Transmittal

To: Mr. Joseph Jones
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Program Management
625 Broadway
Albany, New York 12233-7012

Date: May 13, 2005

File: 10653/36621 #1

Re: Plainview Industrial Park

RECEIVED MAY 16 2005 BUREAU OF ...

We are sending you:

X herewith_under separate cover: _drawings X descriptive literature_letters

If material received is not as listed, please notify us at once.

Quan.	Identifying Number	Title	Action*
3	copies	Work Plan Plainview Industrial Park	

*Action letter code: **R**-reviewed **N**-reviewed and noted **I**-for your information
S-resubmit **J**-rejected **Y**-for your approval

Remarks:

cc:
Jim Heckathorne – O'Brien & Gere

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Jeffrey Banikowski, Sr. Manager – O'Brien & Gere

I:\DIV71\Projects\10653\33526\2_corres\TransDurnin.doc

File on eDOCs? ______ Yes ______ No
Site Name ____________________
Site # ____________________
County ____________________
Town ____________________
Foilable ________ Yes ________ No
Please Write The eDOC File
Name Description ____________

Work Plan

☑ APPROVED
Laurie Rizzo

Plainview Industrial Park
Preliminary Site Characterization
Work Assignment #D004090-24
New York

1-30-104

New York State Department of
Environmental Conservation

May 2005

O'BRIEN & GERE

Work Plan

Plainview Industrial Park
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State
Department of Environmental Conservation
Albany, New York

James R. Heckathorne, P.E.
Vice President

O'BRIEN & GERE ENGINEERS, INC.

O'Brien & Gere Engineers, Inc.
5000 Brittonfield Parkway
Syracuse, New York 13221

Contents

List of Tables

List of Figures

List of Appendices

1. Introduction

1.1. General

This document is the Preliminary Site Characterization (PSC) Work Plan for the Plainview Industrial Park, Nassau County, New York. As shown on Figure 1, the Park is located south of the Long Island Expressway, between Sunnyside Boulevard to the west, Ridge Drive to the east, and Beaumont Drive to the south. The New York State Department of Environmental Conservation (NYSDEC) designation for this site is #1-30-104.

.

The scope presented herein was developed based on the Technical Scope of Work included in the Work Assignment (#DGO4090-21) letter to O'Brien & Gere Engineers dated February 4, 2005, the site visit performed on March 30, 2005, conversations with the NYSDEC Project Manager, Joseph Jones, and background information contained in several documents. These documents include the Preliminary Site Assessment Report dated February 2003, the Record of Decision for the Three Dimensional Circuits Site dated March 2000, the Record of Decision for the Preco Industries Site dated March 1996, and the Preliminary Site Assessment Report for Cherry Lane Lithography dated March 1993. Each of these sites is located within the Plainview Industrial Park.

In general, the scope of work for this project involves preparation of the project work plan, implementation of work described in the work plan, report preparation, and administration. Field work will consist of an initial round of soil vapor sampling, additional soil vapor sampling, and subsequent soil sampling and ground water sampling.

1.2. Project Objectives

The objectives of the PSC are to:

- Collect field data necessary to evaluate if contamination is present within the Industrial Park,
- Define, on a preliminary basis, the nature and extent of the contamination within soils and ground water to determine whether further investigation of the Park is warranted.

1.3 Approach

A TRIAD approach will be used to implement the field portion of the scope of work described earlier in an effort to meet the objectives of this project. The TRIAD approach consists of three components: systematic planning, dynamic work strategies, and real-time measurement systems. This approach allows field decisions to be made on a real-time basis, negating the need for multiple field mobilizations. The TRIAD approach is, therefore, much more cost effective than conventional PSCs.

To implement the TRIAD approach in the field, soil vapor samples will be collected using a membrane interface probe system manufactured by Geoprobe®. As described in this plan, an initial round of samples will be collected at locations represented by the facilities of interest listed in Section 2.2. As each of these initial sample locations is investigated, additional samples will be collected at other locations of interest based on the presence of potential subsurface contamination. Afterwards, soil and ground water samples will be collected at locations based on the soil vapor findings. The exact number and locations of samples will, therefore, be selected in the field. Findings made in the field will be discussed with the NYSDEC project manager while the field work is being performed.

1.4. Document Format

This document contains the following sections:

Section 1 – Introduction
Section 2 – Background
Section 3 – Site Characterization Documents
Section 4 – Scope of Work
Section 5 – Project Staffing Plan
Section 6 – Proposed Subcontractors
Section 7 – Minority and Women Business Enterprise Utilization
Section 8 – Work Assignment Budget
Section 9 – Project Schedule
References

2. Background

2.1. General

The information presented in this section is based on the Technical Scope of Work provided in the Work Assignment letter, conversations with NYSDEC representatives, and background information contained in the documents described in the Introduction.

2.2. Site Location and Background

As noted in the February 2003 Preliminary Site Assessment Report (PSA), the Plainview Industrial Park is located in east-central Nassau County (Figure 1). The Park is about 140 acres and comprises approximately 75 one and two-story buildings used for a variety of commercial and industrial activities. Most of the buildings are surrounded by paved areas used for roads or parking. The locations and general layout of the buildings are shown on Figure 2.

Based on previous investigations discussed later in this plan, concern has been expressed that chlorinated organic solvents detected in area ground water may be associated with one or more of the businesses located within the Park that use or had used chlorinated solvents. The address, status, and related information pertaining to these businesses is as follows. The reviewer should note that much of this information was obtained from the February 2003 PSA.

- 100 Commercial Street – the *Perfume Center of America*. The site was delisted from the New York State registry of hazardous waste sites in December 2004.
- 30 Commercial Court – *Cherry Lane Lithography*. According to the February 2003 PSA, this site has been delisted from the New York State registry of inactive hazardous waste sites.
- 31 Commercial Street – *Three Dimensional Circuits*. This business is currently listed as a Class 4 Site on the New York State registry of inactive hazardous waste sites. A Class 4 site is defined as one that has been properly closed and requires continued management.
- Terminal Drive - *Veeco Instruments*. According to the PSA, ground water remediation for perchloroethylene is on-going.

- 51 Commercial Street – *American Castings and Manufacturing*. This business uses 15 gallons of TCA per year according to the PSA.
- 75 Commercial Street – *Contemporary Packaging*. TCA, inks, and oil waste are stored in drums according to the PSA. At the time of the March 2005 site visit, this property appeared vacant.
- 101 Commercial Street – *Permigile Industries Incorporated*. Documented solvent use includes toluene, xylene, and isopropyl alcohol. The PSA listed TCA waste disposal in 1980.
- 155 Ames Court – Romac Electronic. According to the PSA, this business stored trichloroethylene (TCE) and isopropanol.
- 130 Express Street – Die-Matic Products. According to the PSA, this industry stored hazardous or toxic materials including TCE.
- 150 Express Street – *Omega Industries International Incorporated*. This industry used cleaners according to the PSA.
- 200 Express Street – *Analytical Products Incorporated*. There is a permit limit of 50 ppb for TCA. Leaching pools were cleaned and closed in 1985 according to the PSA.
- 10 Skyline Drive – *Golden Image Graphics*. According to the PSA, there was a violation issued in 1999 against this firm because of storing hazardous material illegally. Golden Image Graphics may no longer occupy this address. During the site visit, the sign at this address indicated that Tomra Metro, Inc. was the occupant.
- 131 Sunnyside Boulevard – *United Stellar Industries Corporation*. This firm handled TCE, had a discharge violation in 1968, and is connected to the county sewer system as a remedy. The building is currently vacant.

