and modify/annotate work plan. |
| 2 | Field Investigation | Site reconnaissance, surface soil sampling, subsurface soil borings and sampling, groundwater sampling, soil vapor sampling, test trench sampling, collect additional samples as determined in the field, field survey, and sample analysis. |
| 3 | Report | Prepare investigation report identifying scope of work, analytical results, summaries and conclusions. |

## Record Review

KeySpan will notify the property owner and secure an access agreement prior to the commencement of all record review and investigation activities.

Prior to the initiation of field investigation activities, VHB will perform a detailed record review of all available historical information sources for the former MGP Site. The purpose of the record review is to determine whether potentially contaminated soils were encountered during construction, and if so, how they were managed, used or disposed. Additional information to be obtained includes foundation and excavation depths, storm sewers and underground features, fill areas, and off-site sources of fill materials.

Specific records for review include on-site as-built records maintained by the existing owners, construction records maintained by the city engineer, and historical documentation at local historical societies and libraries. KeySpan or their authorized representative will perform initiation of communications with current site owners for the purpose of performing record reviews.

Data collected from the historical record review, in conjunction with existing site conditions, will be used to modify this work plan, if necessary, for the purpose of ensuring that potential MGP-related chemical constituents in subsurface soils have been investigated. Furthermore, the record review may preclude the performance of subsurface investigations if historical information indicates that all potentially contaminated soils from the former MGP Site were removed during demolition of the plant facilities, or construction of current Site structures.

A utility search will be performed through a utility search group prior to the commencement of field activities. The locations of underground utilities in the vicinity of the investigation area will be identified prior to intrusive activities.

## Field Investigation

Prior to any field investigation, NYSDEC and current property owners, on and adjacent to the project Site, will be notified by KeySpan. Sample locations, staging areas, and work zones will be coordinated with the site owners to minimize interference with current site operations. All investigation activities will be performed in compliance with the generic QAPP in Appendix A.

The field investigation is broken down into nine discrete subtasks:

- Mobilization;
- Site Reconnaissance;
- Surface Soil Sampling and Analysis;
- Subsurface Soil Sampling and Analysis;
- Groundwater Sampling and Analysis;
- Soil Vapor Sampling and Analysis;
- Test Trench Sampling and Analysis;
- Field Survey;
- Demobilization; and
- Data Validation.

### Mobilization

VHB will mobilize a field team and equipment to the Site. Equipment staging on-site will be coordinated with property owners, and minimized as practical to mitigate site disturbance.

## Site Reconnaissance

At the commencement of field investigation work, VHB will perform a thorough site reconnaissance. The purpose of the site reconnaissance is for the field team to familiarize themselves with the Site, identify sample areas, adjust sample locations based on existing conditions, review utility clearances, identify potential health and safety concerns, and determine if there are any areas of existing environmental conditions which may/or may not be associated with the former MGP Site.

Specific site reconnaissance activities include inspection of the Site and peripheral areas, inspection and screening for organic vapors in storm sewers, manholes, and drainage inlets, inspection and screening for organic vapors in basements and sumps (if any) in structures at the Site, and inspection of existing operations at and adjacent to the Site. Findings, summaries, and conclusions associated with site reconnaissance will be documented in the site logbook.

## Surface Soil Sampling and Analysis

A total of 14 surface soil samples will be collected from the proposed locations shown on Figure 2b. Sample locations will be adjusted as necessary in the field during site reconnaissance to bias the samples toward areas of potentially contaminated media (*i.e.*, stressed vegetation, historic rubble/foundation debris), or high potential exposure pathways. Sample locations also may be adjusted to minimize impacts associated with current site operations and/or avoid potential contemporary sources of chemicals in surface soils. Surface soil samples will be collected from the 0 to 2-inch depth interval.

Samples will be properly collected and packaged in accordance with the QAPP and shipped to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory for analysis. Refer to Table 4-2 for a complete list of proposed samples and analyses.

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SOURCES:
- Aerial photograph dated 1998
- Historic map of site and approximate locations of former MGP structures based on 1901 Sanborn Fire Insurance Maps

NOTE: Linework is not survey quality. Due to the varying scales and accuracies of the data sources, all location representations are approximate.

40 0 40 80 120 Feet

## Map Key

Proposed Sample Locations
- Soil Borings (FRSB-01-11)
- Temporary Monitoring Wells (FRGW-01-07)
- Surface Soils Samples (FRSS-01-14)
- Soil Vapor Samples (FRSV-01-05)

A—A' Test Trench Location (FRTT-A/A')

Historic Structures
- Approximate Location of Former MGP Structure (1901 Sanborn Map)

N

Map Compiled By:
VHB
Vanasse Hangen Brustlin, Inc.

April 2002

KEYSPAN ENERGY

Figure 2b
Proposed Sample Location Plan

Former Far Rockaway Manufactured Gas Plant Site
Borough of Queens
New York City, New York

**Table 4-2 - Proposed Samples and Analyses**

| Matrix | No. of Samples | Analytical Parameters[A] | QA/QC Requirements |
|---|---|---|---|
| Surface Soil | 14 | BTEX (8260B), PAHs (8270C), RCRA Metals (6010B/7471A), and Total Cyanide (9010B) | 1 Duplicate |
| Subsurface Soil (Soil Borings) | 22 | BTEX (8260B), PAHs (8270C), RCRA Metals (6010B/7471A), and Total Cyanide (9010B) | 2 Duplicates |
| Groundwater | 7 | BTEX (8260B), PAHs (8270C), RCRA Metals (6010B/7471A), and Total Cyanide (9010B) | 1 Duplicate<br>1 Trip blank[B] |
| Soil Vapor | 5 | Volatile Organic Compounds and Naphthalene (TO-15) | 1 Duplicate |
| Subsurface Soil (Test Trench) | 3 | BTEX (8260B), PAHs (8270C), RCRA Metals (6010B/7471A), and Total Cyanide (9010B) | 1 Duplicate |

NOTE:

[A] Analysis will include 18 typical MGP-related PAHs. Optionally, 10% of the samples from each matrix will be analyzed for the complete TAL/TCL list.

[B] One trip blank per package containing aqueous samples for VOC analysis will be shipped each day.

BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
PAHS = Polycyclic Aromatic Hydrocarbons
RCRA = Resource Conservation and Recovery Act

## Subsurface Soil Sampling and Analysis

A total of 11 soil borings will be installed for the purpose of collecting subsurface soil samples at the Site. The borings will be installed at the proposed locations shown on Figure 2b. Boring locations will be adjusted as necessary in the field, based upon record reviews and site reconnaissance, to obtain the appropriate data. Boring locations also may be adjusted to minimize impacts associated with current site operations and/or avoid potential contemporary sources of chemicals in surface and shallow subsurface soils.

VHB will retain the services of a subcontractor to perform the soil borings. The borings will be advanced via direct push technology (Geoprobe®) to a depth of approximately 15 feet below ground surface (bgs). Continuous core samples will be collected, screened and inspected for purposes of determining the physical characteristics of the soil, presence of foreign debris, and the presence of chemical constituents. The borings will be logged consistent with the "*Unified Soil Classification System*".

Cuttings from soil borings will be used to backfill the borings at the conclusion of the field investigation. If the cuttings are found to be stained or are suspected to contain Volatile Organic Compounds (VOCs) based on instrument readings, cuttings from the soil borings will be drummed, labeled, and temporarily stored on-site. KeySpan will properly manage all containers generated during the fieldwork. Backfill will be placed to within 6-inches of finished grade, and the borings will be restored to like condition at grade.

Up to two subsurface soil samples will be collected for chemical analysis from each boring. Samples will be collected from the interval or intervals exhibiting a higher degree of staining or odors based on organoleptic appraisal and instrumentation response. In zones that appear to be visually clean and/or odor free, subsurface soil samples will be collected from the vadose zone just above/at the water table interface. Samples will be biased towards visually stained and/or zones with PID readings where possible. Additional discrete samples will be collected from soils with significant staining or high organic vapor content, if determined to be necessary in the field. Two duplicate samples will also be collected for QA/QC analysis.

Samples will be properly collected and packaged in accordance with the QAPP and shipped to a NYSDOH ELAP certified laboratory. Refer to Table 4-2 for a complete list of proposed samples and analyses.

## Groundwater Sampling and Analysis

VHB will obtain the services of a drilling subcontractor to install 7 temporary wells with a Geoprobe®. The wells will be installed at the proposed locations shown on Figure 2b. Well locations may be adjusted to minimize impacts associated with current site operations, potential structure interference, and/or based on information collected during the record review task performed as part of this project.

The temporary wells will be installed with 1-inch PVC screens bridging the water table and extending to a total anticipated depth of 15 feet bgs. The exact depths and construction specifications of the temporary wells will be based on field observations. After installation of all 7 wells, water levels will be measured to obtain groundwater flow direction information. Samples will be collected from each of the temporary wells, utilizing *Low Flow (Minimal Drawdown) Groundwater Sampling Procedures*. One duplicate groundwater sample will also be collected.

Samples will be properly collected and packaged in accordance with the QAPP and shipped to a NYSDOH ELAP certified laboratory. The samples collected from the temporary wells will be analyzed for the parameters specified in Table 4-2.

Upon completion of sampling and collection of survey and groundwater elevation data, the PVC temporary screen will be removed and the borehole backfilled with clean native soils, or a grout mixture of Type I Portland cement with 4% bentonite. Backfill will be placed to within 6-inches of finished grade and restored to like condition at grade.

## Soil Vapor Sampling and Analysis

A soil vapor survey consisting of 5 probes around the perimeter of the existing on-site structure will be completed. The soil vapor probes will be installed generally at the proposed locations shown on Figure 2b. The exact location of the vapor probes will be determined in the field.

All soil vapor probes will be completed using direct push technology. A stainless steel probe, which has been decontaminated prior to use, will be driven to the desired sampling depth of approximately 3 to 4 feet bgs. New polyethylene tubing will be connected to the probe and a suitable vacuum pump, *e.g.* a PID. After ensuring proper connection to the probe, the pump will be allowed to run until the soil vapor within the probe has reached equilibrium. The pump will then be disconnected and the probe will be capped and allowed to stabilize for 5 to 10 minutes prior to sampling.

Samples will be collected from all of the probes utilizing SUMMA® canisters equipped with laboratory provided flow regulators precalibrated in accordance with the selected analytical method. One duplicate sample will also be collected for QA/QC analysis. Samples will be properly collected and packaged in accordance with the QAPP and shipped to a NYSDOH ELAP certified laboratory for analysis. Refer to table 4-2 for a complete list of proposed samples and analyses.

Upon completion, all soil vapor probe holes will be backfilled to within 6-inches of finished grade, and restored to like condition at grade. Cuttings removed from the probes will be used as backfill unless they are found to be stained or suspected to contain VOCs based on instrument readings. Potentially impacted soils will be properly handled and managed as discussed above under *Subsurface Soil Sampling and Analysis*.

## Test Trench Sampling and Analysis

One test trench, designated FRTT-A/A’, is proposed to be completed at the site. The test trench will be excavated at the proposed location shown on Figure 2b. The exact location of the test trench will be adjusted in the field, if necessary, based upon existing site conditions and access. The primary objectives of this effort will be to determine:

➤ the potential presence of buried former MGP facilities at the site which could represent persisting sources, and

➤ the physical characteristics and potential presence of constituents of concern in shallow subsurface soils in these areas through real-time screening data and chemical analysis.

The test trench will be excavated with a Case Bobcat equipped with a narrow trenching bucket. It is anticipated that the trench will be extended to a depth not to exceed 3 feet bgs. Test trench observations and soil characterizations, following the USCS, will be recorded in the field log book. Clean soil removed from the test trenches will be segregated and staged temporarily prior to return to the subsurface as backfill. Potentially impacted soil removed from the trenches will be segregated and immediately placed on and covered with a rip-stop plastic sheeting. Potentially impacted soil will be determined through both visual inspection and the use of real-time monitoring instrument for VOCs. If the water table, buried structures, and/or potentially impacted soils are encountered during test trenching operations, excavation will be terminated. The generation of vapors as determined through the use of real-time monitoring instruments will also trigger the immediate termination of excavation activities.

If any of the conditions listed above are encountered and collection of samples is possible, this will be accomplished utilizing a properly decontaminated hand-auger prior to backfilling and restoration of the trenches. Samples will be biased towards areas revealing evident residual impact potentially attributable to former MGP operations, if present. Provision has been made for the collection of a total of 3 composite soil samples from the test trench. One duplicate sample will also be collected. Samples will be properly collected and packaged in accordance with the QAPP and shipped to a NYSDOH ELAP certified laboratory. The samples will be analyzed for the parameters specified in Table 4-2.

Upon completion or termination, the test trench will be backfilled in the reverse order of soil removal. Backfill will be returned to the trench in lifts not to exceed 12 inches and properly compacted with the excavator bucket to prevent settling. Final cover will utilize the clean soil initially removed and staged separately. If this is not sufficient, clean soil from the surrounding the area may be placed on top of the trenches and/or clean fill/aggregate/stone may be acquired from a local supplier.

## Field Survey

Upon completion of all sampling activities, all sample locations will be located for horizontal and vertical control via a field survey. Any additional sample locations will also be located. A general topographic survey will also be performed to locate structures within the investigation area, establish contours, and drainage features.

## Demobilization

Upon completion of all intrusive sampling activities, the Site will be restored as closely to pre-existing conditions as practicable. All sample locations will be backfilled and restored, as appropriate. All staging areas, equipment, investigation-derived waste (IDW), and other materials will be removed, and any areas disturbed will be restored to like condition.

# Report

Upon receipt of analytical data, VHB will prepare a written report that summarizes field activities and analytical results. The report will be generated consistent with the reporting requirements identified in the OC.

The report will include an executive summary, purpose, scope of work, modifications and/or deviations from the work plan, analytical results, and conclusions and recommendations. The report will also include a qualitative assessment of potential human health exposures relative to the current and anticipated future use of the Site.

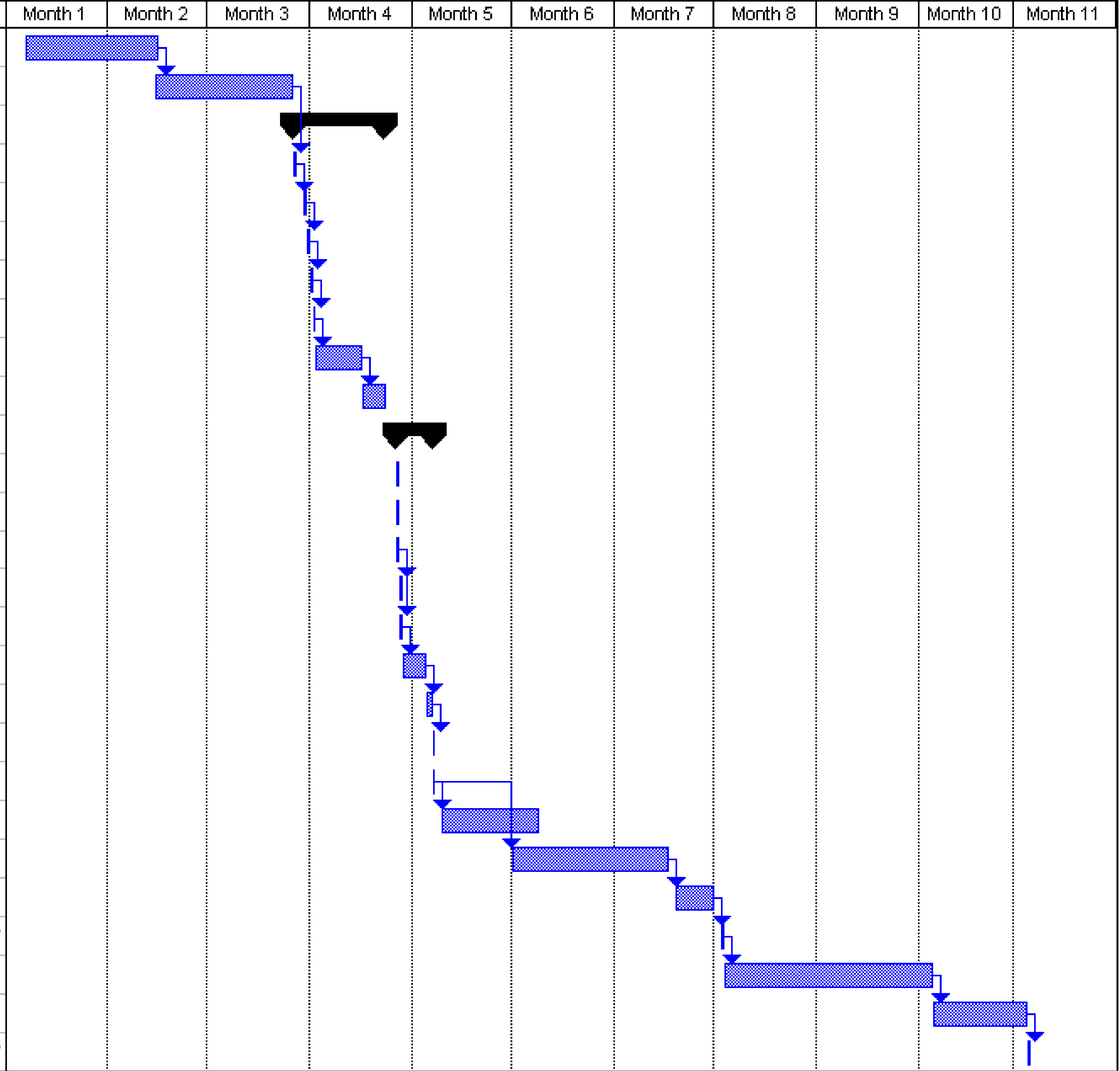
The report outline is as follows:

- Executive Summary
- Introduction
- Scope of Work and Approach
- Site Background
- Site Environmental Setting
- Analytical Findings by Media
- Data Gaps
- Qualitative Human Health Exposure Assessment
- Conclusions
- References
- Figures & Tables
- Appendices

# 5 Schedule

Refer to Figure 3 for a detailed project schedule.

| ID | Task Name | Duration |
|---|---|---|
| 1 | Work Plan | 30 days |
| 2 | NYSDEC Review | 30 days |
| 3 | **Record Review** | **20 days** |
| 4 | KeySpan Records | 1 day |
| 5 | State/County/City Engineer Records | 1 day |
| 6 | Site owner Records | 1 day |
| 7 | Historical society/library records | 1 day |
| 8 | Correlation to existing database records | 1 day |
| 9 | Modify work plan and/or issue report | 10 days |
| 10 | Internal review | 5 days |
| 11 | **Field Investigation** | **10 days** |
| 12 | Mobilization | 1 day |
| 13 | Site Reconnaissance | 1 day |
| 14 | Identify Sampling Locations | 1 day |
| 15 | Surface Soil Sampling | 1 day |
| 16 | Indoor Air Sampling | 1 day |
| 17 | Borings and Soil Sampling | 5 days |
| 18 | Groundwater Sampling | 2 days |
| 19 | Surveying | 1 day |
| 20 | Demobilization | 1 day |
| 21 | Sample Analysis | 21 days |
| 22 | Draft Report | 35 days |
| 23 | Internal Review | 10 days |
| 24 | Submit to NYSDEC | 1 day |
| 25 | NYSDEC Review | 45 days |
| 26 | Revise per NYSDEC comments | 20 days |
| 27 | Submit Final Report | 1 day |



# 6

# Project Management

VHB is the contractor for the Far Rockaway PSA project. VHB is reporting directly to Theodore Leissing who is the project manager for KeySpan. VHB will use the following staff to execute this work plan:

Program Manager: Kurt Frantzen

Project Manager: Jerold Bastedo

Field Manager: Christopher Poole

# 7

# References

ASTM. 2000. D 2487-00: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System). West Conshohocken, PA.

ASTM. 2000. D 2488-00: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). West Conshohocken, PA.

NYSDEC. 1995. Analytical Services Protocol, Division of Water, Albany, New York.

NYSDEC. 1995. Technical and Administrative Guidance Memorandum #4008*: Phase II Investigation Oversight Guidance*. Division of Environmental Remediation. Albany, NY.

NYSDEC. 1988. Technical and Administrative Guidance Memorandum #4007: *Phase II Investigation Generic Work Plan*. Division of Environmental Remediation. Albany, NY.

Vanasse Hangen Brustlin, Inc. (VHB), November 1999, Initial Data Submittal KeySpan Energy Corporation, Former Manufactured Gas Plant Sites. Order on Consent D1-001-99-05, on Long Island, New York. Hempstead-Clinton Road, Babylon, Patchogue, Far Rockaway, Garden City. VHB, Middletown, CT.