There are two recharge basins within the Park, one next to 120 Terminal Drive and the other next to 55 Skyline Drive.

2.3. Previous Investigations

2.3.1. 2002 PSA

Dvirka and Bartillucci Consulting Engineers performed a PSA at the Park on behalf of NYSDEC in 2002. The initial objective of the PSA was to investigate the source of TCA in Plainview Water District Well No. 2-1. During the PSA, TCE and PCE were also identified in area ground water. Dvirka and Bartillucci obtained 34 ground water samples from 18 borings as part of the PSA. Most of the borings were placed in the southern/southeastern end of the Park.

The PSA concluded that industries within the Park may be contributing low levels of chlorinated solvents to the ground water near the center, southeast, and southwest portions of the Park. The report also recognized that the geology in the area is complex, but may have erroneously concluded that perched ground water underlying the park flows predominately to the southeast. Consequently, nearly all ground water samples may have been collected in an upgradient direction with respect to potential sources of contamination. The geology of the portion of Long Island where the park is located is discussed more fully in Section 2.4 of this report.

2.3.2. Remedial Investigation (RI) Three Dimensional Circuits Site

In 1996, an RI was started at the Three Dimensional Circuits Site. An interim remedial measure (IRM) associated with the RI was completed in 1998 and the RI in April 1999. The major contaminants of concern at the site were lead and copper.

The RI consisted of those standard elements required by the appropriate regulations for performing an RI and are not repeated here. The IRM consisted of removal of a portion of the on-site leaching pools and the removal of soils. Based on the IRM, the record of decision (ROD, March 2000) recommended no further action as the preferred remedial alternative.

2.3.3. PSA Cherry Lane Lithography

The 1993 PSA Report discusses work conducted prior to the PSA and the history of the Site. Work conducted prior to the PSA included the removal of approximately 850 tons of contaminated soil from the site, and the excavation of one of four leaching pools. The PSA concluded with the recommendation that a single monitoring well be placed on the site and that a layer of bentonite be installed over the area where the soils were excavated since not all contaminated soils could be removed. Compounds of concern included toluene, TCE, PCE, ethylbenzene and total xylenes.

2.3.4. Phase II Investigation, RI Preco Industries

From 1988 to 1989, Preco Industries performed a preliminary Phase II investigation at the request of NYSDEC. From early 1989 to late 1990, a Phase II investigation was conducted to complement the findings of the preliminary investigation. The findings from these investigations provided initial data on the soil contamination and potential ground water contamination.

An RI was initiated in 1993 as a result of the Phase II findings. In conjunction with the RI, some contaminated areas were remediated immediately by soil removal. The IRMs included areas associated with underground tanks, storage tanks, and a recharge basin.

As a result of the RI, two areas were identified that required further discussion regarding soil removal: areas of marginally contaminated soils and a cistern beneath the building. As discussed in the March 1996 ROD, no further action was required in these areas and the Site was delisted.

2.4. Regional Geology and Hydrology

2.4.1. Geology and Hydrogeology

Regional Geology

The regional geologic setting in the Nassau County area consists of unconsolidated geologic deposits overlying bedrock (Kilburn 1979). The unconsolidated deposits consists of residual or weathered bedrock, and sand, silt, clay, and gravel of alluvial or glacial origin. The unconsolidated deposits are subdivided into stratigraphic or geologic units based on like characteristics, such as grain size distribution, sorting, porosity, composition of grains, and any other unique characteristics. Boundaries between unconsolidated geologic units are often marked by unconformities. An unconformity is an interruption in the continuity of a depositional sequence that represents a period in the geologic past of non-deposition or erosion. Geologic units on opposite sides of an unconformity are often physically very different.

Bedrock Geology

The bedrock underlying Long Island is Precambrian to lower Paleozoic in age (700 million years to 500 million years before present). The bedrock geology predominately consists of schist and gneiss with igneous intrusions. A schist is a strongly foliated crystalline rock of metamorphic origin. The bedrock is known to have some fractures; however, the fractures are not considered significant within the regional hydrogeology because of relatively low fracture permeability in comparison to the unconsolidated deposits. A highly weathered zone of approximately 50 feet exists at the top of the bedrock. This zone contains various colored clays and sandy clay mixed with partly decayed rock and mineral fragments. The bedrock surface slopes at approximately 62 ft/mile toward the southeast, and ranges from 160 feet below sea level at the north shore of Nassau County, to approximately 900 feet below sea level in the vicinity of the site (Kilburn 1979).

Regional Hydrogeology

Four major aquifers exist within the unconsolidated deposits which underlie Nassau County. The aquifers are the Lloyd aquifer, the Magothy aquifer, the Port Washington aquifer, and the upper glacial aquifer.

Lloyd Aquifer

The Lloyd aquifer rests unconformably on bedrock. The bedrock is relatively impermeable and can be considered the base of the hydrogeologic system (Smolensky and Deldman 1988). The Lloyd

Aquifer lies about 900 ft below land surface and is estimated to be 300 ft thick. The Lloyd Aquifer is confined as it underlies a clay unit, the Raritan confining unit. The aquifer reportedly has low to moderate permeability and an average horizontal conductivity of 40 ft/day.

Port Washington Aquifer

The Port Washington aquifer rests unconformably upon bedrock in northern Nassau County and abuts late Cretaceous age (100 million years ago to 65 million years before present) hydrogeologic units to the south (Stearns & Wheler, 1992).

Magothy Aquifer

The Magothy Aquifer is the principal source of fresh water on Long Island. The aquifer is approximately 600 ft thick and lies about 85 ft bls. Due to high concentrations of clays in the upper portions of the Magothy Aquifer, groundwater is more efficiently withdrawn near the base of the aquifer. As a result, most public water supply wells are screened in the lower Magothy aquifer. The Magothy aquifer is considered moderately permeable to highly permeable, and has an average hydraulic conductivity of 50 ft/day (Smolensky and Feldman 1988).

Upper Glacial Aquifer

The upper glacial aquifer is the uppermost hydrogeologic unit on Long Island and forms the present day land surface. The thickness is approximately 85 ft with the upper 10 ft consisting of fill and recent deposits. The upper glacial aquifer is nearly continuous across Long Island. Therefore, almost all recharge must infiltrate through the upper glacial aquifer to reach the lower aquifers. Most recharge originates from the precipitation that Long Island receives. Nearly half of the 44 inches per year average precipitation infiltrates through the upper glacial aquifer to recharge groundwater. The upper glacial aquifer is highly permeable and has a hydraulic conductivity that ranges from 130 feet/day in north-central Long Island, to 270 feet/day and higher in the southern part of Long Island (Eckhardt, Flipse, and Oaksford 1989).