# Appendix A

# Generic Quality Assurance Project Plan

**Generic Quality Assurance Project Plan**

# *Former Manufactured Gas Plants & Related Sites*

New York

Prepared for: **KeySpan Corporation**
**One MetroTech Center**
**Brooklyn, New York 11201-3850**

Prepared by: **VHB/Vanasse Hangen Brustlin, Inc.**
**54 Tuttle Place**
**Middletown, Connecticut 06457**

**April 2002**

# Table of Contents

# List of Figures



# List of Tables



# List of Attachments

# Introduction

## Purpose

The purpose of this generic Quality Assurance Project Plan (QAPP) is to document the type and quality of data needed for environmental decisions and to describe the methods for collecting and assessing those data. The generic QAPP has been designed to ensure high quality, valid data for use in investigation work conducted at a variety of sites formerly related to the manufacturing, storage, and/or transmission/regulation of gas. This document addresses common activities that may be performed at a site but does not describe site- or time-specific tasks. Sample numbers, types, matrices, locations, and frequencies will be identified in the site-specific work plan (sampling and analysis plan). If modifications to the procedures described herein are required for a site-specific investigation, detailed information regarding the changes and rationale for these changes will be provided in the site-specific work plan

## Related Resources

This generic QAPP has been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (EPA) guidance documents. Specific documents used in the creation of this generic QAPP or that complement this document with respect to environmental quality management include:

- *NYSDEC Analytical Services Protocol*, 10/95 Revisions;
- *Guidance for the Data Quality Objectives Process (QA/G-4)* (EPA 1994a);
- *EPA Guidance for Quality Assurance Project Plans (QA/G-5)* (EPA 1998);
- *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* (EPA 1999a);
- *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods SW-846* (EPA 1997).

# Program Description

## Program Objective

The data generated from the sampling program will be used to determine the nature, extent, and source(s) of chemical constituents at a given site; prepare a human health and/or environmental risk/threat assessment; and, if necessary, identify, evaluate, and recommend a cost-effective, environmentally sound, long-term remedial action plan. The data will also be utilized to monitor for the health and safety of workers at the site as well as potential off-site receptors.

## Site Description

The program to which this generic QAPP applies includes a variety of sites where former activities have the potential for the release of chemical constituents into the environment. These sites, include, but are not limited to, former manufactured gas plants (MGPs), gas storage sites, modern LP cracking facilities, gas transmission/regulation stations, *etc*.

A detailed site description will be included in the site-specific work plan.

## Site History

A detailed site history will be included in the site-specific work plan. A general historical discussion of the manufactured gas process is provided below. (*Note*: the following historical discussion is from *Manufactured Gas Plants, a New York Heritage* by The WD Burdick Company, 1996).

Former MGP sites are generally abandoned or reused properties that formerly housed a facility utilized for the production of gas distilled from coal. These facilities, also known as "gasworks" or "town gas," supplied gas to surrounding communities and industries for light, heat, and cooking. The first U.S. MGP opened in Baltimore, Maryland in 1817 and the first New York State MGP opened in 1825 in New York City.

The production of coal gas involved heating coal to drive off gas (primarily methane, hydrogen, and carbon dioxide), which was then condensed. By-products of condensation included tars and oils. Condensed gas was then scrubbed and purified to remove ammonia, sulfur, and other impurities.

During the 1870's, an alternative method of producing gas was developed. The "carburetted water-gas" or "blue water-gas" process involved the use of steam and hot coal to generate hydrogen and carbon dioxide that was then used to crack heavy oil into simpler gas.

Manufactured gas sales increased rapidly during the first half of the 1900's but came to a rapid end around 1950. The demise of the MGP industry was ushered by increased natural gas production and the development of interstate natural gas pipelines.

In general, the environmental legacy of MGPs includes the remnants of subsurface structures and facilities and the possible presence of tar and oil by-products in the surface and/or subsurface environment.

## Sampling Program Design and Rationale

The following presents a general discussion of the sampling that may be conducted in support of a site investigation. Actual sample numbers, types, matrices, locations, and frequencies will be identified in the site-specific work plan

- Soil Vapor - Soil vapor samples may be collected to locate/confirm the source and extent of subsurface organic vapors on- and off-site. It may also be utilized on a preliminary basis to determine if the presence of subsurface vapors is potentially impacting surface receptors.
- Surface Soil - Surface soil samples may be collected on-site to determine the nature and extent of on- and/or off-site chemical analytes in surface soil.
- Sediment/Sludge - Sediment and sludge samples may be collected from dry wells, storm drainage systems, and/or wastewater disposal/sanitary systems located on the site, and surface water bodies on- and off-site. The purpose of these samples is to determine if the wells/systems are a source of site-related chemical constituents, and to determine if these constituents have impacted sediment from surface water bodies.
- Wastewater/Drainage Water - Wastewater and drainage water samples may be collected from dry wells and/or wastewater disposal/sanitary systems located on the site to determine if these wells/systems are a source of site-related chemical constituents.
- Storm Water - Storm water samples may be collected from catch basins and storm drains located on- and off-site to determine if the storm water system contains chemical analytes of concern.
- Surface Water - Surface water samples may be collected from surface water bodies on- and off-site to determine if impacts from site-related chemical constituents exist.
- Subsurface Soil - Subsurface soil samples may be collected during drilling of monitoring wells and borings, excavation of test pits, or by using direct push technology at probe locations. Subsurface soil samples may be collected to delineate the extent of on- and off-site chemical analytes of concern.
- Groundwater - Groundwater samples may be obtained from monitoring wells and/or at direct push probe/Hydropunch locations, which may be installed as part of the investigation, or from monitoring wells which were installed previously at and in the vicinity of the site. Groundwater samples will be collected to define the horizontal and vertical extent of chemical constituents in groundwater on- and off-site.
- Air - Ambient air samples may be collected on- and off-site, within buildings, and outdoors to identify potential health risks.

For a detailed discussion of the sampling program and selection of sample matrices and locations, see the site-specific work plan.

## Analytical Parameters

Surface soil, subsurface soil and sediment samples collected at former MGP and other related sites will typically be analyzed for volatile organic compounds (VOCs) (specifically including benzene, toluene, ethylbenzene, and xylenes [BTEX]); semivolatile organic compounds (SVOCs) (specifically including polycyclic aromatic hydrocarbons [PAHs]); RCRA metals; and total cyanide. Polychlorinated biphenyls (PCBs) and pesticides may also be analyzed if the historical or current use of the property potentially suggests their presence.

Groundwater samples from direct-push sample locations will typically be analyzed for BTEX and PAHs, and monitoring well groundwater and surface water samples will typically be analyzed for VOCs, SVOCs, RCRA metals, total and free cyanide. Pesticides and PCBs may also be analyzed for as discussed above.

Ambient air and soil vapor samples will typically be analyzed for VOCs and naphthalene.

Additional chemical and Geotechnical parameters may be analyzed for on a site-specific basis and include, but are not limited to, total organic carbon, salinity, an expanded metals list (Target Analyte List).

Analytical methodologies will be consistent with the October 1995 edition of the NYSDEC *Analytical Services Protocol* (ASP) and will generally consist of non-Contract Laboratory Program (non-CLP) methods (*e.g.*, 8260B for VOCs). When non-CLP methods are used, analytical procedures will be consistent with the latest update of *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846*, (currently Third Edition, Update III) (EPA 1997). Contract Required Quantitation Limits (CRQLs) for individual analytes will be consistent with Exhibit C of the NYSDEC ASP and will be assessed on a site-by-site basis for comparison with site-specific action levels. Action levels will generally be risk-based or federal/state promulgated matrix-specific limits. If ASP CRQLs are not low enough to meet a specific site's action levels, method detection limits (MDLs) may be used. MDLs for individual analytes will be the lower of those specified by the analytical method (in the ASP or SW-846) or those of the specific laboratory selected for a site. Specific laboratory-achievable MDLs for a given method will be provided in laboratory standard operating procedures (SOPs) prior to initiation of site activities.

Table 1 presents a summary of the parameters/sample fraction typically monitored for at former MGP and other related sites, together with the typical sample location, type of sample, sample matrix, type of sample container, method of sample preservation, holding time and analytical method.

**Table 1**
**SUMMARY OF ANALYTICAL PARAMETERS**

| Sample Location | Sample Type | Sample Matrix | Sample Fraction | Container Type/Size/No.[a] | Sample Preservation | Maximum Holding Time | Analytical Method |
|---|---|---|---|---|---|---|---|
| On-Site/Off-Site | Grab | Soil Vapor | BTEX and Naphthalene | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | -- | 7 days from VTSR | 10/95 NYSDEC ASP, Method 8021B or USEPA TO Methods (TO-1, TO-2, TO-15) |
| | | | Chlorinated Volatile Organics | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | -- | 7 days from VTSR | 10/95 NYSDEC ASP, Method 8260B or USEPA TO Methods (TO-1, TO-2, TO-15) |
| On-Site/Off-Site | Grab | Ambient Air | BTEX and Naphthalene | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | -- | 7 days from VTSR | USEPA TO Methods (TO-1, TO-2, TO-15) |
| | | | Chlorinated Volatile Organics | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | -- | 7 days from VTSR | USEPA TO Methods (TO-1, TO-2, TO-15) |
| | | | VOCs | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | -- | 7 days from VTSR | USEPA TO Methods (TO-14A, TO-15) |
| On-Site/Off-Site | Grab | Surface Soil | BTEX[b] | Glass, clear/40-ml/two 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | | | Polycyclic Aromatic Hydrocarbons (PAHs) | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | | | Polychlorinated biphenyls (PCBs)[c] | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8082 |
| | | | RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months for all other metals | 10/95 NYSDEC ASP, Method 6010B/ 7471 |
| | | | Total Cyanide | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |
| On-Site/Off-Site | Grab | Ash | Semivolatile Compounds | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Ash | TAL Metals | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months for all other metals | 10/95 NYSDEC ASP, Method 6010B/ 7471 |
| | Grab | Ash | Total Cyanide | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |

[a] Verify number and type of containers with specific lab selected to perform the analyses.

[b] If staining of the soil is present.

[c] Samples collected in areas of transformers will be analyzed for PCBs.

**Table 1 (continued)**
**SUMMARY OF ANALYTICAL PARAMETERS**

| Sample Location | Sample Type | Sample Matrix | Sample Fraction | Container Type/Size/No. [a] | Sample Preservation | Maximum Holding Time | Analytical Method |
|---|---|---|---|---|---|---|---|
| On-Site/Off-Site | Grab | Subsurface Soil | BTEX | Glass, clear/40-ml/two 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Subsurface Soil | PAHs | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Subsurface Soil | PCBs [b] | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8082 |
| | Grab | Subsurface Soil | RCRA Metals | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months for all other metals | 10/95 NYSDEC ASP, Method 6010B/7471 |
| | Grab | Subsurface Soil | Total Cyanide | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |
| On-Site | Grab | Test Pit Soil | BTEX | Glass, clear/40-ml/two 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Test Pit Soil | PAHs | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Test Pit Soil | RCRA Metals | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months for all other metals | 10/95 NYSDEC ASP, Method 6010B/7471 |
| | Grab | Test Pit Soil | Total Cyanide | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |
| Storm Water Runoff/Surface Water/Storm Drains/Dry Wells | Grab | Sediment | BTEX | Glass, clear/40-ml/two 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Sediment | Chlorinated Volatile Organics | Glass, clear/40-ml/two 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| | Grab | Sediment | PAHs | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 10 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Sediment | RCRA Metals | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months after VTSR for analysis of all other metals | 10/95 NYSDEC ASP, Method 6010B/7471 |
| | Grab | Sediment | Total Cyanide | Glass, clear/8-oz./one 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |

[a] Verify number and type of containers with specific lab selected to perform the analyses.

[b] Samples collected in areas of transformers will be analyzed for PCBs.

**Table 1 (continued)**
**SUMMARY OF ANALYTICAL PARAMETERS**

| Sample Location | Sample Type | Sample Matrix | Sample Fraction | Container Type/Size/No. [a] | Sample Preservation | Maximum Holding Time | Analytical Method |
|---|---|---|---|---|---|---|---|
| Storm Drains/Dry Wells | Grab | Storm Water Runoff/ Surface Water | BTEX | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Storm Water Runoff/ Surface Water | Chlorinated Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| | Grab | Storm Water Runoff/ Surface Water | PAHs | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 5 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Storm Water Runoff/ Surface Water | RCRA Metals | Plastic/1-L/one 2000 class or equivalent | $HNO_3$ to pH <2 Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months after VTSR for analysis of all other metals | 10/95 NYSDEC ASP, Method 6010B/ 7471 |
| | Grab | Storm Water Runoff/ Surface Water | Total Cyanide | Plastic/250 ml/one 2000 class or equivalent | NaOH to pH >12 Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B |
| Monitoring Wells | Grab | Groundwater | BTEX | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Groundwater | Chlorinated Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| | Grab | Groundwater | PAHs | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 5 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Groundwater | Metals | Plastic/1-L/one 2000 class or equivalent | $HNO_3$ to pH <2 Cool to 4°C | 6 months after VTSR for analysis of others | 10/95 NYSDEC ASP, Method 6010B/ 7470 |
| | Grab | Groundwater | Total & Free Cyanide | Plastic/250-ml/one | NaOH to pH >12 Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B and Method SM4500-CN1 |
| | Grab | Groundwater | Salinity | Plastic/250-ml/one | Cool to 4°C | -- | ASTM Method 210A |
| Groundwater Probe/Hydropunch Locations | Grab | Groundwater | BTEX | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Grab | Groundwater | Chlorinated Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |

[a] Verify number and type of containers with specific lab selected to perform the analyses.

**Table 1 (continued)**
**SUMMARY OF ANALYTICAL PARAMETERS**

| Sample Location | Sample Type | Sample Matrix | Sample Fraction | Container Type/Size/No. [a] | Sample Preservation | Maximum Holding Time | Analytical Method |
|---|---|---|---|---|---|---|---|
| Groundwater Probe/Hydropunch Locations | Grab | Groundwater | PAHs | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 5 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Groundwater | PCBs | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8082 |
| Monitoring Wells | Grab | Groundwater | Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| | Grab | Groundwater | Semivolatile Organics | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 5 days after VTSR for extraction, 40 days after extraction for analysis | 10/95 NYSDEC ASP, Method 8270C |
| | Grab | Groundwater | Pesticides/PCBs | Glass, amber/1-L/two 2000 class or equivalent | Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8081A/8082 |
| | Grab | Groundwater | TAL Metals | Plastic/1-L/two 2000 class or equivalent | $HNO_3$ to pH <2 Cool to 4°C | 26 days after VTSR for Hg analysis, 6 months for all others | 10/95 NYSDEC ASP, 6010B/7470 |
| | Grab | Groundwater | Total & Free Cyanide | Plastic/250-ml/one 2000 class or equivalent | NaOH to pH > 12 Cool to 4°C | 14 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 9010B and Method SM4500-CNI |
| | Grab | Groundwater | Salinity | Plastic/250-ml/one 2000 class or equivalent | Cool to 4°C | --- | ASTM Method 210A |
| Site/Study Area | Trip Blank | Water | BTEX | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8021B |
| | Trip Blank | Water | Chlorinated Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| | Trip Blank | Water | TCL Volatile Organics | Glass, clear/40-ml/three 2000 class or equivalent | Cool to 4°C | 7 days after VTSR for analysis | 10/95 NYSDEC ASP, Method 8260B |
| Site/Study Area | Blank | Ambient Air/Soil Vapor | BTEX/Naphthalene | Sorbent Tube/Tedlar® bag/ SUMMA® Canister | Cool to 4°C | 7 days after VTSR for analysis | USEPA TO Methods (TO-1, TO-2, TO-15) |

Sources: NYSDEC Analytical Services Protocol (ASP) October 1995 and USEPA 1999b.

[a] Verify number and type of containers with specific lab selected to perform the analyses.

Key:
- BTEX = benzene, toluene, ethylbenzene, and xylenes
- L = liter(s)
- ml = milliliters
- VTSR = Verified time of sample receipt at the laboratory
- $HNO_3$ = Reagent-grade nitric acid
- NaOH = Reagent-grade sodium hydroxide
- TO = Toxic Organic compounds in air

## Organization & Responsibility

Program organization is shown in Figure 1.

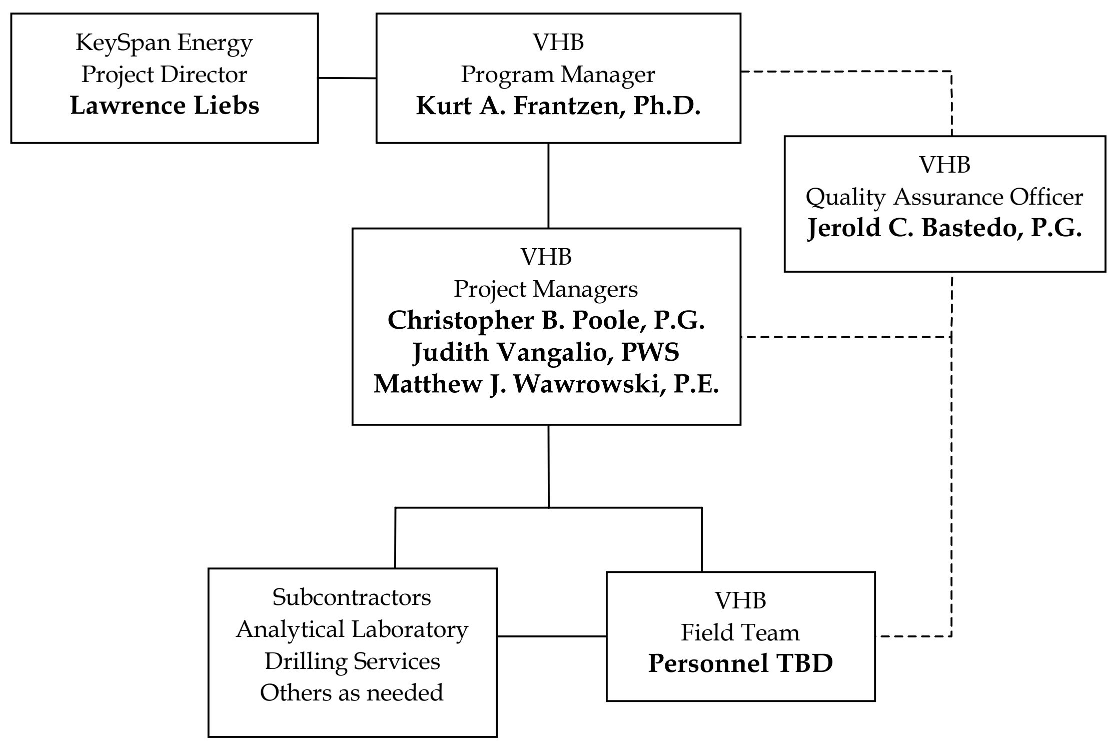



*Figure 1 – Project Organization Chart*

## Training Requirements

At a minimum, all on-site personnel involved with sampling or oversight duties shall have received initial hazardous waste operations (HAZWOPER) training with annual refresher training as prescribed by *29 CFR 1910.120*. Certification of this training shall be provided to the project manager and/or site safety officer prior to initiation of field activities. In addition, at least one site worker shall be trained and certified in Standard First Aid and Adult CPR by the American Red Cross or equivalent. If shipping of hazardous materials to or from a site is required, personnel responsible for shipping shall be duly trained and certified in U.S. Department of Transportation (DOT) and/or International Air Transportation Association (IATA) shipping requirements as required by *49 CFR 172 Subpart H*.

The need for additional specialized training will be determined on a site-by-site basis and described in the site-specific work plan. Specialized training may be required if field-level analyses, geophysical surveys, wetland delineation, *etc*. are to be performed.

## Quality Assurance Objectives & Requirements

Data quality requirements and assessments will be in accordance with the NYSDEC ASP, which includes method detection limits by analyte and sample matrix. When non-CLP methods are utilized (*e.g.,* 8260B, 8270C), data quality requirements will be those found in the latest update of *SW-846*, (currently Third Edition, Update III) (EPA 1997). Note that analyte-specific quantitation limits, accuracy, and precision estimates are determined by the laboratory performing the analysis and are contained in individual laboratory standard operating procedures (SOPs). Therefore, limits for these parameters are not specifically addressed in this generic QAPP but are available from the laboratory selected to perform the analyses. Individual laboratory SOPs and quality assurance (QA) requirements will conform to the quality assurance/quality control (QA/QC) requirements (Volume 10, Exhibit E) of the NYSDEC ASP. Additionally, selected laboratories will be NYS Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified for organic and inorganic analyses as well as NYSDOH CLP certified.

In general, the data collected at an individual site must be of sufficient quantity and quality to support decision making related to definition of the nature and extent of site-related chemical constituents and impacts of off-site contaminants, determination of potential human health and/or ecological risks/threats, and evaluation of engineering alternatives to mitigate these risks, if any.

## Data Quality Objectives

Data quality objectives (DQOs) will be developed for individual sites to ensure that data collected will be of sufficient quality to support decision making as described above. DQOs help ensure the accountability of project staff to produce data of adequate quality for the intended use. DQOs are typically expressed through qualitative or quantitative statements of precision, accuracy, representativeness, comparability, and completeness (PARCC). Various levels of acceptable data quality will also be applied depending on the requirements and DQOs of a particular investigation. The levels of acceptable data that may be used include:

- Field screening. The use of portable instruments for the real-time measurement of organic vapors, dust, inorganic vapors (*e.g.*, hydrogen cyanide, hydrogen sulfide), explosive atmospheres, *etc.*, will be performed as applicable to optimize sampling locations, monitor health and safety, and screen for the presence of chemical constituents.
- Field analysis. Portable analytical instruments and mobile labs will generally not be used but may be required at an individual site to satisfy specific objectives.
- Laboratory analysis. This includes analysis of samples delivered to an appropriately certified laboratory by methods such as those discussed in Section 2.5. This will be the primary level of data quality used for site investigations to define the nature and extent of chemical analytes and in the assessment of human health and ecological risks.

## Data Assessment

Data assessment procedures involve the application of PARCC parameters to determine whether QA objectives for the project have been met. PARCC parameters are expressed as overall performance goals typically related to indicator QC samples. PARCC parameters are applied as applicable throughout this generic QAPP. Definitions of PARCC parameters and assessment methods are provided below.

### Precision

Precision is a measure of the variability or random error in measurements. Precision is indicated by the relative percent difference (RPD) between concentrations of individual analytes in duplicate samples. The overall precision is affected by variability in sampling (including sample heterogeneity) and lab analysis. Laboratory duplicate samples provide an indication of analytical precision while field duplicate samples provide an indication of the overall precision. To this end, laboratory duplicates, including matrix spike duplicates (MSDs) and laboratory spike duplicates, will be analyzed at a rate that conforms to the general QA/QC requirements of the NYSDEC ASP or the specific analytical method, which ever is greater. Unless otherwise specified, this rate shall be one per sample delivery group (batch) or one per 20 field samples. Field duplicate samples shall be collected at the rate of one per ten original samples. See also Section 6.6 pertaining to matrix spike (MS), MSD, and field duplicates. Precision limits will be defined in individual laboratory SOPs. Typically, acceptable precision limits range from zero (no difference between duplicate control samples), and the historical mean relative percent difference between control and duplicate sample analyses is plus or minus three standard deviations (EPA 1997).

## Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference standard. It is a measure of the total error of the system including both systematic (bias) and random errors. Traceable standards or laboratory-prepared solutions of surrogate compounds are spiked into each sample. The corrected percent recovery indicates the presence of bias due to sample or matrix interference. Accuracy limits will be defined in individual laboratory SOPs. Typically, acceptable accuracy limits are the historical mean recovery percentage of control sample analyses plus or minus three standard deviations (EPA 1997). Laboratory accuracy will also be assessed by laboratory control, matrix spike, and matrix spike blank samples analyzed at the rate defined by the analytical method or general QA/QC requirements of the NYSDEC ASP, whichever is greater.

## Representativeness

Representativeness expresses the degree to which the sample data represent the actual conditions of a site. Representativeness is maximized by proper selection of sample locations and collection of a sufficient number of samples and can be assessed qualitatively. Representative samples will be collected as follows:

- Soil Vapor - Samples will be collected from decontaminated stainless steel or dedicated polyvinyl chloride (PVC) soil probes after the soil vapor has reached equilibrium. Samples will be collected using a personal sampling pump, polyethylene tubing (Teflon®-lined when sampling for semivolatiles), and dedicated gas-tight syringe, sorbent tube, or Tedlar® bag. Alternatively, pre-cleaned SUMMA® canisters may be used.
- Surface Soil - Samples will be collected at a depth of 0-2 inches (below sod or pavement when present) using a dedicated stainless-steel or polystyrene scoop, or sterile wooden tongue depressor.

- Sediment (Dry Well/Drainage System) - Samples will be collected from the center of the dry well, wastewater disposal/sanitary system, or catch basin and storm drain (if possible) after the drainage/storm water sample is obtained in order not to introduce sediment into the water column. Samples will be collected utilizing a decontaminated stainless steel or polyethylene long-handled scoop (if possible), or a soil probe or split-spoon sampler.
- Sediment (Surface Water) - Samples will be collected in the area of the surface water samples 0 to 6 inches below the sediment surface after the surface water sample is obtained in order not to introduce sediment into the water column. Samples will be collected with a decontaminated long-handled stainless steel or polyethylene scoop.
- Wastewater/Drainage Water - Samples will be collected from the center of the wastewater disposal/sanitary system (if possible) and at a depth of 6 inches below the surface of standing water (if possible) using a dedicated polyethylene bailer or decontaminated stainless-steel or polyethylene long-handled scoop. Sample portions for BTEX or other lighter-than-water portions will be collected at the surface.
- Storm Water - Samples will be collected from the center of the drainage system or storm drain (if possible) at a depth of 6 inches below the surface of standing water (if possible). Sample portions for BTEX or other lighter-than-water portions will be collected at the surface. Sample will be collected using a dedicated polyethylene bailer, decontaminated stainless steel or polyethylene scoop, or by directly filling appropriate laboratory containers.
- Surface Water - Samples will be collected from the center of the surface water body cross section (if possible) and at mid-depth or at a minimum of 6 inches below the surface of the water (if possible) in the vicinity of the surface drainage discharge point. Sample portions for BTEX or other lighter-than-water portions will be collected at the surface. Samples will be collected using a dedicated polyethylene bailer or scoop or by directly filling appropriate laboratory containers.
- Subsurface Soil (Test Pits) - Samples will be collected from the bucket of the backhoe using a dedicated stainless steel or polystyrene scoop, or sterile wooden tongue depressor.
- Subsurface Soil (Monitoring Well/Soil Boring) - Samples will be collected using a decontaminated steel split-spoon sampler during monitoring well or soil boring construction and transferred to appropriate laboratory containers using dedicated stainless steel or polystyrene scoops, or sterile wooden tongue depressors.
- Subsurface Soil (Probe) - Samples will be collected using a decontaminated steel soil-core sampler with dedicated acetate tube liner and transferred to appropriate laboratory containers using dedicated stainless steel or polystyrene scoops, or sterile wooden tongue depressors.
- Groundwater (Probe/Hydropunch) - Samples will be collected upon installation of the probe using dedicated polyethylene tubing equipped with a bottom check valve, a small diameter bailer, or a peristaltic pump.

- Groundwater (Monitoring Well) - Samples will be collected with a dedicated polyethylene or decontaminated stainless steel bailer after purging three to five well casing volumes (until field measurements for pH, conductivity, temperature and turbidity have stabilized, or until the well is purged dry) and the well has been allowed to recharge.
- Air - Samples will be collected using a dedicated sorbent tube or Tedlar® bag and low-flow sampling pump. Alternatively, pre-cleaned SUMMA® canisters may be used. Samples will be collected over a period of time selected to appropriately represent the conditions to be evaluated.

### Comparability

Comparability expresses the confidence with which one set of data can be compared to another. Quantitatively, comparability can be assessed in terms of precision and accuracy between to sets of data. Qualitatively, data subject to strict QA/QC procedures will be deemed more reliable than data obtained without strict use of these procedures. All data will be presented in the units designated by the methods specified in the NYSDEC ASP or EPA SW-846. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods, as applicable.

### Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected under typical conditions. The acceptability of 100% of the data is desired as a goal for this project. The acceptability of less than 100% complete data, meeting all laboratory QA/QC protocols/standards, will be evaluated on a case-by-case basis.

## Detailed Sampling Procedures

Environmental samples will be collected as part of the site assessment. These may include groundwater, wastewater, storm water, surface water, sediment/sludge, subsurface soil, surface soil, soil vapor, and ambient air. Sample locations may consist of monitoring wells, dry wells, wastewater disposal/sanitary systems, soil probe locations, groundwater probe/ Hydropunch locations, storm water drainage systems, surface water bodies, soil borings, surface soils, test pits, soil vapor points, and ambient air. Actual locations, sample quantities, and matrices will be described in the site-specific work plan.

General sampling approaches and equipment are described in this section. A summary of the general sampling program, including sample media, depths, equipment, rationale, and analytical parameters is provided in Table 2.

When taking soil samples, an attempt will be made to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (*i.e.*, decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Every effort will be made to ensure that the sample is a proper representation of the matrix from which it was collected. For all matrices, VOC aliquots will be transferred into the sample bottle as quickly as possible, with no mixing, to ensure that the volatile fraction is not lost.

Note that, in general, the use of polyethylene, polystyrene, stainless-steel, or Teflon® sampling equipment is acceptable assuming it has been certifiably decontaminated prior to use, either on site or by the manufacturer. Polyethylene is not recommended when sampling for semivolatile organics due to potential release of phthalate esters into the sample.

The materials involved in groundwater sampling are critical to the collection of high quality monitoring information, particularly where the analyses of volatile, pH sensitive, or reduced chemical constituents are of interest. The materials for bailers and pump parts will be Teflon®, stainless steel, PVC, and/or polyethylene.

There will be several steps taken after the transfer of the soil or water sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel (moistened with distilled/deionized water, if necessary).

The sample container will then be properly labeled. Appropriate information such as sample number, location, collection time, and sample description will be recorded in the field logbook. Associated paper work (*e.g.*, chain-of-custody forms) will then be completed and will stay with the sample. Samples will be packaged in a manner that will allow the appropriate storage temperature (4°C) to be maintained during shipment to the laboratory. Samples will be delivered to the laboratory within 48 hours of collection.

**TABLE 2 SUMMARY OF SAMPLING PROGRAM**

| Environmental Media | Sample Location | Sample Point | Sample Depth | Equipment | Rationale | Sample Analyses (Source) |
|---|---|---|---|---|---|---|
| Soil Vapor | On-Site & Off-Site | Soil vapor survey point | 3 feet below soil surface | Decontaminated or disposable soil vapor rods/tubing, sorbent tube/Tedlar® bag and personal sampling pump or SUMMA® canister | Determine soil vapor concentrations, aid location of other samples, and define potential impacts to surface receptors | VOCs and naphthalene (EPA Compendium of TO Methods or 10/95 NYSDEC ASP) |
| Surface Soil | On-Site & Off-Site | Biased to areas of potential contamination or sensitive receptors | 0-2 inches below soil surface | Stainless steel or polystyrene scoop, or sterile wooden tongue depressor | Determine chemical concentrations and potential impacts to receptors | BTEX, PAHs, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Surface Soil | On-Site & Off-Site | Ash | 0-2 inches below surface | Stainless steel or polystyrene scoop, or sterile wooden tongue depressor | Determine chemical concentrations and potential impacts to receptors | SVOCs, TAL metals (10/95 NYSDEC ASP) |
| Sediment/ Sludge | On-Site & Off-Site | Dry well, catch basin, wastewater/sanitary system, storm drain, and surface water body | 0-6 inches below sediment surface | Decontaminated long handle polyethylene scoop, sediment dredge, or split-spoon sampler | Determine chemical concentrations and potential impacts to receptors | BTEX, PAHs, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Wastewater | On-Site | Wastewater/Sanitary System | 6 inches below water surface; at surface when sampling for BTEX | Decontaminated long handle polyethylene scoop or polyethylene/stainless steel bailer | Determine chemical concentrations | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Drainage/Storm Water | On-Site & Off-Site | Dry well/catch basin/storm drain | 6 inches below water surface; at surface when sampling for BTEX | Decontaminated long handle polyethylene scoop or polyethylene/stainless steel bailer | Determine chemical concentrations and potential impacts to receptors | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Surface Water | On-Site & Off-Site | Surface water | 6 inches below water surface; at surface when sampling for BTEX | Decontaminated long handle polyethylene scoop or dedicated polyethylene/stainless steel bailer | Determine chemical concentrations and potential impacts to receptors | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Subsurface Soil | On-Site & Off-Site | Test Pits | Dependent on visual characteristics and organic vapor field screening | Decontaminated backhoe bucket, disposable polystyrene scoop, stainless steel spoon, or sterile wooden tongue depressor | Determine chemical concentrations and extent | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Subsurface Soil | On-Site & Off-Site | Well borehole/soil boring | Dependent on visual characteristics and organic vapor field screening | Auger, decontaminated split spoon, and polystyrene scoop/ stainless steel spoon/ sterile wooden tongue depressor | Determine chemical concentrations and extent | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Subsurface Soil | On-Site & Off-Site | Probe Location | Dependent on visual characteristics and organic vapor field screening | Decontaminated probe and dedicated acetate tube liner | Determine chemical concentrations and extent | BTEX, PAH, RCRA metals, total cyanide, PCBs (10/95 NYSDEC ASP) |
| Groundwater | On-Site & Off-Site | Groundwater Probe/ Hydropunch Location | At screened interval of probe | Disposable polyethylene tubing with bottom check valve, small diameter bailer, or peristaltic pump | Determine chemical concentrations and extent | BTEX and PAH (10/95 NYSDEC ASP) |
| Groundwater | On-Site & Off-Site | Monitoring well | At screened interval of well | Disposable polyethylene bailer, or pre-cleaned stainless steel bailer (after purge of three well volumes) | Determine chemical concentrations and extent | BTEX, PAH, RCRA metals, total cyanide or full TCL/TAL (10/95 NYSDEC ASP) |
| Air | On-Site & Off-Site | Ambient Air | Breathing Zone | Personal sampling pump and dedicated sorbent tube, Tedlar® bag or SUMMA® canister | Determine chemical concentrations in air and worker exposure | BTEX and naphthalene (EPA Compendium of TO Methods) |
| Air | On-Site & Off-Site | Drilling and sample locations | In the breathing zone and at point of sample collection | Photoionization and/or flame ionization detector | To screen for organic vapors in air | Total organic vapors |

Sources: NYSDEC, October 1995, *Analytical Services Protocol*.
EPA, 1999, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*.

Key:
BTEX = benzene, toluene, ethylbenzene, xylenes
PAH = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls
RCRA metals = arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
TCL = Superfund Target Compound List volatiles, semivolatiles, pesticides, PCBs
TAL = Superfund Target Analyte List metals (23) and total cyanide

## Sample Identification

All samples collected will be labeled with a sample identification code. The code will identify the site, sample location, matrix, and series number (for locations with more than one sample). Samples will be labeled according to the following system:

| | |
|---|---|
| Site: | Site name (*e.g.*, Garden City "GC") |
| Sample Type: | Soil Boring or Probe "SB"<br>Monitoring Well "MW"<br>Dry Well "DW"<br>Surface Soil "SS"<br>Surface Water "SW"<br>Sediment "SD"<br>Groundwater Probe "GP"<br>Test Pit "TP"<br>Storm Drain "ST"<br>Sanitary System Leaching Pool "LP"<br>Sanitary System Septic Tank/Pit "SP"<br>Soil Vapor/Gas Probe "SG"<br>Ambient Air "AA"<br>Runoff Water "RW"<br>Runoff Sediment "RS" |
| Sample Matrix: | Soil "S"<br>Sediment "SD"<br>Sludge "SL"<br>Groundwater "GW"<br>Drainage Water/Storm Water "DW"<br>Surface Water "SW"<br>Wastewater "WW"<br>Air "A"<br>Soil Vapor/Gas "SG"<br>Tap Water "TW" |
| Sample Number: | For circumstances where more than one sample of the same type and/or from the same location will be collected, a consecutive sample number will be assigned. When more than one sample is collected from a borehole in a sampling round at different depths, the depth will be indicated on the sample container and in the field logbook. |
| QA/QC: | Matrix Spike/Matrix Spike Duplicate "MS"<br>Field Blank "FB"<br>Trip Blank "TB" |

Based upon the above sample identification procedures, an example of a sample label may be:

Site Name Sample Type Sample Number

**GC-SB-S-1-(5) - MS**

Sample Matrix Sample Depth QA / QC

## Sample Handling, Packaging, and Shipping

All samples will be placed in the appropriate containers as specified by the appropriate method in the NYSDEC ASP or EPA SW-846 (see Table 1). The holding time criteria identified in the ASP will be followed as specified in Table 1. The subcontracted laboratory will provide sample containers. These containers shall be acquired from a reliable source and prepared in a manner consistent with the bottle washing procedures of the NYSDEC ASP.

Sample preservation shall be performed in a manner consistent with the appropriate method in the NYSDEC ASP or EPA SW-846 and as summarized in Table 1. Reagent-grade preservatives shall be used. The pH of each preserved sample will be verified in the field prior to shipping and at the laboratory at the time of sample receipt or just prior to extraction, digestion, and/or analysis.

Prior to packaging any samples for shipment, the sample containers will be checked for proper identification and compared to the field logbook for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler (or laboratory shuttle) with a sufficient amount of bagged ice or "blue ice" packs in order to keep the samples at 4°C until arrival at the laboratory.

All necessary documentation required to accompany the sample during shipment will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with packing tape, and custody seals will be placed in such a manner that opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped to ensure laboratory receipt within 48 hours of sample collection in accordance with NYSDEC requirements. The laboratory will be notified prior to the shipment of the samples.

## Media-Specific Sampling Procedures

### Soil Vapor

1. Refer to the appropriate USEPA Method for toxic organic (TO) compounds in air (USEPA 1999) and/or ASTM method (D5314-92e1).
2. Be certain that the sample location is noted on Location Sketch.
3. Calibrate personal sampling pump in accordance with manufacturer's specifications, if necessary.
4. Drive the decontaminated stainless steel probe into the ground to the desired depth in accordance with the procedures applicable to the specific probe type used (refer to manufacturer's specifications where applicable). Alternatively, drill a hole with a screw-type stainless steel auger to the desired depth. The hole diameter should be the same as that of the probe. Insert dedicated PVC probe into hole.
5. Connect new polyethylene tubing (Teflon®-lined when sampling for SVOCs) to the probe and the pump. Check all connections and turn on pump. Allow the pump to run until the soil vapor within the probe has reached equilibrium.*
6. Collect a vapor sample using a gas tight syringe, sorbent tube, or Tedlar® bag in accordance with the appropriate EPA TO or ASTM method.
7. Shut off pump and disconnect tubing.
8. Record all sample information in the field logbook and on the chain of custody form.
9. Extract probe from the ground. If reusable, decontaminate according to the procedures in Section 6.4. If dedicated, dispose of in accordance with the procedures in Section 6.5.
10. Backfill probe hole with native soil or concrete.

### Shallow Soil/Water

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the sampling equipment, including the shovel or stainless steel scoop, is decontaminated utilizing the procedures outlined in Section 6.4.

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* In order to establish the amount of time required for the soil vapor to reach equilibrium in the probe, the following approaches can be utilized:
   a. Once the personal sampling pump is turned on, collect a sample every 1 to 2 minutes and analyze on a portable gas chromatograph. Continue to collect samples until two consecutive samples yield comparable results. Do this at two or three locations in order to establish a pumping time.
   b. Instead of using a personal sampling pump, attach the tubing from the probe directly to a PID or FID. Once a steady reading is obtained, the system is considered to be in equilibrium. (Not recommended if low levels of volatile organic vapors are present [*i.e.*, <1 ppm].)
   c. Calculate the volume of air within the probe; divide by the pump flow rate to determine the time necessary to evacuate the probe; evacuate three to five volumes prior to collecting sample.

3. Remove laboratory precleaned sample containers from sample cooler, label container with indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Dig/scoop out soil to desired depth (*i.e.*, 0 to 2 inches) and set aside.
5. If water is present, collect a water sample using a disposable scoop or fill the bottle directly by lowering into the water. Replace the container cover. If water is not present, sample the soil at the bottom of the excavation using a disposable scoop, place into the open sample containers and replace the container covers.
6. Backfill excavation with the removed soils that were set aside as the top layer.
7. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.4.
8. Dispose of dedicated sampling devices and disposable personal protective equipment (PPE) as described in Section 6.5.

## Surface Soil

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that non-disposable sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.4.
3. Remove laboratory precleaned sample container from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. At the sample location, clear surface debris (*e.g.*, vegetation, rocks, twigs, *etc.*) or remove sod or pavement as applicable. Collect an adequate amount of soil from a depth of 0 to 2 inches using a decontaminated or disposable scoop and/or sterile wooden tongue depressor. Transfer the sample directly into the sample container.
5. Return the sample container to the cooler.
6. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.4.
7. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Sediment

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that non-disposable sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.4.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.