The four aquifers are hydraulically interconnected to varying degrees. The connection of adjacent hydrogeologic units is controlled by their water-bearing properties and by the groundwater flow dynamics. The Raritan confining unit has a very low hydraulic conductivity, yet it does not completely prevent the migration of groundwater between the Lloyd and Magothy aquifers (Kilburn 1979). It is possible that the Lloyd aquifer is hydrogeologically connected with the adjacent Port Washington aquifer (Smolensky and Feldman 1988). The Port Washington aquifer is believed to be in close hydraulic communication with the adjacent Lloyd and Magothy aquifers. The Port Washington aquifer also forms part of the valley fill deposits in the channels cut by Pleistocene rivers. The valley fill deposits can act as groundwater flow paths that increase the hydraulic connection between aquifers (Kilburn 1979).

The regional groundwater flow on Long Island is separated by a groundwater divide which trends east/west along the north-central portion of Long Island. All groundwater north of the divide discharges into Long Island Sound, and all groundwater south of the divide discharges into Great South Bay (Kilburn 1979).

2.4.2. Site Geology

The site (Industrial Park) is located almost directly over the regional ground water divide described in the preceding paragraph. As noted in the Preco Site ROD dated March 1996, the ground water flow beneath the Site was determined to be in a northerly direction, ranging from 138 to 140 above mean sea level (MSL). In contrast, the water level for regional ground water was found to be between 80 ft and 85 ft above MSL, flowing south-southeast. As a result, it was concluded in the ROD that a perched water zone extended over most of the industrial park.

It is likely that the two recharge basins located in the park influence the direction of ground water flow (personal communication with Robert Stewart, Environmental Engineer, NYSDEC Region 1, April 22, 2005). Mr. Stewart also stated that there might be a pumping well within the park that could be expected to influence the direction of ground water flow.

3. Site Characterization Documents

3.1. Field Activities Plan

The Field Activities Plan (FAP) presents the procedures for implementing field investigations, provides detailed procedures for collecting environmental samples including equipment and personnel requirements, drilling and well installation techniques, sampling techniques, and equipment decontamination procedures. The FAP for this project is provided in Appendix A.

3.2. Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) provides quality assurance/quality control (QA/QC) criteria for work efforts associated with the sampling of environmental media as part of this project. The QAPP is provided in Appendix B.

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

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

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

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

3.3. Health and Safety Plan

The Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere personnel while performing field activities.

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

3.4. Data Management and Validation

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

Ten percent of the analytical data received from the laboratory will be validated as discussed in the QAPP. A Data Usability Summary Report (DUSR) will be prepared by a data validator and an Electronic Data Deliverable (EDD) package will be provided in the USEPA National EDD or Multimedia EDD format.

4. Scope of Work

4.1. General

The following scope of work was developed based on the Technical Scope of Work included in the Work Assignment letter dated February 4, 2005, the March 30, 2005 Site visit, background document review, and conversations with Joseph Jones, NYSDEC project manager. The field activities and sampling/analysis matrix are summarized in Tables 1 and 2, respectively. Detailed procedures for implementing the scope of work are set forth in the FAP, QAPP and HASP that are included in Appendices A, B, and C, respectively.

O'Brien & Gere assumes that the NYSDEC will provide access to each area investigated with limited support from O'Brien & Gere.

4.2. Investigation Activities

4.2.1. Finalize Document Review

Prior to beginning on-site activities O'Brien & Gere will review pertinent background data that were not reviewed as part of Task 1 (Work Plan preparation). This may include discussions with the tax assessor's office (240 Old Country Road, Mineola, NY 11501), an historical records review, discussions with key personnel at those facilities to be investigated, and review of Nassau County Health Department records.

4.2.2. Inventory Existing Monitoring Wells

Based on previous work, a variety of monitoring wells may be available from which water level measurements may be obtained. It is unknown at this time whether these monitoring wells are intact. Therefore, two days will be spent in the field in an attempt to inventory the wells for possible future use.

4.2.3. Marking of Subsurface Utilities

Prior to initiation of intrusive activities, an underground facilities protective organization (UFPO) request will be made. A date and time will then be established for the various utility companies to mark the locations of subsurface public utilities. Utility as-built maps will be requested from the current owners to assist in locating the on-site utilities. Approval of the boring locations will be required from the owner of each property or his representative prior to initiating boring activities.

4.2.4. Membrane Interface Probe

Soil borings will be advanced on-site in strategic areas using a Geoprobe®, a brand name of hydraulically-powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface. The initial samples collected from the borings will be analyzed via a membrane interface probe (MIP). The MIP is a system manufactured by Geoprobe Systems for the detection and measurement of volatile organic compounds in the subsurface. To obtain the sample, a heated probe carrying a permeable membrane is advanced to depth in the soil. VOCs in the subsurface cross the membrane, enter into a carrier gas stream, and are swept to gas phase detectors at the ground surface for measure. A log is made of detector response with probe depth.

Along with the detection of VOCs in the soil, the MIP also measures the electrical conductivity of the soil to give a probable lithology of the subsurface. This is accomplished by using a dipole measurement arrangement at the end of the MIP probe so that both conductivity and detector readings may be taken simultaneously. A simultaneous log of soil conductivity is recorded with detector response. The MIP is a screening tool used to find the depth at which the contamination is located, but is not used to determine the concentration of a compound. For this reason, it should be useful in tentatively identifying areas of concern within the park.

Samples collected via the membrane interface probe will be analyzed by portable gas chromatograph (GC) to measure the volatile analyte concentrations encountered. The GC will be calibrated in accordance with the QAPP.

In addition, supplemental soil vapor samples will be collected in one liter canisters and analyzed at a qualified laboratory for VOCs via Method TO-15 to confirm the MIP sample results.

4.2.5. Soil Sampling

Soil samples will be taken at locations of interest based on the MIP results. For purposes of this plan, it has been estimated that approximately 90 samples will be collected and analyzed for VOCs using

USEPA Method 8260. The exact locations and depth of the samples will not be known until the MIP results are evaluated. However, for purposes of this plan, a 25 ft boring depth has been assumed. Provisions will be made to retrieve soil samples from depths of up to approximately 100 ft below ground surface (bgs) to avoid remobilization to the Site. The soils will be retrieved using typical Geoprobe techniques. Prior to collection, the soils will be screened using a photoionization detector (PID).

4.2.6. Hydropunch® Ground Water Sampling

Ground water samples will be collected from a select number of soil boring locations to evaluate the presence of ground water contamination within the park. The samples will be obtained using a Hydropunch® type ground water sampler. The sampler has a retrievable stainless steel or disposable PVC screen with steel drop off tip, allowing sampler to be taken at multiple depth intervals within the same location.

The ground water sampler operates by advancing 1 ¾-inch hollow push rods within the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted exposing the encased filter screen and allowing ground water to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer is then lowered through the push rods into the screen section for sample collection. Samples collected in this manner will be analyzed for VOCs by USEPA method 8260.

4.2.7. Sediment Sampling

One composite sediment sample will be collected from each of the Park recharge basins. Up to five locations will be involved in each composite. These samples will be analyzed for VOCs by USEPA Methods 8260. The purpose of collecting the sediment samples will be to assess whether the recharge basins have acted or are acting as a source of ground water contamination.

4.2.8. Survey

A global positioning survey (GPS) will be conducted to designate sample locations in latitude/longitude. An eTrex Vista manufactured by Garmin Ltd. will be used to perform the survey. This handheld instrument is accurate to about ± 20 ft horizontally.

4.2.9. Site Characteristics Report

O'Brien & Gere will document characterization activities in a report that summarizes the field activities and analytical results for each location investigated. The report will include plans, analytical data tables, data validation reports, and laboratory data sheets.

Five draft copies will be submitted to the NYSDEC for review and approval. Following the receipt of one set consolidated comments from NYSDEC, the report will be finalized and five final copies will be provided.

4.6. Administration

This task consists of administration duties required by the State Superfund Contract dated 1999 between the Department and O'Brien & Gere including:

- Monthly Cost Control Report pursuant to Schedule 2 of the State Superfund Contract.
- Quarterly report, submitted on Form 101, providing a description of the Engineer's utilization of MBE/WBE firms in relation to this work assignment. The quarterly reports will be submitted on Form 101 before the seventh day of the month following the end of the quarter. In addition to Form 101, the report will include the names of the MBE/WBE firms, subcontracts and purchase order awarded to these firms, scope of work performed, cost of work performed to date, and actual dollar amounts and percent of work assignment costs paid to these MBE/WBE firms to date. This report will include invoices from the MBE/WBE firms and copies of canceled checks paid to the MBE/WBE firms. O'Brien & Gere will also report on such other matters related to Affirmative Action goals and requirements established by this Contract as the Department may require.
- Monthly Project Report describing the compliance with the progress schedule, accomplishments, problems, and projected changes in the scope of services.

5. Project Staffing Plan

The general responsibilities of key project personnel are listed below:

Program Manager:

Douglas M. Crawford, P.E. will be responsible for overall State Superfund Standby Contract (#D004090) program management, including administration and financial issues. Mr. Crawford is NSPE level IX.

Project Manager:

Jeffrey E. Banikowski, CPG will be responsible for overall management of the work assignment under the State Superfund Standby Contract (#D004090-21). Responsibilities will include coordination with NYSDEC, budget responsibilities, assistance in preparation of the work plan, and reviewing field activities and the site characterization report. Mr. Banikowski is NSPE level VIII.

Project Officer:

James R. Heckathorne, P.E. will be the Professional Engineer of record and be responsible for reviewing and signing documents that require the stamp and signature of a New York State licensed Professional Engineer. Mr. Heckathorne is NSPE level IX.

Sr. Project Scientist:

John Hunt, a Sr. Project Scientist, will act as field supervisor. Mr. Hunt will be responsible for coordination with the subcontractors, day to day field activities, and general oversight pertaining to the field work.

6. Proposed Subcontractors

The following subcontractors are tentatively identified for the purpose of completing the tasks described above:

- O'Brien & Gere Laboratories for soil and ground water sample analyses
- Vironex for MIP and Geoprobe® work

7. Women Business Enterprise Utilization

In addition to the subcontracting services described in the previous section, O'Brien & Gere anticipates utilizing women business enterprises (WBE) for the following activities:

- Advantage Travel is a WBE that will be responsible for making travel and lodging arrangements for O'Brien & Gere personnel.
- Skyline Specialty, Inc. is a WBE that will be utilized for the purchase of field supplies and rental of field equipment.
- Nancy Potek, a WBE, for data validation
- Centek Laboratories, LLC, a WBE, for laboratory services related to soil vapor analyses
- Skyline Specialty, Inc., a WBE, for equipment rental
- Featherstone Supply Co., a WBE, for equipment rental
- Theresa Beddoe, a WBE, for field work.

8. Work Assignment Budget

The following State Superfund Standby Contract schedules are included in Attachment 2:

Schedule 2.11(a)	Summary of Work Assignment
Schedule 2.11(b)	Direct Labor Hours Budgeted
Schedule 2.11(b-1)	Direct Administrative Labor Hours Budgeted
Schedule 2.11(c)	Direct Non-Salary Costs – In-House, Field Supplies, and Travel
Schedule 2.11(d)	Vendor Rental Equipment
Schedule 2.11(e)	Cost -Plus Fixed-Fee Subcontractors
Schedule 2.11(f)	Unit Price Subcontracts
Schedule 2.11(g)	Monthly Cost Control Report – Fiscal Information (Summary and Each Individual Task)
Schedule 2.11(h)	Monthly Cost Control Report – Labor Hours (Summary and Each Individual Task)

The costs presented in the Schedule 2.11 consist of those incurred since project inception and estimated costs to complete the above-described tasks. These costs represent our estimate based on the current status of the project and available information and assumptions stated in this Work Plan. The costs of the project may be affected by additional information or issues raised during execution of the project. Out of scope efforts will be estimated and presented to the Department for approval prior to execution.

9. Project Schedule

Table 3 is a Preliminary Project Schedule that is based on limited information that is currently available regarding access to individual properties within the Park. Some of the dates may, therefore, change as the Work Plan is being implemented.

References

Eckhardt, D.A.V., W.J. Flipse, Jr., E.T. Oaksford, 1989. Relation Between Land Use and Groundwater Quality in the Upper Glacial Aquifer in Nassau and Suffolk Counties, Long Island, New York, U.S. Geological Survey, Water Resources Investigations Report 86-4142.

Kilburn, C. Hydrology of the Town of North Hemstead, Nassau County, Long Island, New York, Department of Public Works, Long Island Water Resources Bulletin, 12, 87p.

NYSDEC, March 26, 1993. Preliminary Site Assessment Report, Cherry lane Lithography, Site No. 130057, Plainview/Oyster Bay (T), Nassau County.

NYSDEC, March 1996. Record of Decision, Preco Industries Site, Plainview, Nassau County, Site Number 1-30-044.

NYSDEC, February 2003. Preliminary Site Assessment Report, Plainview Industrial Park (NYSDEC Site Registry No. 1-30-104).

NYSDEC, March 2000. Record of Decision, Three Dimensional Circuits Site, Oyster Bay, Nassau County, Site Number 1-30-026.

NYSDEC, March 11, 2005. Work Assignment Letter from Dorothy A. Norvick, Chief, to James R. Heckathorne, Vice President.

Smolensky, D.A. and S.M. Feldman, Geohydrology of the Bethpage – Hickville – Levitown Ava, Long Island, New York, Water Resources Investigaion Report 88-4135.