4. Wear disposable gloves and boots or hip-waders if necessary to enter surface water bodies.
5. Insert scoop slowly at 0-6 inches into the sediment and remove sample. Sample sediment only after surface water samples have been taken to avoid introduction of sediment into the water.
6. If depth to sediment is greater than the reach of a long handled scoop, the sample may need to be collected utilizing a soil probe, split-spoon sampler, or sediment dredge.
7. With a sterile wooden tongue depressor and/or dedicated or decontaminated scoop, transfer the sample into the open sample container taking care not to spill sample on the outside of the container or overfill container and replace cover on the sample container.
8. Return sample container to sample cooler.
9. If necessary, decontaminate the sampling equipment according to the procedures outlined in Section 6.4.
10. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

### Surface Water (Including Open Bodies, Drainage Water, Wastewater, Storm Water)

1. Be certain sample location is noted on Location Sketch.
2. Be certain that all non-disposable sampling equipment has been decontaminated utilizing the procedures outlined in Section 6.4.
3. Remove laboratory precleaned sample bottles from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Wear disposable gloves and boots or hip-waders if necessary to enter surface water bodies. Enter the water downstream of the sample location with minimal disturbance of the sediment.
5. Lower the scoop or bailer slowly into the water making sure that the sample is taken just below the surface of the water (or at the water/air interface if there is a sheen present) and raise the sample out of the water. Sample water before sediment to avoid introduction of sediment into the water.
6. Gently pour the sample into the sample container, taking care not to spill the sample on the outside of the container or overfill, and replace cover on the sample container. For volatile organic samples, make sure that there are no air bubbles in the sample vial after it has been capped. This is accomplished by filling the vial such that there is a meniscus on top. Carefully slide the cap, Teflon®-side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove septum, and add more sample (or resample). Replace septum, recap, and check for bubbles. Continue until vial is bubble-free.

7. Return sample container to sample cooler. If the sample is obtained directly with a sample container, dry the exterior of the container before placing into cooler.
8. If reusable, decontaminate the sampling equipment according to the procedures outlined in Section 6.4.
9. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Subsurface Soil (Test Pit)

Test pit excavation will be conducted using a backhoe or excavator operated by qualified personnel.

1. Be certain that the sample location is noted on Location Sketch.

2. Be certain that the sampling equipment, including the backhoe/excavator bucket, is decontaminated utilizing the procedures outlined in Section 6.4.

3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.

4. Set aside soil from the top 2 feet (or less if chemicals are suspected to be present).

5. Lower the bucket into the test pit and remove soil/waste material.

6. Immediately upon retrieval of the soil/waste material, obtain an organic vapor measurement with a PID or FID.

7. Depending upon the organic vapor measurement, odors, and visual characteristics, obtain a soil sample from the backhoe bucket with a dedicated or decontaminated scoop and/or wooden tongue depressor. Place into the open sample containers and replace the container covers.

8. Record sample and test pit information, including a description of soil/waste with location, depth, and material sampled, on a test pit log form or in the site logbook.

9. Return the sample container to the cooler.

10. Backfill test pit using the soil removed during excavation. If soil/wastes were disposed off site or are not suitable to use as backfill, acquire certified clean fill (if the supplier does not perform testing, make prior arrangements to sample and analyze the fill). Compact fill with the backhoe bucket in lifts not to exceed 12 inches. Use the top 2 feet of soil that was set aside as the top layer.

11. If reusable, decontaminate the sampling equipment according to the procedures described in Section 6.4.

12. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Subsurface Soil (Probe)

Sampling will be conducted using a direct push rig (*e.g.*, Geoprobe®) operated by qualified personnel.

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the sampling equipment, including the sampling rods, is decontaminated utilizing the procedures outlined in Section 6.4.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.
4. Equip the decontaminated probe with a dedicated acetate liner and drive to the desired sampling depth.
5. Retrieve the soil probe and immediately after opening it, obtain an organic vapor measurement with a FID or PID.
6. Remove a sample aliquot from the soil probe using a dedicated or decontaminated scoop and/or sterile wooden tongue depressor, place into the open sample container and replace the container cover.
7. Return the sample container to the cooler.
8. Decontaminate the probe and reusable sampling equipment according to the procedures described in Section 6.4.
9. Backfill the probe hole with clean native soil or grout consisting of Type I Portland cement with 3 – 5% bentonite by weight.
10. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Subsurface Soil (Borehole, Split Spoon)

Drilling and sampling will be conducted using a drill rig equipped with hollow-stem augers and drive hammer that is operated by qualified personnel.

1. Be certain that the sample location is noted on Location Sketch.
2. Be certain that the sampling equipment (augers, split spoon) has been decontaminated utilizing the procedures outlined in Section 6.4.
3. Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.

4. Drill into the soil to the desired depth and drive the split-spoon sampler ahead of the lead auger in accordance with ASTM procedures (ASTM D1586-99).

5. Retrieve the split spoon and immediately after opening obtain an organic vapor measurement with a PID or FID and fill out Boring Log Form.

6. Remove a sample aliquot from the split spoon using a dedicated or decontaminated scoop and/or sterile wooden tongue depressor, place into the open sample container and replace the container cover.

7. Return the sample container to the cooler.

8. Decontaminate the split spoon and reusable sampling equipment according to the procedures described in Section 6.4.

9. Backfill the borehole with clean native soil and/or a grout mixture consisting of Type I Portland cement with 3 - 5% bentonite by weight.

10. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Groundwater (Probe, Hydropunch)

Sampling will be conducted using a direct push rig (*e.g.*, Geoprobe®) with a screen point sampler or standard drill rig equipped with a Hydropunch that is operated by qualified personnel.

1. Be certain sample location is noted on Location Sketch.

2. Be certain that the probe rods and sampling equipment have been decontaminated utilizing the procedures outlined in Section 6.4.

3. Remove the laboratory precleaned sample containers from sample cooler, label container with an indelible marker. Record all sample information in the field logbook and on the chain of custody form.

4. Drive the screen point sampler or Hydropunch to the desired depth and expose the screened portion of the tool.

5. Obtain a sample by using a decontaminated Hydropunch bailer, dedicated small-diameter bailer, dedicated polyethylene tubing equipped with a bottom check valve, or peristaltic pump equipped with dedicated polyethylene tubing. The use of stainless steel bailers or Teflon®-lined tubing is recommended when sampling for semivolatile organics due to the potential for release of phthalate esters from polyethylene.

6. Gently fill the sample container taking care not to spill on the outside of the container or overfill container and replace cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing (see Surface Water above).

7. After sample collection, obtain field measurements including pH, conductivity, temperature, and turbidity, or as specified in the site-specific work plan.

8. Return sample containers to sample cooler.

9. Decontaminate reusable sampling equipment according to the procedures described in Section 6.4.

10. Backfill the probe hole with clean native soil and/or a grout mixture consisting of Type I Portland cement with 3 - 5% bentonite by weight.

11. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Groundwater (Monitoring Well)

1. Be certain sample location is noted on Location Sketch.

2. Be certain that the sampling equipment have been decontaminated utilizing the procedures outlined in Section 6.4.

3. Measure the depth of water using a decontaminated water level indicator and compute the volume of standing water in the well.

4. Remove three to five times the volume of standing water from the well until field measurements (*e.g.*, pH, conductivity, temperature, and turbidity) stabilize, the well is dry, or two hours has passed since the inception of purging, whichever occurs first. Turbidity should be less than 50 NTU prior to collection of a sample for metals analysis. However, in fine-grained formations where turbidities remain above 50 NTU, filtering is not permitted. Rather, allow the suspended particles in the well water to settle out for a period up to, but not to exceed, 24 hours after sampling. Carefully collect a sample from the top of the water column, taking care not to disturb the material settled on the bottom of the well. Well purging may be accomplished with dedicated or decontaminated bailers constructed of polyethylene (not recommended when sampling for semivolatile organics), PVC, stainless steel, or Teflon®. Alternatively, low-flow pumping techniques may be used as described in *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (Puls and Barcelona 1996), *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells* (EPA 1996), or equivalent guidelines.

5. Remove the laboratory precleaned sample containers from sample cooler, and label container with an indelible marker.

6. Obtain a sample by using a bailer or low-flow pumping techniques as described above.

7. Gently fill the sample containers taking care not to spill on the outside of the container or overfill container and replace the cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing (see Surface Water above).

8. Return sample container to sample cooler.

9. Record all sample information in the field logbook and on the chain of custody form.

10. Decontaminate reusable sampling equipment according to the procedures described in Section 6.4.

11. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Ambient Air (Sorbent Tube)

1. Refer to the appropriate USEPA method (*e.g.,* TO-1 or TO-15) (EPA 1999b) and/or ASTM method (D6196-97).

2. Be certain sample location is noted on Location Sketch.

3. Set the flow rate† to the desired setting on the air pump.

4. Label sorbent tube and record all sample information in the field logbook and on the chain of custody form.

5. Connect the sorbent tube to the pump using polyethylene or Teflon®-lined tubing and set sorbent tube in breathing zone. (This can be accomplished by attaching the pump to a stake).

6. Turn on pump and monitor the pump flow rate at half-hour intervals during the duration of sampling.

7. Turn off pump and disconnect the sorbent tube and check the pump flow rate.

8. Cap sorbent tubes and/or place in shipping containers, as applicable, and place in cooler.

9. Dispose of dedicated sampling devices and disposable PPE as described in Section 6.5.

## Ambient Air Sampling (Passivated/SUMMA® Canister)

Evacuated (subatmospheric pressure) air canisters may be used to collect grab samples of short duration or time-integrated samples over a period of hours using a flow-restrictive inlet. Pump-driven positive pressure samples may also be collected

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† Flow rate is determined using a calculation contained in the appropriate analytical method based on the constituents of concern at the site.

over time. Site-specific objectives and procedures will be included in the site-specific work plan.

1. Refer to the appropriate USEPA method (TO-14A or TO-15) (EPA 1999b) and/or ASTM method (D5466-95).

2. Be certain sample location is noted on Location Sketch.

3. Complete screening analysis using an organic vapor analyzer prior to placing canister.

4. Record ambient air temperatures in vicinity of canisters.

5. For time-integrated tests, calculate desired flow rate (see Method TO-14A).

6. For subatmospheric pressure canisters, connect practice canister to mass flow controller and mass flow meter. Adjust controller to desired rate, close practice canister valve, and reset timer to zero.

7. Attach certified clean canister to the flow controller and open canister and vacuum pressure gauge valves.

8. Record pressure data, close vacuum pressure valve and temperature. Record time and date.

9. After the sampling period, record maximum, minimum, and current temperature as well as current flow control reading.

10. Close canister valve, disconnect sampling line. Record final canister pressure. Turn sampler off.

11. Label canisters and place in manufacturer-supplied shipping containers.

10\. Dispose of disposable sampling equipment and PPE as described in Section 6.5.

## Decontamination Procedures

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling point. In instances where this is not possible, a field cleaning/decontamination procedure will be used in order to mitigate cross contamination between sample locations. A decontamination station/pad will be established for field activities, if necessary. This will be an area located away from the source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling locations to keep equipment transport handling to a minimum after decontamination.

All non-disposable equipment will be decontaminated at appropriate intervals (*e.g.*, prior to initial use, prior to moving to a new sampling location, and prior to leaving the site). Different decontamination procedures for various types of sampling equipment are used. When using field decontamination, sampling should commence in the area of the site with the lowest contamination, if known or probable, and proceed through to the areas of highest potential contamination.

## Drilling/Probing Equipment

All equipment such as drill rigs and other mobile equipment will receive an initial cleaning prior to use at the site. The frequency of subsequent cleanings while on site will depend on how the equipment is actually used in relation to collecting environmental samples. After the initial decontamination, cleaning may be reduced to those areas that are in close proximity to materials being sampled. Drill rig/probe items such as augers, drill/probe rods and drill bits will be cleaned in between sample locations. Drill/probe rigs that are obviously leaking fuel, lubricants, or hydraulic oil, or that have loose, flaking paint, will not be used.

Drilling/probing equipment will be decontaminated in the following manner:

- Wash thoroughly with non-residual detergent (*e.g.,* Alconox®) and potable water using a brush to remove particulate matter or surface film if present.
- Pressure wash with hot potable water/steam.
- Once decontaminated, remove all items from the decontamination area.

All downhole/drilling items, such as split-spoon samplers, Shelby tubes, rock coring tools, or any other piece of equipment that will come in direct contact with a sample during drilling, will be decontaminated by pressure washing or by the procedure described below.

## Sampling Equipment

Decontamination procedures for non-disposable, non-dedicated sampling equipment will be as follows:

- Wash thoroughly with non-residual detergent (*e.g.,* Alconox®) and potable water using a brush to remove particulate matter or surface film. Pressure washing will be utilized, if necessary, to remove oil and/or tar.
- Rinse with a 1:10 nitric acid solution when sampling for metals.
- Rinse with potable water.
- Rinse in a well-ventilated area with methanol (pesticide grade) and air dry.
- Rinse thoroughly with deionized or distilled water and air dry.
- Wrap completely in clean aluminum foil for storage. For small sampling items, such as scoops, decontamination will take place over a drum specifically used for this purpose.

## Well Casing and Development Equipment

Field cleaning of well casings will consist of a manual scrubbing with a non-residual detergent solution to remove foreign material, followed by high-pressure hot water/steam cleaning. This procedure will be used on the inside and outside of casings/pipes to remove all traces of oil, grease, and tar, if present. Alternatively, This material will then be stored in such a manner so as to preserve it in this condition. Special attention to threaded joints will be necessary to remove cutting oil or weld burn residues, if necessary.

Materials and equipment that will be used for the purposes of well development will also be decontaminated by steam cleaning. An additional step will involve flushing the interior of any hose, pump, etc. with detergent solution followed by a potable water rinse prior to the development of the next well.

## Control and Disposal of Investigation-Derived Waste

During construction and sampling of monitoring wells and soil borings, waste materials, soil, and water may be generated from drill cuttings, drilling fluids, decontamination water, development water, and purge water. All soil cuttings generated during the remedial investigation will be handled in a manner consistent with NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4032, *Disposal of Drill Cuttings*.

In the absence of organic vapor readings, all water generated during the investigation, including decontamination water, drill water and purge water, will be discharged on site, if possible, following testing. If it is not possible to discharge water on site, the next preferred option is discharge of the water to a municipal sewer system. Such discharge requires prior approval of the local publicly owned treatment works. The site-specific work plan will provide detailed information on the disposal of water generated during the investigation. Disposal of all investigation-derived wastes must be pre-approved by a KeySpan site representative since KeySpan will be considered the waste generator and will ultimately be responsible for its disposition.

DOT-approved 55-gallon drums and/or a pre-lined waste storage container (*i.e.,* roll-off) will be used for the containment of soil cuttings, water not otherwise disposed of, and similar wastes. PPE and disposable sampling equipment (*i.e.*, bailers, scoops, tongue depressors, tubing, *etc.*) that are likely to be contaminated based on visual observations, field screening, and previous analytical results will also be drummed. If this material is not suspected to be contaminated, it will be rendered unusable and double-bagged. Drums will be marked, labeled with a description of their contents, date, and the location from which the waste was derived and sealed. All drummed and bagged wastes will be stored on site in a secure area pending disposal.

## Quality Control Samples

Various types of QC samples are used to check the cleanliness and effectiveness of field handling methods, assess sample matrix effects on analysis, and determine levels of background laboratory contamination.

## Field QC Samples

### Trip Blanks (Travel Blanks)

The primary purpose of a trip blank is to detect other sources of contamination that might potentially influence contaminant values reported in actual samples, both quantitatively and qualitatively. The following have been identified as potential sources of contamination:

- Laboratory reagent water;
- Sample containers;
- Cross contamination in shipment;
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

A trip blank will consist of a set of 40-ml sample vials filled at the laboratory with laboratory-demonstrated analyte-free water. Trip blanks will be handled, transported, and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, these sample containers only travel with the sample cooler. The temperature of the trip blanks will be maintained at 4°C while on site and during shipment. Trip blanks will return to the laboratory with the same set of bottles they accompanied in the field.

The purpose of a trip blank is to control sample bottle preparation and blank water quality as well as sample handling. Thus, the trip blank will travel to the site with the empty sample bottles and back from the site with the collected samples in an effort to simulate sample handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality.

Trip blanks will be submitted only when collecting water samples for VOC analysis, including field blanks, at the rate of one per shipping cooler containing VOC sample portions. Trip blanks will be analyzed for VOCs only.

### Equipment Rinsate Blanks

Rinsate blank samples are designed to demonstrate that non-dedicated sampling equipment has been properly prepared and cleaned before use and that cleaning procedures between samples are sufficient to minimize cross-contamination. Rinsate blanks are prepared by passing analyte-free (deionized) water over sampling equipment and analyzing the samples for all applicable parameters. If previous analytical data is available, it may be possible to predict which areas or samples are likely to have the highest chemical concentrations. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

Rinsate blanks shall be collected whenever non-dedicated equipment is used (*e.g.*, split spoons, bailers) at the rate of one per 20 samples per matrix.

### Field Duplicates

Duplicates consist of two sets of field samples collected independently at a sampling location during a single sampling event. Field duplicates may be sent to the laboratory so that they are indistinguishable from other analytical samples. Duplicates are used to assess sample homogeneity as well as the consistency of the overall sampling and analytical system.

In accordance with the NYSDEC ASP, field duplicates will be collected at the rate of one per ten field samples per matrix.

### Matrix Spikes/Matrix Spike Duplicates

The matrix spikes (MS) and matrix spike duplicates (MSD) are aliquots of a designated sample (water or soil) which are spiked in the laboratory with known quantities of specified compounds. These QC samples will be used to evaluate the matrix effect of the sample upon the analytical methodology, as well as to determine the overall precision of the analytical method used. The procedures and frequency regarding the MS/MSD samples are defined in the NYSDEC ASP. Sufficient sample volume shall be provided to the laboratory such that one MS/MSD set per 20 field samples per matrix can be analyzed.

## Laboratory QC Samples

Laboratory QC samples include numerous spike and blank samples and calibration standards designed to assess several analytical precision and accuracy issues. Examples of internal laboratory QC samples include method blanks, matrix spike blanks, laboratory control samples, surrogate spikes, spike duplicates, initial and continuing calibration blanks, *etc*. The QC samples required and the frequency of analysis is defined by the individual method of analysis and will conform to the NYSDEC ASP or most recent update of SW-846. Laboratory QC issues will be addressed during data validation.

## Field Management Documentation

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the sampling plan and generic QAPP in an efficient and high quality manner. Field management procedures will include, at a minimum:

- ➤ Following proper chain-of-custody procedures to track a sample from collection through analysis;
- ➤ Noting when, how, and where samples are collected or split (if required);
- ➤ Preparing a location sketch;
- ➤ Completing chain-of-custody forms, and test pit, boring/drilling, and well construction logs;
- ➤ Maintaining a daily field logbook; and
- ➤ Recording daily equipment calibration information, field activities, and work plan changes.

Proper completion of field documentation is necessary to support the consequent actions that may result from the sample analysis. This documentation will provide legally defensible support that the samples were collected and handled properly.

### Location Sketch

For each sampling point, a location sketch will be completed using permanent references and distances to the sampling point noted, if possible. When possible, the location sketch should be drawn in the field logbook.

### Field Logbook

Field logbooks will be bound and have consecutively-numbered pages. The *Environmental Risk Management Field Logbook* which will be utilized during the performance of field programs at all KeySpan sites is attached to this generic QAPP in its entirety as Appendix A. All pertinent information regarding the site and sampling procedures will be documented in the field logbook. Notations will be made in logbook fashion, noting the time and date of all entries. Information recorded in this notebook will include, but not be limited to, the following:

The first page of the log will contain the following information:

- ➤ Project name and address
- ➤ Project number
- ➤ Project Manager, Site Safety Officer, and Team Members
- ➤ Dates of field activities
- ➤ Emergency contacts

Daily entries, will be made for the following information:

- ➤ Purpose of sampling
- ➤ Location of sampling point
- ➤ Number(s) and volume(s) of sample(s) taken
- ➤ Description of sampling point (including matrix) and sampling methodology
- ➤ Date and time of collection, arrival, and departure
- ➤ Collector's sample identification number(s)
- ➤ Analyses to be performed
- ➤ Sample distribution and method of storage and transportation
- ➤ References, such as sketches of the sampling site or photographs of sample collection
- ➤ Field observations, including results of field analyses (e.g., pH, temperature, specific conductance), water levels, drilling logs, and organic vapor and dust readings
- ➤ Photographic information
- ➤ Signature of personnel responsible for completing log entries
- ➤ Site visitors' and subcontractors' names, titles, and contact information
- ➤ Weather conditions
- ➤ Any remarks or additional pertinent information pertaining to sample collection or general site activities.