Table 1. New York State Department of Environmental Conservation
Plainview Industrial Park
Task Summary

Plainview Industrial Park
Task 1 – Work Plan Development
Subtask 1 – Site Visit: Perform Site visit with the NYSDEC Project Manager and O'Brien & Gere field manager.
Subtask 2 – Background Review: Gather sufficient background information to design the Work Plan
Subtask 3 – Prepare Draft Work Plan
Task 1B – Prepare Final Work Plan
Work Plan includes Field Analysis Plan, Health and Safety Plan, and Quality Assurance Plan
Task 2 – Site Characterization
Subtask 1 – Prepare a Base Map
Subtask 2 – Survey
Subtask 3 – Obtain membrane interface data
Subtask 4 – Obtain additional soil, soil vapor and ground water samples as necessary
Task 3 – Site Characterization Reports
Subtask 1 – Monitor and evaluate budget and project status
Subtask 2 – Prepare Draft and Final Site Characterization Reports

Table 2. NYSDEC Plainview Industrial Park Work Plan

Analytical Sampling Summary

Task/Analysis	Method	Matrix	Samples*	MS	MSD	Field Duplicates	Equipment Blanks	Trip Blanks	Total Samples
Gem Cleaners - Rockville Center									
4.2.4 Membrane Interface Probe									
VOCs	Field GC	Soil Vapor	168	N/A	N/A	N/A	N/A	N/A	168
4.2.4 Confirmation Samples									
VOCs	TO-15	Soil Vapor	9	1	1	1	N/A	N/A	12
4.2.5 Soil Samples									
VOCs	USEPA 8260	Soil	90	5	5	5	5	5	115
4.2.6 Ground Water Sampling (Hydropunch)									
VOCs	USEPA 8260	Water	4	1	1	1	2	1	10
4.2.7 Sediment Sampling									
VOCs	USEPA 8260	Sediment	6	1	1	1	1	1	11
Waste Disposal									
VOCs/Metals	USEPA 8260/6010	Soils	9	N/A	N/A	N/A	N/A	N/A	9

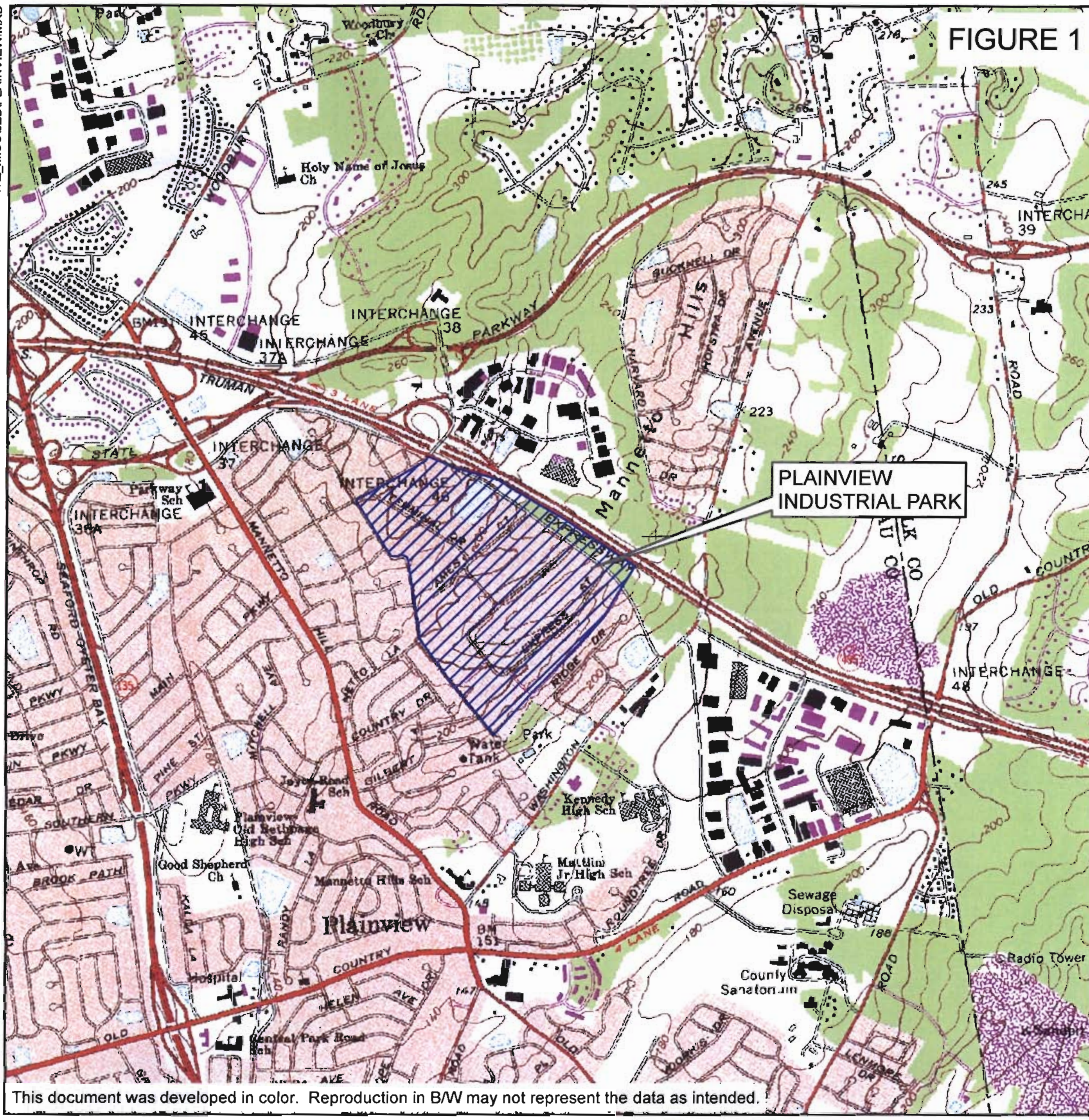
***-Estimated**

Table 3. Tentative Schedule

The following schedule has been developed with the recognition that access agreements have yet to be obtained. Therefore, the schedule should be considered tentative in nature.

Task	Duration in Weeks Following Work Plan Acceptance
1A – Draft Work Plan Preparation	6
1B – Final Work Plan	2
2 – Site Characterization	18
3 – Site Characterization Report	12

T:\Z_MISC\JEB\PLAINVIEW.MXD



PLOT DATE: 04/28/05 DIV. 84 JPS

ADAPTED FROM: HUNTINGTON, NEW YORK USGS QUADRANGLE.

QUADRANGLE LOCATION

PLAINVIEW INDUSTRIAL PARK
PLAINVIEW, NEW YORK

SITE LOCATION

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

Feet

FILE NO. (10)
MAY 2005

1:24,000

O'BRIEN & GERE ENGINEERS, INC.

Field Activities Plan

Plainview Industrial Park Site
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State Department of Environmental Conservation

May 2005

O'BRIEN & GERE

Field Activities Plan

Plainview Industrial Park Site
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State
Department of Environmental Conservation
Albany, New York

May 2005

O'BRIEN & GERE ENGINEERS, INC.

Contents

List of Exhibits

1. Introduction

1.1. General Plan

This document is the Field Activities Plan (FAP) for the Plainview Industrial Park, designated as Site #1-30-104 by the New York State Department of Environmental Conservation (NYSDEC). The FAP describes the procedures for implementing the Preliminary Site Characterization (PSC) field investigation described in the PSC Work Plan (O'Brien & Gere, 2005 - Work Assignment #D004090-24). The location of the Park is shown on Figure 1 of the Work Plan. This FAP provides details the methodologies for collecting environmental samples, the equipment and personnel requirements for collecting the samples, the direct-push penetration techniques to be used in the investigation, sampling techniques, and equipment decontamination procedures.