Each daily entry page will be dated and the person making the entries will sign the bottom of the page. If more than one person makes entries in the logbook, individual entries will be initialed and the person with primary responsibility for keeping the logbook will sign the bottom of the page.

## Chain of Custody and Sample Identification Documentation

This section describes the procedures for sample chain of custody to be followed by VHB and laboratory personnel. The purpose of these procedures is to ensure that the integrity of he samples is maintained during their collection, transportation, storage, and analysis. The primary objective of chain-of-custody procedures is to provide an accurate written record that can be used to trace the possession and handling of a sample from the moment of its collections through its analysis.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- ➤ It is in the individual's physical possession;
- ➤ It is in the individual's view after being in his or her physical possession;
- ➤ It is secured by the individual so that no one can tamper with it; or
- ➤ The individual puts it in a designated and identified secure area.

When unused sample bottles or samples are shipped or will not be in project staff's physical possession, shipping containers/boxes should be sealed with custody tape. Individual bottles may also be sealed with custody tape across the lid. Custody tape (seals) are preprinted, adhesive-backed seals designed to break if the seals are disturbed in order to indicate possible breaches in chain of custody.

In general, the laboratory selected to perform the analytical services provides chain-of-custody forms. At a minimum, the following information will be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Date and time of collection
- Sample location
- Sample type
- Analysis requested
- Number of containers and volume taken
- Remarks
- Type of waste
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

Forms provided by the laboratory will be utilized. The chain-of-custody form will be filled out and signed by the person performing the sampling. The original of the form will travel with the sample and will be signed and dated each time the sample is relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler will keep one copy and a copy will be retained for the project file. A copy of the completed form will be returned by the laboratory with the analytical results.

The sample bottle will also be labeled with an indelible marker with a minimum of the following information:

- Sample number
- Analysis to be performed
- Date of collection
- Preservation techniques

A NYSDOH ELAP- and CLP-certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used to analyze samples collected during the investigation. The selected laboratory's SOPs will be made available upon request.

## Split Samples

Whenever samples are being split with another party, a chain-of-custody form will be completed for each set of samples. The split sample set will be relinquished to the party accepting the split samples. The sampler will sign under "relinquished by" and the party accepting the split samples will sign under "received by." A copy of the split sample chain-of-custody record will be maintained in the project file.

## Corrections to Documentation

No pages from field logbooks will be removed for any reason. If corrections to a field log book, sketch, or sampling form are necessary, they must be made by drawing a single line through the incorrect entry (so that the original entry can still be read) and writing the corrected entry alongside. All corrections must be initialed and dated by the person responsible for making the corrections.

## Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, the change, rationale for the change, and signatures of authorizing parties will be recorded in the field logbook. The Field Team Leader will make entries of this nature with the concurrence of the KeySpan on-site supervisor, VHB Project Manager, and NYSDEC Project Manager, if required.

# Calibration Procedures & Preventive Maintenance

Equipment calibration and operating procedures, which will include provisions for documentation of frequency, conditions, standards, and records reflecting the calibration procedures, methods of usage, and repair history of the measurement system will be maintained. Calibration of field equipment will be performed daily in accordance with the manufacturer's specifications to ensure reliable operation of the equipment. Daily field calibration procedures and results will be recorded in the field logbook.

Calibration procedures and preventive maintenance for laboratory equipment, in accordance with the NYSDEC ASP, will be contained in the laboratory's SOPs, which will be available upon request.

## Documentation, Data Reduction & Reporting

A NYSDOH ELAP- and CLP-certified laboratory meeting the New York State requirements for documentation, data reduction, and reporting will be used. All data will be cataloged according to sampling locations and sample identification nomenclature, as described above. All laboratory data packages provided by the laboratory will meet the requirements of a Category B deliverable as defined by the NYSDEC ASP.

## Data Validation

As described above, summary documentation regarding data validation will be completed by the laboratory using NYSDEC forms contained in the NYSDEC ASP and submitted with the data package.

Data validation will be performed in order to define and document analytical data quality in accordance with NYSDEC requirements that investigation data must be of known and acceptable quality. The analytical and validation processes will be conducted in accordance with the NYSDEC ASP dated October 1995.

Because the NYSDEC ASP is based on the EPA CLP, EPA Functional Guidelines for Organic and Inorganic Data Review (EPA 1999c; 1994b) will assist in formulating SOPs for the data validation process. The data validation process will ensure that all analytical requirements specific to the site work plan, including this generic QAPP are followed. Procedures will address validation of routine analytical services results based on the NYSDEC Target Compound List for standard sample matrices.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results. The overall level of effort and specific data validation procedure to be used will be for "100% validation."

During the review process, it will be determined whether the contractually required laboratory submittals for sample results are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of data. Each data package will be checked for completeness and technical adequacy of the data. Upon completion of the review, the reviewers will develop a QA/QC data validation report for each analytical data package.

"Qualified" analytical results for any one field sample will be established and presented based on the results of specific quality control (QC) samples and procedures associated with its sample analysis group or batch. Precision and accuracy criteria (*i.e*., QC acceptance limits) will be used in determining the need for qualifying data. Where the laboratory has reduced test data, the method of reduction will be described in the report. Reduction of laboratory measurements and laboratory reporting of analytical parameters will be verified in accordance with the procedures specified in the NYSDEC program documents for each analytical method (*i.e*., recreate laboratory calculations and data reporting in accordance with the method specific procedure). The standard operating guideline manuals and any special analytical methodology required will specify documentation needs and technical criteria and will be taken into consideration in the validation process. Copies of the complete data package and the validation report, including the laboratory results data report sheets, with any qualifiers deemed appropriate by the data reviewer, and a supplementary field QC sample result summary statement, will be submitted to KeySpan.

The following is a description of the two-phased approach to data validation that will be used for the investigation. The first phase is called check-listing and the second phase is the analytical quality review, with the former being a subset of the latter.

- Check-listing - The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.
- Analytical Quality Review - The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Summary Data Validation/Usability Report will be prepared and submitted to KeySpan.

## Performance & System Audits

Performance audits are a quantitative evaluation of the laboratory's measurement systems. They generally consist of evaluation of the lab's performance in analyzing performance evaluation samples and blind samples provided by regulating agencies. A NYSDOH ELAP- and CLP-certified laboratory, which has satisfactorily completed performance audits and performance evaluation samples, will be used to perform sample analyses for all field investigations.

System audits are a qualitative on-site review and evaluation of the components and implementation of VHB's QA program. They may consist of field, laboratory, or office audits performed by qualified QA or technical staff. During field activities, the QA officer may accompany sampling personnel into the field, in particular in the initial phase of the field program, to verify that the site sampling program is being properly conducted, and to detect and define problems so that corrective action can be taken early in the field program. All findings will be documented and provided to the Field Team Leader and VHB Project Manager.

## Corrective Action

The selected laboratory will meet the ASP requirements for corrective action protocols, including sample "clean up" to attempt to eliminate/mitigate matrix interference. The NYSDEC ASP includes both mandatory and optional sample cleanup and extraction methods. GPC cleanup is required for certain analyses and matrices in order to meet contract required detection limits. There are several optional cleanup and extraction methods noted in the ASP. These include florisil column cleanup, silica gel column cleanup, acid-base partition, steam distillation and sulfuric acid cleanup for PCB analysis.

High levels of matrix interference may be present in waste, soil, and sediment samples. This interference may prevent the achievement of ASP detection limits if no target compounds are found. In order to avoid unnecessary dilutions, the optional cleanup methods noted in the NYSDEC ASP will be required to be performed by the laboratory as necessary.

Corrective action will be required whenever a deficiency is identified in the laboratory or field operations. Laboratory corrective action procedures will be provided in the quality assurance manual provided by the laboratory selected to perform the analysis. Corrective action procedures for field activities will depend upon the nature of the system deficiency. Misidentification of samples and similar errors will require corrections to field documentation. Inappropriate decontamination procedures or the presence of analytes in field blanks may require additional decontamination, changes in the procedure, and/or resampling. Unauthorized changes to the sampling plan may also require resampling. These and similar deficiencies will be evaluated on a case-by-case basis by the field team leader, project manager, QA officer, and KeySpan representative. Documentation of deficiencies and the corrective actions applied thereto should be made in the field logbook, QA audit report, corrective action memorandum, and/or final site report, as appropriate.

## References

American Society For Testing And Materials (ASTM), 2000, *D1586-99 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*, West Conshohocken, PA.

ASTM, 2000, *D5314-92e1 Standard Guide for Soil Gas Monitoring in the Vadose Zone,* West Conshohocken, PA.

ASTM, 2000, *D5466-95 Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology),* West Conshohocken, PA.

ASTM, 2000, *D6196-97 Standard Practice for Selection of Sorbents and Pumped Sampling/Thermal Desorption Analysis Procedures for Volatile Organic Compounds in Air*, West Conshohocken, PA.

New York State Department of Environmental Conservation (NYSDEC), October 1995, *Analytical Services Protocol*, Division of Water, Albany, NY 12233-3500.

NYSDEC, 1989, Technical and Administrative Guidance Memorandum (TAGM) No. 4032, *Disposal of Drill Cuttings*, Division of Environmental Remediation, Albany, NY.

Puls, Robert W. and Michael J. Barcelona, 1996a, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540 S-94/504, U.S. EPA Superfund Technology Support Center for Ground Water, Ada, OK.

United States Environmental Protection Agency (USEPA), 1999a, *EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5)*, Interim Final, Office of Research and Development, Washington, D.C.

USEPA, 1999b, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition*, EPA/625/R-96/010b, Center for Environmental Research Information, Cincinnati, OH.

USEPA, 1999c, *Contract Laboratory Program, National Functional Guidelines for Organic Data Review,* EPA 540/R-99-008, Office of Emergency and Remedial Response.

USEPA, 1998, *EPA Guidance for Quality Assurance Project Plans (QA/G-5),* EPA/600/R-98/018, Office of Research and Development, Washington, D.C.

USEPA, 1997, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods SW-846*, Third Edition, Update III, Office of Solid Waste.

USEPA, 1996, *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells*, Region I SOP # GW 0001, Revision 2.

USEPA, 1994a, *Guidance for the Data Quality Objectives Process (QA/G-4)*, EPA/600/R-96-055, Office of Research and Development, Washington, D.C.

USEPA, 1994b, *Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review,* EPA 540/R-94-013, Office of Emergency and Remedial Response.

The WD Burdick Company, 1996, *Manufactured Gas Plants, a New York Heritage,* Skaneateles Falls, NY

# Attachment A

# Environmental Risk Management Field Logbook

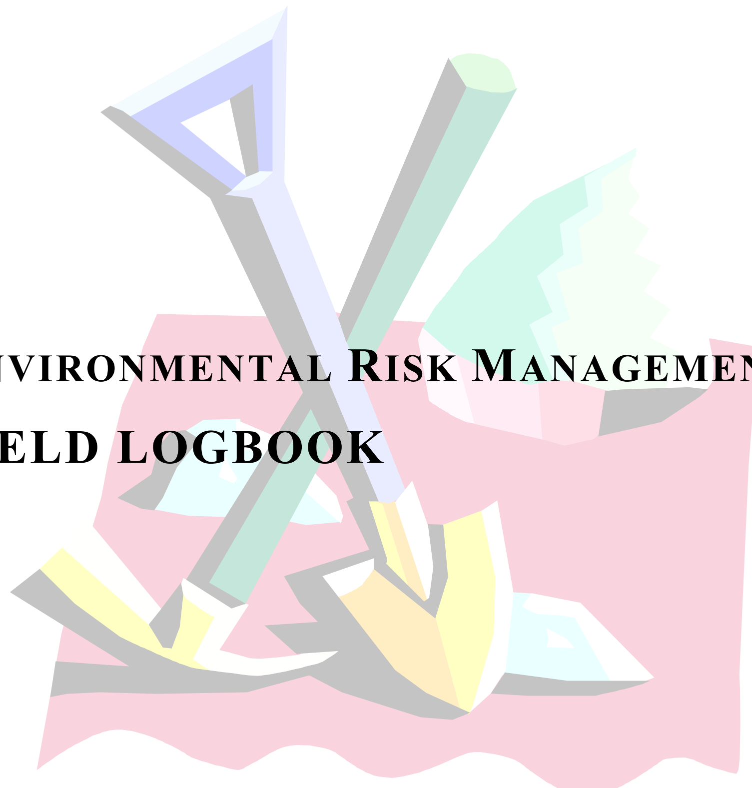
Transportation
Land Development
Environmental
Services

VHB Vanasse Hangen Brustlin, Inc.

54 Tuttle Place
Middletown, Connecticut 06457
860 632-1500
FAX 860 632-7879

# ENVIRONMENTAL RISK MANAGEMENT

# FIELD LOGBOOK



Site Name: ______________________________

Client: ________________________________

Project Number: _________________________

Dates of Field Activities: ________________

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CLIENT: ______________________________

JOB NUMBER: ______________________________

SITE NAME: ______________________________

DRILLER: ______________________________

LOCATION City/Town: ______________________________

State: ______________

PROJECT MANAGER: ______________________________

FIELD TEAM LEADERS: ______________________________

SITE SAFETY OFFICER (S): ______________________________

TEAM MEMBERS: ______________________________

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JOB START / FINISH DATES: ______________________________

BOOK ______ OF ______

| | | | |
|---|---|---|---|
| VHB CORPORATE: | 617-924-1770 | FAX: | 617-924-2286 |
| VHB MIDDLETOWN, CT: | 860-632-1500 | FAX: | 860-632-7879 or 860-632-8839 |
| PROJECT LABORATORY: | ______________ | FAX: | ______________ |
| Laboratory Name: | ______________ | | |

FEDERAL EXPRESS TOLL FREE: 1-800-GO-FEDEX or 1-800-463-3339

| Project / Client Contact(s) | Affiliation | Phone |
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## Drawings / Sketches

DRAWINGS / SKETCHES

DRAWINGS / SKETCHES

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DRAWINGS / SKETCHES

# Well/Soil Boring Log

Client Name: ____________________________________

Site Name / Location: ______________________________

Project No.: _____________________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

| | | | |
|---|---|---|---|
| Driller: | ______________________ | Well/Boring Depth: | ______________________ |
| Drill Rig: | ______________________ | Depth to Groundwater: | ______________________ |
| Technique: | ______________________ | VHB Representative: | ______________________ |
| Date: | ______________________ | | ______________________ |
| Weather: | ______________________ | | ______________________ |

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
|---|---|---|---|---|---|---|---|---|---|---|
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
|---|---|---|---|---|---|---|---|---|---|---|
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| ***Well ID:*** | | ***Date:*** | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

| | | |
|---|---|---|
| TOIC = top of inner casing | Vol(s) = volume(s) | NTU = Nephelometric turbidity units |
| µS/cm = microSiemens per centimeter | °C = degrees Celsius | °F = degrees Fahrenheit |

# Well/Soil Boring Log

Client Name: ________________________________

Site Name / Location: ___________________________

Project No.: _________________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ____________________

Driller: ____________________ Well/Boring Depth: ____________________

Drill Rig: ____________________ Depth to Groundwater: ____________________

Technique: ____________________ VHB Representative: ____________________

Date: ____________________ ____________________

Weather: ____________________ ____________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

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|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| ***Well ID:*** | | ***Date:*** | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| | Total Vol. Withdrawn | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time | Gallons | Well Vol(s). | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
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**Key**:

| | | |
|---|---|---|
| TOIC = top of inner casing | Vol(s) = volume(s) | NTU = Nephelometric turbidity units |
| µS/cm = microSiemens per centimeter | °C = degrees Celsius | °F = degrees Fahrenheit |

# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ______________________________

Project No.: ______________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**: BGS = below ground surface; F/PID = flame/photoionization detector; HAS = hollow-stem auger; NA = not applicable; NR = no recovery; PPM = parts per million

# Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| *Well ID:* | | *Date:* | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

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|---|---|---|
| TOIC = top of inner casing | Vol(s) = volume(s) | NTU = Nephelometric turbidity units |
| µS/cm = microSiemens per centimeter | °C = degrees Celsius | °F = degrees Fahrenheit |

# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ______________________________

Project No.: ______________________________

Location Sketch

Comments/Notes:

# Well / Soil Boring Log

Well/Boring ID: ______________________

| Driller: | ____________ | Well/Boring Depth: | ____________ |
|---|---|---|---|
| Drill Rig: | ____________ | Depth to Groundwater: | ____________ |
| Technique: | ____________ | VHB Representative: | ____________ |
| Date: | ____________ | | ____________ |
| Weather: | ____________ | | ____________ |

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | |
|---|---|---|
| BGS = below ground surface | HAS = hollow-stem auger | NR = no recovery |
| F/PID = flame/photoionization detector | NA = not applicable | PPM = parts per million |

## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**: BGS = below ground surface; F/PID = flame/photoionization detector; HAS = hollow-stem auger; NA = not applicable; NR = no recovery; PPM = parts per million

# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| *Well ID:* | | *Date:* | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

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# Well/Soil Boring Log

Client Name: ____________________________________

Site Name / Location: ______________________________

Project No.: _____________________________________

Location Sketch

Comments/Notes:

_____________________________________________________________________________

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# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
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## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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**Key**:

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# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| ***Well ID:*** | | ***Date:*** | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

| | | | | | |
|---|---|---|---|---|---|
| TOIC | = top of inner casing | Vol(s) | = volume(s) | NTU | = Nephelometric turbidity units |
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# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ________________________

Project No.: _______________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**: BGS = below ground surface; F/PID = flame/photoionization detector; HAS = hollow-stem auger; NA = not applicable; NR = no recovery; PPM = parts per million

## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | |
|---|---|---|
| BGS = below ground surface | HAS = hollow-stem auger | NR = no recovery |
| F/PID = flame/photoionization detector | NA = not applicable | PPM = parts per million |

# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| ***Well ID:*** | | ***Date:*** | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

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|---|---|---|---|---|---|
| TOIC | = top of inner casing | Vol(s) | = volume(s) | NTU | = Nephelometric turbidity units |
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# Well/Soil Boring Log

Client Name: ____________________________________

Site Name / Location: ______________________________

Project No.: _____________________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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**Key**:

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|---|---|---|---|---|---|
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## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| ***Well ID:*** | | ***Date:*** | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ______________________________

Project No.: ______________________________

Location Sketch

Comments/Notes:

# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**: BGS = below ground surface; F/PID = flame/photoionization detector; HAS = hollow-stem auger; NA = not applicable; NR = no recovery; PPM = parts per million

## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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|---|---|---|---|---|---|
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# WELL DEVELOPMENT RECORD

| | | | |
|---|---|---|---|
| *Well ID:* | | *Date:* | |
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key**:

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# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ______________________________

Project No.: ______________________________

Location Sketch

Comments/Notes:

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# WELL / SOIL BORING LOG

Well/Boring ID: ______________________________

Driller: ______________________ Well/Boring Depth: ______________________

Drill Rig: ______________________ Depth to Groundwater: ______________________

Technique: ______________________ VHB Representative: ______________________

Date: ______________________ ______________________

Weather: ______________________ ______________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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# Well/Soil Boring Log

Client Name: ______________________________

Site Name / Location: ________________________

Project No.: ______________________________

Location Sketch

Comments/Notes:

# Well / Soil Boring Log

Well/Boring ID: ____________________

Driller: ____________________ Well/Boring Depth: ____________________

Drill Rig: ____________________ Depth to Groundwater: ____________________

Technique: ____________________ VHB Representative: ____________________

Date: ____________________ ____________________

Weather: ____________________ ____________________

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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## Well/Soil Boring Log (cont.)

| Depth (feet BGS) | Sample # | Blow Counts | | | | Recovery | F/PID (PPM) | Field Classification and Remarks | Graphic Log | Well Diagram[1] |
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[1] See also separate well diagram containing well construction details.

**Key**:

| | | | | | |
|---|---|---|---|---|---|
| BGS | = below ground surface | HAS | = hollow-stem auger | NR | = no recovery |
| F/PID | = flame/photoionization detector | NA | = not applicable | PPM | = parts per million |

# WELL DEVELOPMENT RECORD

| *Well ID:* | | *Date:* | |
|---|---|---|---|
| Description of development technique: | | | |
| Developed by: | | | |

### *Initial Development Water*

| | | |
|---|---|---|
| Static water level (feet TOIC) | Total well depth (feet TOIC): | |
| Casing volume (gallons) | Color: | Clarity: |

### *Final Development Water*

| | | |
|---|---|---|
| Ending water level (feet TOIC): | Total well depth (feet TOIC): | |
| Casing volume (gallons): | Color: | Clarity: |

### *Well Development – Water Quality Measurements*

| Time | Total Vol. Withdrawn | | pH | Temp. (ºC/ºF) | Sp. Cond. (µS/cm) | Turbidity (NTU) | Other | Comments |
|---|---|---|---|---|---|---|---|---|
| | Gallons | Well Vol(s). | | | | | | |
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**Key:**

TOIC = top of inner casing
µS/cm = microSiemens per centimeter
Vol(s) = volume(s)
°C = degrees Celsius
NTU = Nephelometric turbidity units
°F = degrees Fahrenheit

# Geotechnical Reference Data

**USEFUL CONVERSIONS**

| | | | | |
|---|---|---|---|---|
| 1 gallon | = | 0.134 cubic feet | = | 3.785 liters |
| 1 cubic foot | = | 7.482 gallons | = | 28.32 liters |
| 1 meter | = | 3.281 feet | = | 39.37 inches |
| 1 inch | = | 2.540 centimeters | = | 0.0833 feet |
| 1 kilometer | = | 0.6214 miles | = | 3,281 feet |
| 1 kilogram | = | 2.205 pounds | = | 35.27 ounces |
| Density of water | = | 8.54 pounds/gallon | = | 1 kilogram/liter |

**VOLUME OF WATER IN CASING OR HOLE**

| Diameter of Casing/Hole | Gallons per Foot of Depth | Liters per Meter of Depth |
|---|---|---|
| 1 | 0.041 | 0.509 |
| 2 | 0.163 | 1.142 |
| NX (2.98) | 0.362 | 4.49 |
| 3 | 0.367 | 4.56 |
| HQ (3.78) | 0.583 | 7.24 |
| 4 | 0.653 | 8.11 |
| 6 | 1.47 | 18.2 |
| 8 | 2.61 | 32.4 |
| 12 | 5.88 | 73.0 |
| 24 | 23.5 | 292 |

**USEFUL RELATIONSHIPS**

Volume of well casing or hole, in gallons:

$$V_c = 0.163 \cdot r^2 \cdot h$$

Annular volume, in gallons:

$$V_a = 0.0408 \cdot (d_b{}^2 - d_c{}^2) \cdot h$$

Where:

$r$ = radius of casing/hole in inches

$h$ = height of water or depth of casing/hole in feet

$d_b$ = diameter of borehole in inches

$d_c$ = outside diameter of casing in inches

**ANNULAR VOLUME CHART (GALLONS/LINEAR FOOT)**

| Casing I.D. | Borehole Diameter | | | | |
|---|---|---|---|---|---|
| | 6 in. | 8 in. | 9 in. | 11 in. | 13 in. |
| 1 in. | 1.44 | 2.58 | -- | -- | -- |
| 2 in. | 1.31 | 2.46 | 3.16 | -- | -- |
| 4 in. | -- | 1.97 | 2.67 | 4.31 | -- |
| 6 in. | -- | 1.15 | 1.85 | 3.49 | 5.45 |

**SOIL DESCRIPTION CHECKLIST (BASED ON ASTM D2488)**

1. Group Symbol/Name
2. Particle Size Distribution
3. Color (in moist condition)
4. Odor (only if organic or unusual, but not if contaminated)
5. Moisture: dry, moist, wet

*Coarse Grained Portion*

6. Particle Angularity: angular, subangular, subround, round
7. Particle Shape: flat, elongated, both
8. Hardness: *e.g.*, do coarse grains fracture when struck with hammer

*Fine Grained Portion*

9. Plasticity: nonplastic, low, medium, high
10. Dry strength: none, low, medium, high, very high
11. Dilatancy: none, slow, rapid
12. Toughness: low, medium, high
13. Consistency: very soft, soft, firm, hard, very hard

*For Intact Samples*

14. Structure: stratified, laminated, fissured, slickensided, lensed, homogeneous
15. Cementation: weak, moderate, strong
16. Name/geologic interpretation
17. Additional comments: *e.g.*, presence of roots, mineralization, difficulty drilling or excavating, density (penetration test)

### Grain Size Chart

| Phi | mm | Inches | U.S. Standard Sieve | Description (USCS) |
|---|---|---|---|---|
| 8.23 | 300 | 11.8 | | Boulders |
| 6.23 | 75 | 2.95 | | Cobbles |
| 4.25 | 19 | 0.75 | | Coarse Gravel |
| 2.25 | 4.75 | 0.19 | No. 4 | Fine Gravel |
| -1 | 2 | .079 | No. 10 | Coarse Sand |
| 1.23 | 0.425 | .0167 | No. 40 | Medium Sand |
| 3.74 | 0.075 | .00295 | No. 200 | Fine Sand |
| | <0.075 | | | Silt and Clay |

### Moisture Condition

| Description | Criteria |
|---|---|
| Dry | Absence of moisture, dusty, dry to the touch |
| Moist | Damp but no visible water |
| Wet | Visible free water, usually below water table |

### Soil Classification Chart[A]

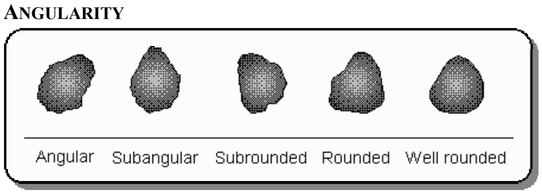
| *Major Divisions* | | | Group Symbol[C] | Typical Names |
|---|---|---|---|---|
| **Coarse-grained soils** More than 50% retained on No. 200 sieve ( 0.075 mm) | **Gravels** (More than 50% retained on No. 4 sieve) | Clean gravels (little or no fines) | GW | Well-graded[B] gravels, gravel-sand mixtures, little or no fines |
| | | | GP | Poorly-graded[B] gravels, gravel-sand mixtures, little or no fines |
| | | Gravels with fines | GM | Silty gravels, gravel-sand-silt mixtures |
| | | | GC | Clayey gravels, gravel-sand-clay mixtures |
| | **Sands** (More than 50% between No. 4 and 200 sieves) | Clean sands (little or no fines) | SW | Well-graded[B] sands, gravelly sands, little or no fines |
| | | | SP | Poorly-graded[B] sands, gravelly sands, little or no fines |
| | | Sands with fines | SM | Silty sands, sand-silt mixtures |
| | | | SC | Clayey sands, sand-clay mixtures |
| **Fine-grained soils** More than 50% smaller than No. 200 sieve (0.075 mm) | **Silts and clays** (Liquid limit <50) | | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity |
| | | | CL | Inorganic clays of low to medium plasticity gravelly clays, sandy clays, silty clays, lean clays |
| | | | OL | Organic silts and organic silty clays of low plasticity |
| | **Silts and clays** (Liquid limit >50) | | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts |
| | | | CH | Inorganic clays of high plasticity, fat clays |
| | | | OH | Organic clays of medium to high plasticity, organic silts |
| **Highly organic soils** | | | PT | Peat and other organic soils |

[A] Based on Unified Soil Classification System and ASTM D2487, adapted from Holtz and Kovacs 1981.

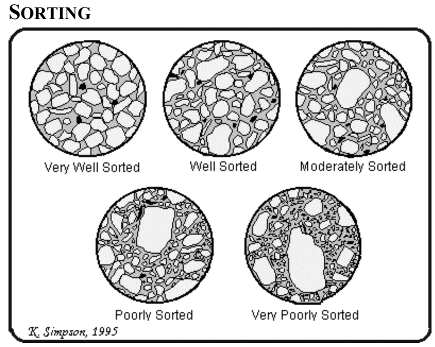
[B] "Well-graded" (or "poorly sorted") indicates a wide range in grain sizes, including all intermediate particle sizes. "Poorly-graded" (or "well sorted") indicates mostly one grain size or range of sizes with intermediate particle sizes missing.

[C] Other qualifiers may be added to group symbol. For example, if gravels or fines contain 15-30% sand, add "with sand." If sands or fines contain 15-30% gravel, add "with gravel." If fines contain >30% gravel or sand, add "gravelly" or "sandy," whichever predominates. If soil contains cobbles or boulders, add "with cobbles" and/or "with boulders."

### Angularity




### Sorting




### Particle Shape

| Description | Criteria |
|---|---|
| Flat | Particle width:thickness ratio >3 |
| Elongated | Particle length:width ratio >3 |
| Both | Meets both criteria |

**PLASTICITY**

| Description | Criteria |
|---|---|
| Nonplastic | An 1/8″ thread cannot be rolled at any water content. |
| Low | Thread can barely be rolled and lump cannot be formed when drier than the plastic limit. |
| Medium | Thread is easy to roll and little time is required to reach the plastic limit. Thread cannot be rerolled after reaching the plastic limit. Lump crumbles when drier than the plastic limit. |
| High | It takes considerable time rolling and kneading to reach the plastic limit. Thread can be rerolled several times. Lump can be formed without crumbling when drier than the plastic limit. |

**DILATANCY**

| Description | Criteria |
|---|---|
| None | No visible change in the specimen. |
| Slow | Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly when squeezed. |
| Rapid | Water appears quickly on the surface of the specimen during shaking and disappears quickly when squeezed. |

**CONSISTENCY**

| Description | Criteria |
|---|---|
| Very soft | Thumb will penetrate soil more than 1 inch. |
| Soft | Thumb will penetrate soil about 1 inch. |
| Firm | Thumb will indent soil about ¼ inch. |
| Hard | Thumb will not indent soil but readily indented with thumbnail. |
| Very hard | Thumbnail will not indent soil. |

**CEMENTATION**

| Description | Criteria |
|---|---|
| Weak | Crumbles or breaks with handling or little finger pressure. |
| Moderate | Crumbles or breaks with considerable finger pressure. |
| Strong | Will not crumble or break with finger pressure. |

**IDENTIFICATION OF FINE-GRAINED SOILS FROM MANUAL TESTS**

| Group Symbol | Dry Strength | Dilatancy | Toughness |
|---|---|---|---|
| ML | None to low | Slow to rapid | Low |
| CL | Medium to high | None to slow | Medium |
| MH | Low to medium | None to slow | Low to medium |
| CH | High to very high | None | High |

**DRY STRENGTH**

| Description | Criteria |
|---|---|
| None | Dry specimen crumbles into powder under handling pressure |
| Low | Dry specimen crumbles into powder with some finger pressure |
| Medium | Dry specimen breaks into pieces or crumbles with considerable finger pressure |
| High | Dry specimen cannot be broken with finger pressure but will break into pieces between thumb and hard surface |
| Very High | Dry specimen cannot be broken between thumb and hard surface |

**TOUGHNESS**

| Description | Criteria |
|---|---|
| Low | Only slight pressure is required to roll the thread near the plastic limit. The thread and lump are weak and soft. |
| Medium | Medium pressure is required to roll the thread near the plastic limit. The thread and lump have medium stiffness. |
| High | Considerable pressure is required to roll the thread near the plastic limit. The thread and lump have very high stiffness. |

**STRUCTURE**

| Description | Criteria |
|---|---|
| Stratified | Alternating layers of varying material or color with layers at least 6 mm thick. |
| Laminated | Alternating layers of varying material or color with layers less than 6 mm thick. |
| Fissured | Breaks along definite planes of fracture with little resistance |
| Slickensided | Fracture planes appear glossy, sometimes striated. |
| Blocky | Cohesive soil that can be broken down into small, angular lumps that resist further breakdown. |
| Lensed | Inclusion of small pockets of different soils. |
| Homogeneous | Same color and appearance throughout. |

**SOIL DENSITY FROM STANDARD PENETRATION TEST***

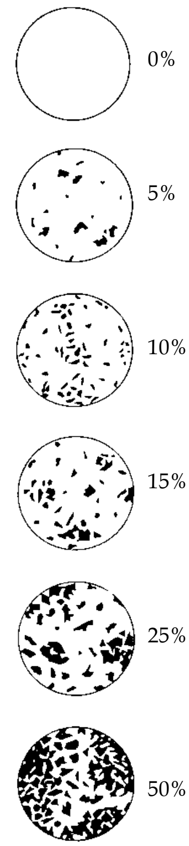
| Granular Soils | | Cohesive Soils | |
|---|---|---|---|
| N-value | Description | N-value | Description |
| 0 – 10 | Loose | 0 – 4 | Soft |
| 10 – 30 | Medium dense | 4 – 8 | Medium stiff |
| 30 – 50 | Dense | 8 – 15 | Stiff |
| > 50 | Very dense | 15 - 30 | Very stiff |

*ASTM D1586. N-value defined as blow count of 6 – 18 inch depth interval of sampler driven by 140-lb. hammer.

**ROCK DESCRIPTIVE TERMS**

| | | | |
|---|---|---|---|
| Hardness | Soft | Scratched by fingernail | |
| | Medium Hard | Scratched easily by penknife | |
| | Hard | Difficult to scratch with a penknife | |
| | Very Hard | Cannot be scratched by penknife | |
| Weathering | Fresh | Rock is unstained. May be fractured, but discontinuities are not stained. | |
| | Slightly | Rock is unstained. Discontinuities show some staining on the surfaces of rocks, but discoloration does not penetrate rock mass. | |
| | Moderate | Discontinuity surfaces are stained. Discoloration may extend into rock along discontinuity surfaces. | |
| | High | Individual rock fragments are thoroughly stained and may be crumbly. | |
| | Severe | Rock appears to consist of gravel-sized fragments in a "soil" matrix. Individual fragments are thoroughly discolored and can be broken with fingers. | |
| Bedding Planes | Laminated | < .04 in. | < 1 mm |
| | Parting | 0.04 in. – 0.24 in. | l mm - 6 mm |
| | Banded | 0.24 in. - 1 in. | 6 mm - 30 mm |
| | Thin | 1 in. - 4 in. | 3 cm - 9.1 cm |
| | Medium | 4 in. - 12 in. | 9.1 cm - 30.5 cm |
| | Thick | 12 in. - 36 in. | 30.5 cm - 1 m |
| | Massive | > 36 in. | > 1 m |
| Fracture Spacing | Very close | < 2 in. | < 5.1 cm |
| | Close | 2 in. – 1 ft. | 5.1 cm - 30.5 cm |
| | Moderately close | l ft. - 3 ft. | 30.5 cm - 91.4 cm |
| | Wide | 3 ft. – 10 ft. | 91.4 cm - 3 m |
| | Very wide | > 10 ft. | > 3 m |
| Voids | Porous | Smaller than a pinhead. Their presence is indicated by the degree of absorbency. | |
| | Pitted | Pinhead size to a ¼ inch. If only thin walls separate the individual pits, the core may be described as honeycombed. | |
| | Vug | ¼ inch to the diameter of the core. The upper limit will vary with core size. | |
| | Cavity | Larger than the diameter of the core. | |
| RQD | Very Poor | 0 – 25% | <u>RQD – Rock Quality Designation</u> |
| | Poor | 25 – 50% | Modified core recovery percentage calculated by dividing the sum of the lengths of core pieces 4 inches or larger by the total length of the run. RQD is a general estimate of the soundness of the rock and accounts for core loss, fracturing, weathering, etc. Use judgment to discern fractures caused by drilling and core recovery from *in-situ* fractures. |
| | Fair | 50 – 75% | |
| | Good | 75 – 90% | |
| | Excellent | 90 – 100% | |

**PARTICLE PERCENT COMPOSITION ESTIMATE**




**REFERENCES**

- American Society For Testing And Materials (ASTM), 2000, D2488-93e1 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), West Conshohocken, PA.
- ASTM, 2000, D2487-98 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), West Conshohocken, PA.
- ASTM, 2000, D1586-99 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils, West Conshohocken, PA.
- Compton, Robert R., 1985, Geology in the Field, John Wiley & Sons, Inc., New York, NY.

- Holtz Robert D. and William D. Kovacs, 1981, An Introduction to Geotechnical Engineering, Prentice-Hall, Inc., Englewood Cliffs, NY.

# FIELD CHANGE FORM

Project Name:________________________________________

Project Number:____________________ Field Change Number:____________________

Location:______________________________ Date:____________________

Field Activity Description:________________________________________

Reason for Change:________________________________________

Recommended Disposition:________________________________________

______________________________ ____________________

Field Operations Officer (VHB) (Signature) Date

Disposition:________________________________________

______________________________ ____________________

On-site Supervisor (NYSDEC) (Signature) Date

Distribution: Project Manager (VHB)
Project Manager (NYSDEC)
Field Operations Officer
On-site Supervisor (NYSDEC)

Others as Required: ____________________

Date: ____________________

# DAILY EQUIPMENT CALIBRATION LOG

Project Name: ______________________________

Project Number: ______________________________ Calibrated by: ______________________________

| Instrument Name and Model Number | Calibration Method | Time | Readings and Observations |
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**KEYSPAN ENERGY**
***Field Program Photographic Log***

**Week Ending:** ______________________ **Page:** _________ **of** _________

| Photograph Number | Date | Time | Location | Photograph Description |
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**Date:** ______________________

# SAMPLE INFORMATION RECORD

**Client Name:** ______________________________________

**Site Name / Location:** ________________________________

**Project No.:** ______________________________________

***Location Sketch***

**Comments/Notes:**

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

**Date:** ______________________

# SAMPLE INFORMATION RECORD

**Site:** ______________________ **Sample Crew:** ______________________

**Sample Location/Well No.:** ______________________

**Field Sample I.D. Number:** ______________________ **Time:** ______________________

**Weather:** ______________________ **Temperature:** ______________________

**Sample Type:**

**Groundwater:** ______________________ **Sediment:** ______________________

**Surface Water/Stream:** ______________________ **Air:** ______________________

**Soil:** ______________________ **Other (describe, i.e., water, septage, etc.):** ______________________

**Well Information (fill out for groundwater samples):**

**Depth to Water:** ______________________ **Measurement Method:** ______________________

**Depth of Well:** ______________________ **Measurement Method:** ______________________

**Volume Removed:** ______________________ **Removal Method:** ______________________

**Field Test Results:**

**Color:** ______________ **pH:** ______________ **Odor:** ______________

**Temperature (ºF):** ______________ **Specific Conductance (µmhos/cm):** ______________

**Other (OVA, Methane Meter, etc.):** ______________________

---

**Constituents Sampled:**

______________ ______________ ______________ ______________

______________ ______________ ______________ ______________

**Remarks:**

______________________________________________

______________________________________________

______________________________________________

***Well Casing Volumes***

| | | | | | |
|---|---|---|---|---|---|
| **GAL/FT** | **1" = 0.041** | **1½" = 0.10** | **2½" = 0.24** | **3½" = 0.50** | **6" = 1.47** |
| | **1¼" = 0.077** | **2" = 0.16** | **3" = 0.37** | **4" = 0.65** | **8" = 2.61** |

**KEYSPAN ENERGY**

***Development Data Form***

**Well ID:** ____________________ **Date:** ____________________

**Total Well Depth :** ____________________ **FT.**

***(From Top of Casing)***

**Volume of Standing** ***(Water in Well):*** ____________________ **GALS.**

**Depth to Water :** ***(From Top of Casing)*** ____________________ **FT.**

**FLOW RATE (Average):** ____________________ ***GPM***

**Purge Time:** ***Start:*** ____________________ ***Finish:*** ____________________

**TOTAL GALLONS PURGED:** ____________________ ***GAL***

| **Sample Time:** *(min. since start of* | **Flow Rate** *(gpm)* | **pH** *(pH units)* | **Conductivity** *(mS/cm)* | **Dissolved Oxygen** *(mg/l)* | **Temperature** *(Celcius)* | **Salinity** *(Percent)* | **Turbidity** *(NTU)* | **Depth to Water** *(Ft.)* | **General Comments** |
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**KEYSPAN ENERGY**

***Monitoring Well Sample Data Form***

**Well ID:** ______________________ **Sample Date:** ______________________

**Total Well Depth (from top of casing):** ______________________ **Depth to Water (from top of casing):** ______________________

**Well Diameter:** ______________________ **Volume of Standing Water in well:** ______________________

**Sampling Crew:** ______________________

**Purge Time:** *Start:* ______________________ *Finish:* ______________________

**Purging Method:** ______________________

**Sampling Method:** ______________________

**Sample Time:** *Start:* ______________________ *Finish:* ______________________

**Sample Analysis:** ______________________

| ***PURGE DATA*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Time:** | **Flow Rate** *(gpm)* | **Volume Purged** *(gallons)* | **pH** *(pH units)* | **Conductivity** *(mS/cm)* | **Turbidity** *(NTU)* | **Dissolved Oxygen** *(mg/l)* | **Temperature** *(Celcius)* | **Salinity** *(Percent)* | **PID Headspace** *(ppm)* | **General Comments** |
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**VHB** **Overburden Monitoring Well Diagram** *Environmental Risk Management*

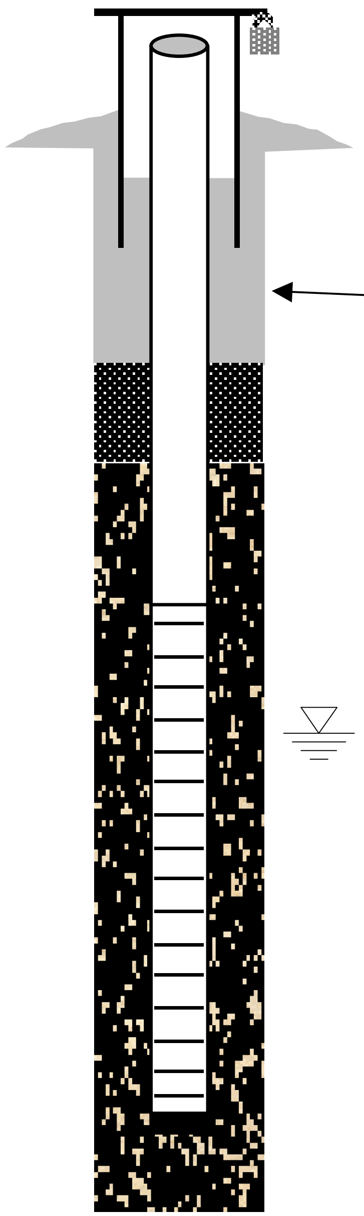
Project Name: ____________________ Project No.: ____________________ Well ID: ____________________

Driller: ____________________ VHB Rep.: ____________________

Location: ____________________ Rig Type(s): ____________________ 'otal Depth: ____________________

Date Started/Finished: ____________________ Drilling Method(s): ____________________ Elevation: ____________________

**Depth (feet below ground surface, unless otherwise specified):**



______________ Ground Surface Elevation

______________ Top of inner casing (riser)

Casing diameter (inches): ____________

Casing material: ____________

______________ Top of grout

Grout material: ________________

Borehole diame ________________

______________ Top of bentonite seal

Bentonite type: ________________

______________ Top of filter pack

Type/Size: ________________

______________ Top of well screen

Screen type: ________________

Screen slot size: ________________

______________ Depth to groundwater

______________ Depth of well

Date of measurement: ________________

______________ Bottom of well screen

______________ Total depth of well

______________ Total depth of borehole

**Comments:**

# Appendix B

# Generic Health and Safety Plan with Site Specific Addendum

Generic Health and Safety Plan

# *Former Manufactured Gas Plants & Related Sites*

New York

Prepared for: **KeySpan Corporation**
**One MetroTech Center**
**Brooklyn, New York 11201-3850**

Prepared by: **VHB/Vanasse Hangen Brustlin, Inc.**
**54 Tuttle Place**
**Middletown, Connecticut 06457**

**APRIL 2002**

# Table of Contents

# List of Attachments

## Policy Statement

This generic Health and Safety Plan (HASP) establishes the procedures and requirements to ensure the health and safety of VHB employees at former manufactured gas plants (MGP) and related sites. Prior to commencing work, a site-specific health and safety plan Addendum Form (HASP Addendum) must be completed, reviewed and approved by the regional health and safety coordinator and project manager, and attached to this generic HASP in order to fulfill the requirements of **29 CFR 1910.120**, *Hazardous Waste Operations and Emergency Response* (see Attachment A).