The objective of PSC is to determine potential source areas within the Park that may be contributing to local ground water contamination. The PSC involves multiple properties and multiple environmental media. As described in the Work Plan, the overall approach may be modified based on real-time results of field data collection and is subject to the constraints of property access and field conditions.

2. Field Investigation Activities

This section describes the field activities to be completed as part of the PSC Work Plan. The following summarizes detailed procedures for implementing the scope of work as set forth in the PSC Work Plan. The field task summary and analytical sampling summary for each individual property is described in Tables 1 and 2, respectively, of the PSC Work Plan.

2.1. Marking of Subsurface Utilities

Prior to initiation of intrusive activities and once access agreements are in place, an underground facilities protective organization (UFPO) request will be made. A date and time will then be established for the various companies to mark the locations of subsurface public utilities. Utility as-built maps will be requested from the current owners to assist in locating the on-site utilities. Approval of the boring locations will be required from the property owner or his representative prior to initiating boring activities.

2.2. Soil Vapor Survey

The first element of the PSC field work will involve conducting a soil vapor survey. The soil vapor survey will be conducted to evaluate the extent of volatile organic compounds (VOCs) in soil vapor, as well as to assess potential source(s) of VOCs.

2.2.1. Locations

Tentative soil vapor survey locations are identified on Figure 2 of the PSC Work Plan. The locations were selected to provide an areal distribution of data collection points encompassing properties that may potentially contain sources of VOCs detected in ground water.

2.2.2. Procedures

For each subsurface survey location, a Membrane Interface Probe (MIP) will be installed by a qualified vendor using a direct-push system.

The MIP is a site investigation tool developed to measure total volatile organic compounds (VOCs) while classifying soil lithology in the subsurface. As the MIP is driven to depth using Geoprobe® soil probing equipment, a permeable membrane on the side of the probe is heated at desired intervals to volatize organic compounds present. The VOCs permeate the membrane and are delivered to the surface using an internal carrier gas. At the surface, total VOC readings are provided by using a series of detectors, including a photoionization detector (PID), flame ionization detector (FID), or electron capture detector (ECD). The MIP log provides semi-quantitative/qualitative information on contaminant levels and allows the investigator to collect targeted samples from zones of interest. In addition, the real time log provides a depth/speed graph, an electrical conductivity log of the formation (to evaluate lithology), and a temperature log of the heated sensor. When the MIP is coupled with a field GC/MS, the constituents detected in the zone of interest can be speciated and relative concentrations can be evaluated. The soil vapor and conductivity surveys will be continuously logged to a depth of approximately 25 ft below grade at the sample locations. (See Exhibit A for a detailed description of the MIP technology.)

The MIP-GC/MS survey will be conducted for a period of 7 work-days. It is expected that, during this 7-day effort, about 45 to 56 survey locations will be logged.

2.2.3. Analyses

Vironex or another qualified contractor will perform MIP and in-field GC/MS analysis while Centek Laboratories, LLC will perform laboratory analyses of soil vapor samples. Quantitative analytical services are described below.

In-Field Mobile Laboratory Analysis

Soil vapor samples extracted will be field screened using the MIP and confirmed, if necessary, using a mobile laboratory equipped with GC/MS capabilities. A qualified chemist will operate the GC/MS and electronic deliverables will be provided for each analysis. Data will be interpreted by the chemist and the field supervisor.

In addition, quality assurance/quality control (QA/QC) standards will be used in accordance with EPA guidelines for data validity. A detailed description of QA/QC to be performed and mobile laboratory specifications are provided in Exhibit A.

Off-Site Laboratory Analysis

Soil vapor samples collected via the MIP will be supplemented or confirmed. Supplemental soil vapor sample collection and analyses are described in Section 2.6.

2.2.4. Data Use

The mobile laboratory screening and quantitative analytical data will be used to perform an overall characterization of the Park and, if necessary, to make real-time sampling decisions in the field to help guide the investigation. Subsequent to the initial 7-day soil vapor screening effort, O'Brien & Gere will select soil sample locations or additional soil vapor sample locations in collaboration with the NYSDEC Project Manager. The off-site analyzed soil vapor data will be used to confirm or supplement field analytical results.

2.3. Soil Boring Installations

2.3.1. Locations

Soil borings will be advanced at locations on site. The proposed locations will be selected in collaboration with the NYSDEC Project Manager based on the results of the soil vapor survey, property access issues, or utility clearances. The tentative number of soil borings to be advanced is summarized in Table 2 of the PSC Work Plan.

2.3.2. Procedures

All soil borings will be advanced using Geoprobe® or direct push methods. The soil borings will be advanced to a depth of approximately 25 ft below grade for selected locations.

The soil sampling effort will be conducted for a period of 3 work-days. It is expected that, during this 3-day effort, about 30 locations will be sampled.

Up to 3 soil samples will be collected from each boring, depending on visual inspection, photoionization detector (PID) field screening, and the judgment of the field supervisor. The samples will, in general, represent the highest observed soil vapor survey readings (based on the MIP technology).

Samples for VOC analysis will be selected and transferred to the appropriate laboratory containers and placed in a cooler containing ice.

Associated QA/QC samples will be collected in accordance with the Quality Assurance Project Plan (QAPP) provided in Appendix B and Table 2 of the PSC Work Plan.

2.3.3. Analyses

Samples will be shipped with a chain-of-custody to O'Brien & Gere Laboratories for analysis. Table 2 of the PSC Work Plan summarizes the type of analyses, the analytical methods, and the quantity of samples that will be collected.

2.4. Hydropunch Ground Water Sampling

2.4.1. Locations

Ground water screening samples will be collected from hydropunch boring locations to evaluate the extent of contamination in ground water underlying the Park and the potential for offsite migration, if any. The proposed ground water screening locations are identified on Figure 2 of the PSC Work Plan.

2.4.2. Procedures

Discrete ground water screening samples will be collected from each boring using Geoprobe® or similar discrete screen point ground water sampling methods. Direct-push ground water sampling consists of pushing a protected well screen to a known depth, retracting the drill rods to expose the screen and allowing ground water to enter the sampler. Ground water samples will be obtained if sufficient ground water is available. If yields are not sufficient to obtain a sample via the screen point sampler, a 0.75-inch diameter temporary polyvinyl chloride (PVC) well will be installed within the borehole.

Samples will be collected at each of the borings at an elevation where observations indicate the potential for perched ground water. Specifically, samples will be collected at the interface between the predominant sands and any clay layer encountered, or at the interval representing the highest PID reading. In the absence of clay layers, elevated PID readings, or other indications observed in the field, a sample from about 100 feet below ground surface (bgs) will be analyzed.

Associated QA/QC samples will be collected in accordance with the QAPP provided in Appendix B and Table 2 of the PSC Work Plan.

Following completion of a discrete ground water sample, all downhole equipment will be decontaminated in accordance with Section 2.8 of this document. Following completion, boreholes will be backfilled with native materials, clean sand or grouted (cement/bentonite grout).

The ground water screening effort will be conducted for a period of 2 work-days. It is expected that, during this 2-day effort, 4 locations will be probed and sampled.