Both this generic HASP and the HASP Addendum have been developed for the sole use of VHB employees, and are not intended for use by firms or personnel not participating in VHB's training and health and safety programs. Subcontractors are responsible for developing and providing their own HASP.

## Training

Prior to commencing site activities, all VHB team members will receive training as indicated below:

- ✓ 40-hour OSHA HAZWOPER Training (29 CFR 1910.120)
- ✓ Annual 8-hour OSHA Refresher Training (29 CFR 1910.120)
- ✓ Hazard Communication (29 CFR 1901.1200)
- ✓ Annual First Aid/CPR
- Other:

In addition, personnel will have an opportunity to read and understand the project work plan including all applicable components (sampling and analysis plan, quality assurance project plan, and HASP Addendum).

## General Site Description

A detailed site-specific description is presented in the HASP Addendum which is included as Attachment E to this generic HASP. A general historical discussion of the manufactured gas process is provided below. (*Note*: the following historical discussion is from *Manufactured Gas Plants, a New York Heritage* by The WD Burdick Company, 1996).

Former Manufactured Gas Plants (MGP) sites are generally abandoned or reused properties that formerly housed a facility for the production of gas distilled from coal. These facilities, also known as "gasworks" or "town gas" supplied gas to surrounding communities and industries for light, heat, and cooking. The first U.S. MGP opened in Baltimore, Maryland in 1817 and the first New York State MGP opened in 1825 in New York City.

The production of coal gas involved heating coal to drive off gas (primarily methane, hydrogen, and carbon dioxide), which was then condensed. By-products of condensation included tars and oils. Condensed gas was then scrubbed and purified to remove ammonia, sulfur, and other impurities.

During the 1870's, an alternative method of producing gas was developed. The "carburetted water-gas" or "blue water-gas" process involved the use of steam and hot coal to generate hydrogen and carbon dioxide that was then used to crack heavy oil into simpler gas.

Manufactured gas sales increased rapidly during the first half of the 1900's but came to a rapid end around 1950. The demise of the MGP industry was ushered by increased natural gas production and the development of interstate natural gas pipelines.

In general, the environmental legacy of MGPs includes the remnants of subsurface structures and facilities and possible contamination of the surface and subsurface environment by tar and oil by-products. These by-products may include the substances listed below.

### Potential Site Hazards, Former MGP Sites

| Waste Type(s) | | Waste Characteristics | | Type/Form of Hazard | |
|---|---|---|---|---|---|
| **Petroleum** | ✓ | **Toxic** | ✓ | **Dust** | ✓ |
| **Liquid** | ✓ | Corrosive | | **Liquid** | ✓ |
| **Sludge** | ✓ | **Ignitable** | ✓ | Gas | |
| **Soil** | ✓ | **Volatile** | ✓ | **Vapors** | ✓ |
| **Unknown** | ✓ | Reactive | | **Contact** | ✓ |
| Other | | Unknown | | IDLH | |
| | | | | Other | |

## Scope of Work

Tasks to be performed at MGP and other related sites shall include but not be limited to the following:

- Collection of surface and/or subsurface soil samples via hand auger, drill rig or back hoe
- Collection of groundwater samples

- Collection of surface water and/or sediment samples
- Collection of soil gas and/or ambient air samples

For a list of site-specific tasks to be performed, please refer to the HASP Addendum (see Attachment E).

## Physical Hazard Assessment

**Hazards of Concern (check as many as apply):**

- ✓ **Biological**
- ✓ **Cold Stress**
- ✓ **Compressed Gas Cylinders**
- ✓ **Confined Space**
- ✓ **Corrosives**
- ✓ **Drums and Containers**
- ✓ **Electrical**
- ✓ **Flammable/Explosive**
- ✓ **General Construction/Overhead Obstructions**
- ✓ **Heat Stress**
- ✓ **Heights (Scaffolding, Ladders)**
- ✓ **Noise**
- ✓ **Radiological**
- ✓ **Ultraviolet Radiation**
- ✓ **Utility Lines**
- ✓ **Weather Extremes**
- Other:

The dangers that may be attributed to these hazards are discussed below.

Note that a copy of the applicable regulations and/or VHB corporate standard operating procedures pertaining to the above hazards will be attached to the HASP addendum if applicable to site-specific work.

### Biological

Potential hazards include poison ivy, deer tick bites, stinging insects, etc. Identify site-specific hazards and establish procedures to avoid identified hazards. Carry barrier creams and poison oak and ivy cleaners. Any team members allergic to bee stings will notify all team members of their condition. Prescription medication must be carried. Current (5 to 10 years) tetanus shots for all personnel will be required.

### Cold Stress

Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. To guard against them: wear appropriate clothing; have warm shelter readily available; provide warm noncaffeinated beverages, carefully schedule work and rest periods, and monitor workers' physical conditions.

## Compressed Gas Cylinders

Ensure compliance with **29 CFR 1910 Subpart H**. Cylinders may be required when operating in Level B with supplied air, when operating pneumatic pumps with compressed nitrogen, or when monitoring with a flame ionization detector. Use caution when moving or storing cylinders. Keep oxygen, hydrogen, and other flammable gases away from all ignition sources. Store cylinders upright and secure them with a chain or other means. Do not transport cylinders in site vehicles. Consult the local fire department regarding storage permits for flammable gases. If required, obtain and post permit.

## Confined Space

**Permit-required confined space entry is <u>not</u> permitted under any circumstances without the prior approval of the Regional Health and Safety Coordinator (RHSC) and/or the Corporate Health and Safety Officer (CHSO).** Atmospheric testing will be conducted by qualified VHB team members prior to entry of a confined space. If a **permit-required** confined space is encountered, qualified OSHA-trained personnel shall conduct work within permit-required confined spaces. Ensure compliance with **29 CFR 1910.146 H**. A confined space is a space that:

- "Is large enough and so configured that an employee can bodily enter and perform assigned work;
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
- Is not designed for continuous employee occupancy."

A ***permit-required*** confined space is a confined space that:

- "contains or has the potential to contain a hazardous atmosphere;
- contains a material that has the potential for engulfing an entrant;
- has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward and tapers to a smaller cross-section; or
- contains any other recognized serious safety or health hazard."

Do not enter any excavations or pits that are over 4 feet deep.

## Corrosives

Corrosive acids are present as preservatives in water sampling vials. Care to prevent skin contact should be taken when sampling with these corrosive materials; appropriate personal protective equipment shall be donned prior to sampling.

## Drums and Containers

Ensure compliance with **29 CFR 1910.120(j)**. Consider unlabeled drums to contain hazardous substances. Move drums only as necessary; use caution and warn nearby personnel of potential hazards. VHB will not move shock-sensitive (crystallized solids), leaking, or damaged drums. Properly distinguish empty drums by laying them on their sides in a designated, secured area.

## Electrical

Ensure compliance with **29 CFR 1910 Subparts J and S**. Locate and mark energized lines. If necessary, a licensed electrician will be contracted to de-energize lines. All electrical equipment will be equipped with ground fault circuit interrupters (GFCI). Evaluate areas of standing water with respect to nearby electrical sources or equipment.

## Flammable/Explosive

Ensure compliance with **29 CFR 1910 Subpart H**. Inform personnel of potential hazards. Establish site-specific procedures for working around flammables. Ensure that appropriate fire suppression equipment and systems are available and in good working order and employees are trained in the use of fire suppression equipment. Define requirements for intrinsically safe equipment.

## General Construction/Overhead Obstructions

The greatest potential hazard at most sites is related to the operation of heavy equipment, especially in the case of malfunction, misuse or improper operation. Only qualified personnel should operate heavy equipment. Personnel not directly involved with equipment operation should stand a safe distance away from the machinery. All personnel should wear hard-hats and safety boots (steel toes and shanks) when working near heavy equipment and any time there is a potential hazard from overhead or falling objects. During excavation and trenching, ensure compliance with **29 CFR 1926 Subpart P**.

## Heat Stress

Heat related illness (heat cramps, heat exhaustion, and heat stroke) and impaired ability to work are possible at temperatures greater that 60 degrees Fahrenheit with high humidity. To guard against them: wear appropriate clothing; provide shade from direct sunlight, have an ample supply of stress beverages and water available, carefully schedule work and rest periods, and monitor workers' physical conditions.

## Heights

Where appropriate, ensure compliance with the subparts of **29 CFR 1910 and 1926** regarding manlifts, ladders, scaffolding, etc. Identify special safety equipment needs (e.g., lanyards, harnesses, safety nets, etc.).

## Noise

Ensure compliance with **29 CFR 1910.85**. Elevated noise levels may be encountered during heavy equipment use. Persons working in close proximity to construction equipment shall wear sufficient hearing protection. This equipment may include foam ear plugs or foam ear muffs. Hand signals must be used for communication in these situations. Prior to donning protective hearing equipment, all team members will establish and practice hand signals. Establish noise level standards, inform personnel of hearing protection requirements, and define site-specific requirements for noise monitoring as appropriate.

## Radiological

(To be added if required.)

## Ultraviolet Rays

Exposure to ultraviolet rays occurs every day. Apply sunblock and wear hats, long sleeves and pants.

## Utility Lines

Identify and locate all existing utilities prior to work. Ensure that electrical utility lines are at least 25 feet away from project activities. Always look for overhead utilities when climbing ladders, etc. or when raising drill rig masts, crane booms, etc. Prior to intrusive activities call the appropriate "One-Call Network" indicated below:

- New York State (except NYC and LI): 1-800-962-7962
- New York City and Long Island: 1-800-272-4480

## Weather Extremes

Establish site-specific contingency plans for severe weather. In the event of immediate danger, airhorns or whistles will be used to indicate evacuation to a designated safe shelter. Weatherize equipment as appropriate (water-proof, freeze prevention, etc.). Cease work and relocate to a safe indoor location or vehicle during electrical storms.

## Chemical Hazard Assessment

Toxic chemicals potentially present at former MGP sites are summarized below. Also presented are the associated symptoms of acute exposure to such contaminants. Chemical properties and hazards for specific contaminants as defined by the National Institute for Occupational Safety and Health (NIOSH) are provided in Attachment C. Since additional unsuspected hazards may exist at a site, periodic air quality monitoring and evaluation of site conditions will be performed during all on-site activities.

### Potential Chemical Contaminants, Former MGP Site

| Chemical Contaminants* | Potential Hazards | OSHA PEL | NIOSH REL |
|---|---|---|---|
| **Volatile Organics** | Toxic by ingestion, inhalation, skin absorption, and eye contact. Irritant to eyes, nose. Headache, dilated pupils, tearing, confusion, dizziness, and nervousness may occur | benzene: 1 ppm<br>ethylbenzene, toluene, xylenes: 100 ppm | benzene: 0.1 ppm<br>ethylbenzene, toluene, xylenes: 100 ppm |
| **Semivolatile Organics** (coal tar-related compounds) | Toxic by ingestion and skin contact. Dermatitis and bronchitis. | 0.2 $mg/m^3$ | 0.1 $mg/m^3$ |
| **Inorganics** | Toxic by ingestion, inhalation, skin absorption, and eye contact. Irritant to nose, eyes, throat. Dermatitis, gastrointestinal disturbances, respiratory irritation may occur. | Hydrogen cyanide: 10 ppm (IDLH @ 50 ppm)<br>Hydrogen sulfide: 20 ppm (IDLH @ 100 ppm) | Hydrogen cyanide: 4.7 ppm<br>Hydrogen sulfide: 10 ppm |
| **Dust** | Irritant to nose, eyes, throat. May cause coughing, wheezing and/or choking. | 10 $mg/m^3$ (ACGIH TLV) | - |

* See Attachment C for NIOSH Chemical properties and hazards.

## Symptoms of Chemical Exposure

On-site workers should be aware of the specific symptoms of acute chemical exposure listed above. In general, workers should also be aware of some indications of toxic effects of chemical exposure which are described below:

Exposure indicators observable by others:

- Changes in complexion, skin discoloration;
- Increased rate of respiration, gasping;
- Lack of coordination;
- Changes in demeanor;
- Excessive salivation, papillary response; and
- Changes in speech pattern

Exposure indicators not observable by others:

- Headaches;
- Dizziness;
- Blurred vision;

- Cramps;
- Weakness;
- Nausea; and
- Irritation of eyes, skin, or respiratory tract

### Volatile Organic Compounds (VOCs)

VOCs may be encountered during the site investigations. Total VOCs will be routinely monitored in ambient air with a flame- or photo-ionization detector within various work zones at the site. If action levels are exceeded (see below), an increase in personal protective equipment shall be performed and/or engineering controls to mitigate the release of VOCs shall be implemented.

### Inorganic Compounds

If HCN, $H_2S$ and dust particulates may be encountered during the site investigation, these analytes will be continually monitored via instrumentation in the work zone areas (see below). If action levels (see below) are exceeded in ambient air, an increase in personal protective equipment or cessation of work activities may be warranted.

### Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) for common substances and chemicals used during field investigations are provided in Attachment D.

## On-Site Control

A VHB employee will be designated to coordinate access control to the work zone. No unauthorized personnel should enter the work zone without appropriate 40-hour OSHA site worker safety training. Control boundaries will be established as follows:

- Exclusion Zone: A minimum 10-foot radius around the sampling point will be treated as the Exclusion Zone.
- Contaminant Reduction Zone: A 5-10 foot perimeter around the Exclusion Zone will be treated as the Contaminant Reduction Zone.
- Support Zone: The remainder of the Site outside of the Contaminant Reduction Zone will be considered the Support Zone.

### Monitoring Procedures

Based on the potential hazards present at the former MGP sites, the following monitoring equipment will be used. VHB will perform real-time air monitoring within the work zone during the performance of all intrusive work activities. The following instruments will be utilized. Monitoring level results will be used to determine what type (if any) site control measures or respiratory protection will be necessary.

## Monitoring/Surveillance Equipment (check all that apply)

| | Contaminant/Analyte | Instrument | Work Area Action Level (above background) |
|---|---|---|---|
| ✓ | Organic Vapors (measured as benzene) | PID (Photovac 2020 or equivalent) or FID (Foxboro Organic Vapor Analyzer or equivalent) | 0 - 1 ppm: Level D 1 - 5 ppm: Level C<br>>5 ppm: cease work and consult with RHSC/CHSO |
| ✓ | HCN and $H_2S$ | Dräger Miniwarn, Monitox, or equivalent | >4 ppm: cease work and evacuate work area |
| ✓ | Aerosol/dust | MIE PDM-3 Miniram or equivalent | 10 mg/m$^3$: institute engineering controls to reduce dust |
| | Oxygen | MSA 260 or equivalent | < 19.5% or > 25%: cease work and evacuate area |
| | Explosive gas | MSA 260 or equivalent | >10% LEL: cease work and evacuate area |
| | Noise | Noise dosimeter | <85 dBa: Hearing protection recommended<br>85 – 120 dBa: Hearing protection required<br>>120 dBa: Evacuate area |
| | Metal Detector | | |
| | Personal Sampling Pump | | |

RHSC = Regional Health and Safety Coordinator
CHSO = Corporate Health and Safety Officer

## Community Air Monitoring Plan and Action Levels

Real-time air monitoring for organic vapors and aerosols/dust will be performed at the perimeter of the work area during all intrusive activities on a periodic basis. Downwind air monitoring frequency will be based upon the levels obtained in the work area and the judgment of the site safety officer. The following action levels will apply:

| Analyte | Action Level | Response |
|---|---|---|
| Organic vapors | ✋any detection in ambient air | ☞Modify work practices to minimize volatilization of contaminants |
| | ✋>1 ppm sustained reading in ambient air | ☞Stop work until controls are identified that will reduce volatilization of contaminants. Do not restart work unless authorized by the project manger, department director, and/or the site safety officer. |
| Aerosol/dust | ✋Downwind reading 5 mg/m3 greater than upwind reading | ☞Implement dust suppression (water) controls. |

## Personal Protective Equipment (PPE)

The initial level of personnel protection will be Level D unless otherwise indicated on the HASP Addendum. Changes to levels of protection will be based on the action levels described above. All changes in the level of protection shall be approved by the site safety officer.

### Level D PPE will include:

- Gloves (work gloves for general activities, latex or neoprene gloves for sampling, decontamination, etc.);
- Long sleeve shirt and long pants;
- Boots/shoes, leather or chemical-resistant, steel toe and shank;
- Safety glasses or chemical splash goggles (optional unless required for specific job function);
- Hard hat;
- Hearing protection;
- Optional: Tyvek coveralls for dusty/dirty conditions, Saranex coveralls for splash protection.

### Level C PPE will include:

- Tyvek coveralls (Saranex if splash protection is required);
- Air purifying respirator (full-faced mask) with dust and organic vapor cartridge;
- Hard hat;
- Boots/shoes, steel toe and shank;
- Chemical-resistant outer boots;
- Inner and outer gloves;
- Hearing protection.

### Level B PPE will include:

Consult with RHSC or CSHO for specific PPE requirements.

## General Safety Requirements

The following general safety procedures will be followed by all persons entering and/or working on the site:

- A safety and operations meeting will be conducted at the commencement of a field program and as required thereafter for all personnel working at the site and documented on a safety meeting record form or in the field notebook. The information obtained as site work progresses will be addressed in the meetings and will be used to update the HASP Addendum, as necessary.

- Work will be conducted during daylight hours only unless prior approval of the RHSC or his/her designee is obtained and the illumination requirements of **29 CFR 1910.120(m)** are satisfied.
- No employee or subcontractor may be allowed in the on-site support zone without the prior knowledge and consent of the Site Safety Officer and review of these Health and Safety Procedures.
- No one will be allowed in the exclusion zone on-site who has not been 40-hour OSHA health and safety trained or without the prior knowledge and consent of the Site Safety Officer.
- There will be no activities conducted on-site without sufficient backup personnel. At a minimum, two persons ("buddy system") must be present at the site.
- All contractor or subcontractor personnel will bring to the attention of the Site Safety Officer or field team leader any unsafe condition or practice associated with the site activities that they are unable to correct themselves.
- There will be no smoking, eating, chewing gum or tobacco, applying cosmetics, or drinking except in the support zone.
- Hands shall be thoroughly cleaned prior to smoking, eating, drinking, applying cosmetics or other activities outside the contaminant reduction zone.
- Team members will avoid unnecessary contamination (i.e., walking through known or suspected "hot" zones or contaminated puddles, kneeling or sitting on the ground, leaning against potentially contaminated barrels/drums or equipment).
- Respirators will <u>not</u> be worn with beards, long sideburns, or under other conditions that prevent a proper seal. A current medical, fit test, and respirator training will be required prior to donning respirators.
- No visitors will be allowed access without the knowledge and consent of the Site Manager and/or Site Safety Officer. All visitors will be required to sign-in and be briefed on safety procedures and must be escorted while on-site.
- Work will <u>not</u> be conducted during electrical storms. Work conducted during other inclement weather must be approved by the project manager and RHSC or his/her designee.

## Decontamination Procedures

Dedicated sampling equipment will be used to the maximum extent possible to eliminate the need for equipment decontamination. However, all non-expendable equipment will be cleaned according to Standard Operating Protocols. This protocol includes:

- Rinse with potable water;
- Wash with laboratory-grade detergent (Alconox) and water;
- Rinse with potable water;

- Rinse with a 1:10 solution of $HNO_3$;
- Rinse with potable water;
- Rinse with methanol;
- Triple rinse with laboratory deionized water (distilled water may be substituted where deionized water is not available); and
- Allow to air dry.

The decontamination procedure for Level D requires the disposal of gloves, boot covers, coveralls (if used) in polyethylene-lined containers on-site. All used PPE will be rendered unusable prior to disposal.

The decontamination procedures utilized for Level C site conditions will consist of the following nine-step process:

- All sampling devices, monitoring instruments and other equipment used on-site will be segregated into piles on a polyethylene drop cloth and decontaminated as necessary.
- Outer boots and gloves will be washed with soap and water and then rinsed with water or appropriately disposed.
- The tape around the outer boots and gloves will be removed and deposited into a polyethylene-lined container.
- Outer boots will be removed and placed on the polyethylene drop cloth.
- Outer gloves will be removed and disposed of in polyethylene-lined containers.
- Tyvek coveralls will be removed and disposed of in polyethylene-lined containers.
- Respirator will be removed and washed with clean water and sanitized.
- Inner gloves will be removed and disposed in a polyethylene-lined container.
- Worker's hands and face will be washed with soap and water before leaving the site.

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard Level D Decontamination Protocol shall be used unless conditions require an upgrade to Level C PPE and Decontamination Protocols.

## Emergency Medical Care

<u>Refer to the Site-Specific HASP Addendum included as Attachment F to this generic HASP for local emergency medical information</u>.

### First Aid

General first aid procedures for exposure include, but are not limited to, the following procedures:

- If contaminant contacts the eyes, irrigate immediately with large amounts of water (unless contaminant is reactive with water);
- If contaminant contacts skin, wash with soap and water promptly (unless contaminant is reactive with water);
- If contaminant is inhaled, move the exposed person to fresh air immediately. If the person's breathing has stopped, perform artificial respiration **ONLY** if appropriately trained and currently certified by the Red Cross or equivalent. Request appropriate medical attention as soon as possible using telephone number(s) listed on the HASP Addendum Form (Emergency Information and Local Resources).

On-site VHB personnel will keep a standard-approved first-aid kit at the site during all field activities. At least one VHB team member will be properly trained in Standard First-Aid and Adult CPR.

First Aid equipment is available on-site at the following locations:

First Aid Kit: located in field vehicle

Emergency Eye Wash: located in field vehicle

Emergency Shower: water is located in the field vehicle

Other (Specify): ______

## Emergency Procedures

The following standard emergency procedures will be used by on-site personnel. These procedures may be modified as appropriate or required for each incident. The Site Safety Officer will be notified of any on-site emergencies and will be responsible for ensuring that the appropriate procedures are followed.

- **Fire/Explosion:** The fire department will be notified and all personnel moved to a safe distance from the involved area.
- **Personal Protective Equipment Failure:** If any site worker experiences a failure or malfunction of personal protective equipment that adversely affects the protection factor, that person and his/her buddy will immediately leave the Exclusion Zone. Re-entry will not be permitted until the equipment has been repaired or replaced.
- **Other Equipment Failure:** If any other equipment on-site fails to operate properly, the Site Manager and Site Safety Officer will be notified and will then evaluate the effect of such failure on continuing operations. If the failure affects personnel safety and/or prevents completion of the investigation activities, all

personnel will leave the Exclusion Zone until the situation is remedied through appropriate action(s).

## Generic HASP Approval Signatures

I have read, understood, and approve the provisions set forth in this generic Health and Safety Plan.

| | | |
|---|---|---|
| Deborah K. Wojcicki | | |
| Regional Health and Safety Coordinator | Signature | Date |
| | | |
| TBD | | |
| Site Health and Safety Officer | Signature | Date |

# Attachment A

# OSHA Hazardous Waste Site Operations and Emergency Response

Source Links:

(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9765&p_text_version=FALSE = OSHA 1910.120)

(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992&p_text_version=FALSE = OSHA 1910.1000 Table Z-1)

(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9993&p_text_version=FALSE = OSHA 1910.1000 Table Z-2)

(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9994&p_text_version=FALSE = OSHA 1910.1000 Table Z-3)

# Attachment B

# OSHA HAZWOPER Certifications

OSHA training certificates for all personnel working on site will be provided immediately prior to initiation of field activities and will be maintained on site by the Site Safety Officer.

# Attachment C

# NIOSH Chemical Properties and Hazards

The following are presented in this Attachment:

- Aresenic
- Benzene
- Benzo(a)antracene
- Benzo(a)pyrene
- Chlorodiphenyl (42% chlorine) (PCB)
- Chlorodiphenyl (54% chlorine) (PCB)
- Chromium
- Coal Tar Pitch Volatiles
- Copper
- Ethyl Benzene
- Hydrogen Cyanide
- Hydrogen Sulfide
- Lead
- Mercury
- Naphtha (Coal Tar)
- Naphthalene
- Silica, crystalline (as respirable dust)
- Tetrachloroethene (PCE)
- Toluene
- Trichloroethene (TCE)
- Vanadium Dust
- Vanadium Fume
- m-Xylene
- o-Xylene
- p-Xylene

(Source: http://www.cdc.gov/niosh/npg/npg.html)

# Attachment D

# Material Safety Data Sheets

The following MSDSs are presented in this attachment:

- Alconox
- Concrete mix (Portland)
- Fluorescent Dye Penetrant
- Fluorocarbon Lubricant
- Freon 113 Refrigerant
- Gasoline (Nonleaded & Leaded)
- Gojo Hand Cleaner
- Hydrogen, compressed
- Hydrochloric Acid
- Isobutylene in air
- Methanol Reagent
- Nitric Acid Reagent
- Sodium Hydroxide Reagent
- Sulfuric Acid Reagent
- WD-40 Aerosol Lubricating Oil

(Suggested source: http://msds.pdc.cornell.edu/msdssrch.asp)

# Attachment E

# Health and Safety Form Templates

The following Health and Safety Form templates are presented in this attachment. These forms will be utilized to demonstrate proper implementation and compliance with VHB's health and safety program.

- Site Entry and Exit Log
- Safety Meeting Form
- Safety Inspection List
- Incident Notification Form
- Medical Data Sheet
- Respiratory Certification Record

# SITE ENTRY AND EXIT LOG

**SITE:**____________________________________

| Date | Name | Representing | Date/Time In | Date/Time Out |
|---|---|---|---|---|
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# SAFETY MEETING FORM

DATE HELD________________________________ Time____________________

1. The safety meeting was held this date for the following personnel:

   (CONTRACTOR)______________________________________________________

   (SUB-CONTRACTOR)__________________________________________________

   (FOM)_____________________________________________________________

   (OTHER)___________________________________________________________

2. Subjects discussed (note, delete, or add):

   Accident trends/new hazards –
   Individual protective equipment –
   Back injury, safe lifting techniques –
   Fire prevention –
   Sanitation, first aid, waste disposal –
   Tripping hazards –
   Staging –
   Equipment inspection & maintenance (zero defects) –
   Hoisting equipment –
   Ropes, hooks, chains, and slings –
   Trucks, tractors, front-end loaders, scrapers, graders, gradall –
   Electrical grounding, temporary wiring, GFCI –
   Lockouts for safe clearance procedures: electrical, pressure moving parts –
   Steep slopes –
   Toxic materials: hazards, MSDS, respiratory, ventilation –
   Other –

3. Forwarded ________________________________

   Prepared by ________________________________

   Signature ________________________________

# SAFETY INSPECTION LIST

Project Name/Number:______________________________ Date:________________

Superintendent's Name:____________________________ Title:________________

This safety inspection list is to be completed by the FOM and turned into the VHB Project Director with the week's paperwork. Any deficiencies found are to be corrected immediately.

1. Is the OSHA Safety and Health protection poster on the job? ____
2. Are emergency telephone numbers conspicuously posted? ____
3. Are first-aid kits and supplies on the job? ____
4. Are there first-aid trained personnel on the job? ____
5. Are warning signs and posters adequate? ____
6. Is there an adequate supply of personal protective gear available?
   a. Hard Hats ____
   b. Hearing Protection ____
   c. Eye and Face Protection ____
   d. Respiratory Protection ____
7. Are all personnel wearing the appropriate personal protective gear? ____
8. Is there an adequate slope or support provided for all trenches and excavations? ____
9. Is temporary electrical service grounded and is all other electrical equipment grounded? ____
10. Is the housekeeping adequate – are all aisles, passageways, and stairways clear of obstructions? ____
11. Are there any fire hazards on the job that could be eliminated? ____
12. Has heavy equipment been thoroughly inspected and is there a record of the inspections on file? ____

13. Is the job site fire protection adequate?

    a. Fire Extinguishers – have they been checked? ____
    b. Available Water Hoses? ____
    c. Barrels of Water with Buckets? ____

14. Is there adequate clearance between equipment or machinery and energized power lines? ____

15. Is the record of injuries and illnesses properly maintained and on file? ____

16. Are there job-site safety meetings held at least once a week? ____

17. Are all new employees indoctrinated with respect to their individual safety responsibilities? ____

18. Do my personal safety practices set a good example for all employees? ____

19. Misc.:____________________________________________

____________________________________________

____________________________________________

____________________________________________

________________________________ ________________

Signature Date

# INCIDENT NOTIFICATION FORM

TO: Vanasse Hangen Brustlin Consulting Engineers Project Manager

Date:____________________________

FROM: FOM and/or ______________________________________________________
(someone who has direct knowledge of the incident)

1. Contractor's Name:___________________________________________

2. Organization:________________________________________________

3. Telephone Number:____________________________________________

4. Location:____________________________________________________

5. Reporter Name:_______________________________________________

6. Name of Injured:___________________________ Birthdate:_______________

7. Company Employing Injured:___________________________________

8. Date of Incident:_____________________________________________

9. Company Employing Injured:___________________________________

10. Location of Incident:_________________________________________

11. Brief Summary of Incident (provide pertinent details including type of operation at time of incident):

    ______________________________________________________________

    ______________________________________________________________

    ______________________________________________________________

12. Cause, if known:_____________________________________________

13. Casualties, if any:____________________________________________

14. Details of Any Existing Chemical Hazards or Contamination:

______________________________________________________________

______________________________________________________________

15. Estimated Property Damage:________________________________

16. Affect on Contract Schedule:_______________________________

17. Actions Taken by Contractor:_______________________________

18. What Medical Help was Given:______________________________

______________________________________________________________

______________________________________________________________

19. Doctor and/or Hospital (if known):___________________________

______________________________________________________________

20. When did Employee Return to Work:__________________________

21. Other Damages/Injuries Sustained (public or private):

______________________________________________________________

______________________________________________________________

______________________________________________________________

22. Additional Information:

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

# MEDICAL DATA SHEET

This Medical Data Sheet will be completed by all on-site personnel and will be kept in The Support Zone during site operations.

Project:______________________________________________

Name:______________________________________________

Address:______________________________________________

______________________________________________

Home Telephone: Area Code (      ) ______________________________

Date of Birth:_______________ Height:____________ Weight:____________

In case of Emergency, contact:______________________________
(name and relationship)

Address:______________________________________________

Telephone: Area Code (      ) ______________________________

Do you wear contact lenses? (   ) Yes (   ) No

Allergies:______________________________________________

List medication taken regularly:______________________________

Particular sensitivities:______________________________________

Previous/recent illnesses or exposures to hazardous chemicals:______________

______________________________________________

Name of Personal Physician:______________________________

Telephone: Area Code (      ) ______________________

## RESPIRATORY CERTIFICATION RECORD

## RESPIRATORY PROTECTION PROGRAM
## RECORD OF RESPIRATOR USE

Name______________________________________ Date__________________

Social Security Number_________________________ Age___________________

Location____________________________________________________________

Department_____________________________ Supervisor___________________

Area to be used in___________________________________________________

Type of Respirator________________________ Fitted By____________________

Medical Approval Date________________________________________________

Medical Facility/Physician_____________________________________________

Specific contaminants for which respiratory protection is necessary:

### EMPLOYEE STATEMENT

I, an employee of _______________________ have received the above referenced respirator. I have been fitted and properly instructed on its uses and limitations. I, also, understand that it is my responsibility to properly clean, maintain and store my respirator in a clean area unless other arrangements have been made to assure maintenance and care of the respiratory protection.

Signature__________________________________

Date______________________________________

# Attachment F

# Site-Specific HASP Addendum Form

# Attachment F

# Site-Specific Health and Safety Plan Addendum Form

This site-specific information supplements the generic Health and Safety Plan (HASP) developed for Manufactured Gas Plant (MGP) sites as well as other related sites. All site activities are governed by the instructions contained within both the generic HASP and this HASP Addendum.

## General Site Information

| | | | |
|---|---|---|---|
| Site Name: | Far Rockaway Former MGP Site | VHB Project No: | 06392.00 (00024) |
| Location: | Near intersection of Brunswick Avenue and 12th Street | Today's Date: | April 2002 |
| | Far Rockaway, Queens County, New York 11691 | Date of Field Activities: | Summer/Fall 2002 |

## Emergency Information and Local Resources

| Agency | Name | Phone Number |
|---|---|---|
| Ambulance: | -- | 911 |
| Hospital: | Peninsula Hospital Center<br>5115 Beach Channel Dr. Far Rockaway, NY 11691<br>(See Hospital Route Map) | 1-718-734-2000 |
| Fire Department: | Inwood Fire Department | 1-516-239-3057, or 911 |
| Police: | Far Rockaway Police Department | 1-718-868-3400, or 911 |
| Poison Control: | National Poison Control Center | 1-800-682-9211 |
| Spill Control: | National Reporting Center | 1-800-424-8802 |
| VHB Regional Safety Coordinator | Debbie Wojcicki | 1-860-632-1500 |
| Other: | NYSDEC – Region 1 (General) | 1-631-444-0354 |

## Project Contacts

| Contact | Name | Phone Number |
|---|---|---|
| VHB Project Manager: | Jerry Bastedo | 1-716-627-4572 (Office)<br>1-716-864-2701 (Cell) |
| VHB Field Team Leader: | Chris Poole | 1-860-632-1500 (Office)<br>1-203-376-9697 (Cell) |
| VHB Site Safety Officer: | Chris Poole | 1-860-632-1500 (Office)<br>1-203-376-9697 (Cell) |
| Client Contact: | Ted Leissing | 1-631-391-6144 (Office) |
| Site Contact: | -- | -- |
| Regional Health & Safety Coordinator | Debbie Wojcicki | 1-860-632-1500 |
| Regulatory Contact: | Joseph White | 1-518-402-9564 |
| Subcontractors: | TBD | -- |
| Other: | | |

## Site Description and History

The site is located in a densely populated, mixed commercial, residential area of the Far Rockaway (Borough of Queens), Queens County, New York. Specifically, the site is located the intersection of 12th Street and Brunswick Avenue approximately 1000 feet west of Motts Bay. All gas production attributed to the Far Rockaway works was based on the Lowe water gas process. The site generated gas from 1900 to 1909. The site is currently used as a warehouse and office. There are no typical chemical constituent sources above ground level. No information regarding the existence of subsurface artifacts or chemicals have been identified. Potential site chemicals include aromatic hydrocarbons (BTEX), polycyclic aromatic hydrocarbons (PAHs), inorganics, etc.

## Scope of Work

### Site-Specific Task Description (check all that apply):

| | | | |
|---|---|---|---|
| ✓ | ***Site Inspection*** | ✓ | ***Monitoring Well Sampling*** |
| ✓ | ***Surface Soil Sampling*** | ✓ | ***Groundwater Sampling*** |
| ✓ | ***Subsurface Soil Sampling/Soil Borings*** | ✓ | ***Test Pit Excavation*** |
| | Surface Water/Sediment Sampling | | Tank Sampling |
| ✓ | ***Soil Gas Sampling*** | ✓ | ***Surveying*** |
| | Indoor Air/Ambient Air Sampling | ✓ | ***Water Level Measurement*** |
| ✓ | ***Monitoring Well Drilling and Installation*** | | Aquifer Testing |
| ✓ | ***Monitoring Well Development*** | ✓ | ***Decontamination*** |

## HASP Addendum Approval Signatures

| | | |
|---|---|---|
| Jerry Bastedo | | |
| Project Manager | Signature | Date |
| Chris Poole | | |
| Site Health & Safety Officer | Signature | Date |
| Debbie Wojcicki | | |
| Regional Health & Safety Coordinator | Signature | Date |

## Generic HASP and Site-Specific HASP Addendum Form Acceptance / Health and Safety Meeting Record

The undersigned acknowledge that they have read, understand, and agree to abide by the health and safety plan:

| Printed Name | Signature | Affiliation | Date |
|---|---|---|---|
| | | | |
| | | | |
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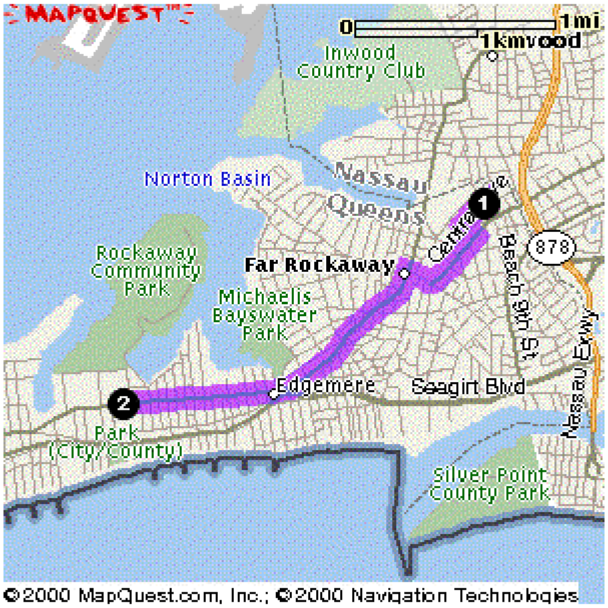
## Hospital Route Map – Far Rockaway Former MGP Site





Peninsula Hospital Center
5115 Beach Channel Drive, Far Rockaway, NY 11691
1-718-734-2000

### Driving Directions

| STARTING FROM | ARRIVING AT | ESTIMATED TRAVEL TIME | TOTAL DISTANCE |
|---|---|---|---|
| Brunswick Avenue and 12th Street<br>Far Rockaway, NY 11691 | Peninsula Hospital Center,<br>5115 Beach Channel Drive,<br>Far Rockaway, NY 11691 | 15 Minutes | 2.4 Mile |

| | | |
|---|---|---|
| 1. | Start out going North on **BEACH 12TH ST** towards **BRUNSWICK AVE** by turning left. | 0.0 |
| 2. | Turn LEFT onto **BRUNSWICK AVE**. | 0.2 |
| 3. | Turn LEFT onto **WHEATLEY ST**. | 0.1 |
| 4. | Turn RIGHT onto **CENTRAL AVE**. | 0.3 |
| 5. | Turn SLIGHT RIGHT onto **MOTT AVE**. | 0.1 |
| 6. | Turn LEFT onto **BEACH CHANNEL DR**. | 0.1 |
| 7. | Stay straight to go onto **ROCKAWAY FRWY**. | 0.8 |
| 8. | Turn RIGHT onto **SEAGIRT BLVD**. | 0.1 |
| 9. | Turn SLIGHT RIGHT onto **BEACH CHANNEL DR/REV JOSEPH H MAY DR**. | 0.8 |