2.4.3. Analyses

Samples will be shipped along with a chain-of-custody to O'Brien & Gere labs for analysis. Table 2 of the PSC Work Plan summarizes the type of analyses, the analytical methods, and the quantity of samples that will be collected.

2.5. Sediment Sampling

2.5.1. Locations

Sediment samples will be collected from on-site recharge basins. Specific locations will be selected based on field conditions and the judgment of the field supervisor following further examination of these areas.

2.5.2. Procedures

Based on field conditions, samples will be collected using lexan tubing, decontaminated hand auger, trowel, or ponar dredge. Samples will be screened with a PID via the headspace method and composited from several locations, as appropriate. Sediment samples for VOC analysis will be selected and transferred to the appropriate laboratory containers for the remainder of the analysis and placed in a cooler containing ice. Associated QA/QC samples will be collected in accordance with the QAPP provided in Appendix B and Table 2 of the PSC Work Plan.

2.5.3. Analyses

Samples will be shipped with a chain-of-custody to O'Brien & Gere labs for analysis. Table 2 of the PSC Work Plan summarizes the type of analyses, the analytical methods, and the quantity of samples that will be collected.

2.6. Supplemental Soil Vapor Sampling

Supplemental soil vapor samples will be collected at a depth of 5 to 8 feet as part of the PSC in order to supplement or confirm MIP data and to evaluate the potential for VOC vapor intrusion into occupied buildings. Sample locations will be based on the MIP screening results, the potential for vapor intrusion into occupied buildings, and the judgement of O'Brien and Gere in collaboration with the NYSDEC Project Manager. Samples will be collected in accordance with the recent New York State Health Department guidance (February 2005) on soil vapor sampling for health-based soil vapor intrusion investigations. Time-averaged samples will be collected for off site laboratory analysis using Summa-type canisters.

2.6.1. Locations

Soil vapor samples will be collected from up to 9 locations. Sampling locations and sampling depths will be based on the results of the MIP soil vapor survey and the judgment of the field supervisor with input from the NYSDEC project manager.

2.6.2. Procedures

For each sample, a soil vapor sample probe will be installed either manually or by a direct-push system. A slotted aluminum sampling point will be fitted to inert tubing which runs through a hollow steel rod. The hollow rod will be removed after it has been advanced to the selected sampling depth, leaving the point and tubing in the ground.

After removal of the hollow rod, a minimum of 3 inches of clean, permeable material will be placed to cover the vapor point. To prevent infiltration of ambient air and dilution of the sample, the probe hole will be sand-packed and sealed. Pre-hydrated bentonite grout will then be placed on top of the sand pack extending to the ground surface.

Soil gas sample collection

To remove stagnant or ambient air from the sample string (consisting of the vapor point, sand pack, and tubing) and to provide samples that are representative of subsurface conditions, one sample-string volume will be purged prior to sample collection. Sampling points will be purged with a syringe or vacuum pump at a rate of less than 200 cubic centimeters per minute (cc/min).

The samples will be collected using pre-cleaned vacuum extracted canisters. The vacuum extracted canisters will be equipped with vacuum gauges and flow control valves. Prior to sample collection, the vacuum gauge reading will be recorded in the field log book. After the sample point has been purged, the tubing will be connected to the flow controller of a 1L stainless steel vacuum extracted canister. The flow controller will be calibrated to collect the sample over a 6-hour period.

At the end of the sample draw, the vacuum gauge reading will be recorded in the field log book. The sample tubing will be removed from the ground, and the probe hole will be sealed with native material.

2.6.3. Analyses

Quantitative analyses of soil gas samples will be conducted by Centek Laboratories, LLC. The soil gas samples will be analyzed for VOCs using USEPA Method TO-15. The detection limits for each compound will be 5 $\mu g/m^3$ or less, assuming there are no matrix interferences. Quality Assurance/Quality Control (QA/QC) samples associated with the soil vapor sampling are specified in the Quality Assurance Project Plan (QAPP) provided in Appendix B of the PSC Work Plan.

2.6.4. Data Use

Soil vapor data will be compared to field data to confirm the field analyzed soil vapor results or to supplement soil, ground water, and sediment analytical data.

2.6.4. Analyses

Table 2 of the PSC Work Plan summarizes the type of analyses, the analytical methods, the laboratory conducting the analyses and the estimated quantity of samples that will be collected.

2.7. Sample and Field Equipment Handling

The equipment will be inspected to verify that it is in working order and decontaminate sampling equipment, as appropriate. Any equipment or materials that are in short supply or are showing indication of wear should be noted and replaced.

Upon receipt of the sampling containers from the laboratory, the containers should be inventoried to make sure appropriate containers were delivered, the preservatives checked, and the general condition of containers assessed.

Samples will be handled and standard chain of custody procedures will be applied according to procedures presented in the QAPP. In general, samples will be placed in appropriate containers upon collection. The samples will then be assigned a sample designation identifying sample location, date, and time. The labeled sample containers will then be chilled to approximately 4°C, and transported to the analytical laboratory for analysis.

Field notes will be completed by field personnel to document the details of the sampling event for each sample collected. Photographs will also be taken during the PSC including date and time.

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

In addition to the sample identification, field personnel will label each sample container with the following information:

- Site name;
- Date and time of sample collection;
- Analysis requested;

- Preservative(s); and
- Client name.

Information will be entered in the field notes in waterproof ink. In addition, sample container labels should be completed with ink that does not contain organic solvents. The reviewer is referred to the QAPP for specific details on chain-of-custody protocols and shipping requirements.

2.8. Equipment Documentation Procedures

A suitable area will be established, on publicly owned property, if possible, for the purpose of decontaminating investigation equipment. Decontamination procedures are described below.

Drilling equipment
Direct-push samplers will be decontaminated after each use using a non-phosphate detergent wash followed by a potable water rinse. The decontamination water will be periodically changed during the drilling program. These decontamination fluids will be transferred to 55-gallon drums.

After the completion of each well borehole, drill rods and other miscellaneous drilling tools will be decontaminated using a high-pressure steam cleaner. This decontamination will be conducted on a temporary decontamination pad such that the decontamination fluids can be collected and transferred to 55-gallon drums or other suitable containers.

Other sampling equipment
Any other non-dedicated sampling equipment (hand augers, spoons, bowls, etc.) will be decontaminated between each use with an alconox® and potable water wash and a distilled water rinse.

2.9. Survey of Sample Locations

A GPS instrument (Garmin Model eTrex Vista) survey will be performed at each location following the on-site sampling activities. The horizontal locations of soil vapor, ground water, soil, and sediment samples will be referenced by latitude and longitude reference points to within 20 feet. Pertinent site characteristics and sample locations will be incorporated into the site base map, which will be provided in AutoCAD 2000.

2.10. Quality Assurance/Quality Control

Quality assurance/quality control issues associated with this project are addressed in the QAPP developed for this program. The QAPP is provided in Appendix B of the PSC Work Plan.

2.11. Health and Safety

Health and safety issues associated with this project are addressed in the Health and Safety Plan (HASP) developed for this program. The HASP is provided in Appendix C of the PSC Work Plan.

3. Handling of Investigation-Derived Wastes

3.1. General

Investigation-derived wastes (IDW) may be created during the PSC, requiring management. IDW could include the following:

- Excess sample material (soils)
- Ground water resulting from sampling temporary wells.
- Decontamination fluids resulting from decontamination of drilling equipment and other miscellaneous sampling equipment.
- Personnel protective equipment (PPE) and associated refuse resulting from the execution of field activities.

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

3.1.1. Excess Soils

Soil generated during soil borings (should be minimal due to the direct push methods used) will be put back down the borehole following completion. Additional waste cuttings will be placed in 55-gallon drums and temporarily staged on-site or at a convenient staging area until the drum contents are characterized and can be properly disposed.

3.1.2. Ground Water

Ground water produced during sampling activities will be placed in 55-gallon drums and temporarily staged on-site until the drum contents are characterized and can be properly disposed.

3.1.3. Decontamination Fluids

Decontamination fluids produced during the decontamination of sampling equipment will be placed in 55-gallon drums and temporarily staged on-site until the drum contents are characterized and can be properly disposed.

3.1.4. PPE and General Refuse

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

3.1.5. Waste Characterization Analyses

At the conclusion of field activities, the soil, ground water, and decontamination fluids will be appropriately characterized and, after receiving the necessary approvals, will be transported for treatment and/or disposal at a permitted facility.

It is anticipated the waste characterization of soil and liquid samples (*i.e.* ground water and decontamination fluids) will include Toxicity Characteristic Leaching Procedure (TCLP) VOCs.

Exhibit A

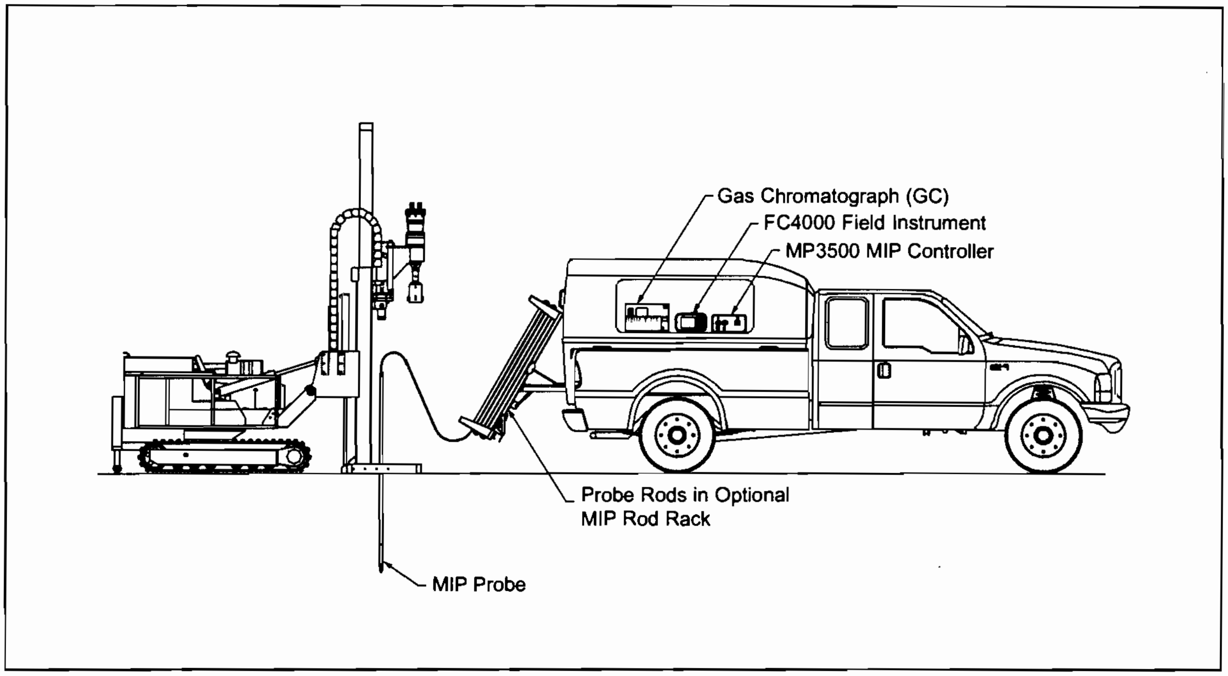
MIP and In-field GC/MS Technology

GEOPROBE® MEMBRANE INTERFACE PROBE (MIP)

STANDARD OPERATING PROCEDURE

Technical Bulletin No. MK3010

PREPARED: May, 2003



THE MIP SYSTEM MAY BE DEDICATED TO A SINGLE CARRIER VEHICLE FOR USE IN TANDEM WITH MULTIPLE GEOPROBE® DIRECT PUSH MACHINE MODELS

Geoprobe Systems®

A DIVISION OF KEJR, INC.

Geoprobe Systems®

**Geoprobe® and Geoprobe Systems®, Macro-Core® and Direct Image®
are Registered Trademarks of Kejr, Inc., Salina, Kansas**

Equipment and tool specifications, including weights, dimensions, materials, and operating specifications included in this brochure are subject to change without notice. Where specifications are critical to your application, please consult Geoprobe Systems®.

1.0 OBJECTIVE

This document serves as the standard operating procedure for use of the Geoprobe Systems® Membrane Interface Probe (MIP) to detect volatile organic compounds (VOCs) at depth in the subsurface.

2.0 BACKGROUND

2.1 Definitions

Geoprobe®: A brand name of high quality, hydraulically-powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface. The Geoprobe® brand name refers to both machines and tools manufactured by Geoprobe Systems®, Salina, Kansas. Geoprobe® tools are used to perform soil core and soil gas sampling, groundwater sampling and testing, soil conductivity and contaminant logging, grouting, and materials injection.
**Geoprobe® is a registered trademark of Kejr, Inc., Salina, Kansas.*

Membrane Interface Probe (MIP): A system manufactured by Geoprobe Systems® for the detection and measurement of volatile organic compounds (VOCs) in the subsurface. A heated probe carrying a permeable membrane is advanced to depth in the soil. VOCs in the subsurface cross the membrane, enter into a carrier gas stream, and are swept to gas phase detectors at ground surface for measurement.

2.2 Discussion

The MIP is an interface between contaminates in the soil and the detectors at ground surface. It is a screening tool used to find the depth at which the contamination is located, but is not used to determine concentration of the compound. Two advantages of using the MIP are that it detects contamination in situ and can be used in all types of soil conditions.

Refer to Figure 2.1. The MIP is a logging tool used to make continuous measurements of VOCs in soil. Volatile compounds outside the probe diffuse across a membrane and are swept from the probe to a gas phase detector at ground surface. A log is made of detector response with probe depth. In order to speed diffusion, the probe membrane is heated to approximately 100° C (212° F).

Along with the detection of VOCs in the soil, the MIP also measures the electrical conductivity of the soil to give a probable lithology of the subsurface. This is accomplished by using a dipole measurement arrangement at the end of the MIP probe so that both conductivity and detector readings may be taken simultaneously. A simultaneous log of soil conductivity is recorded with the detector response.

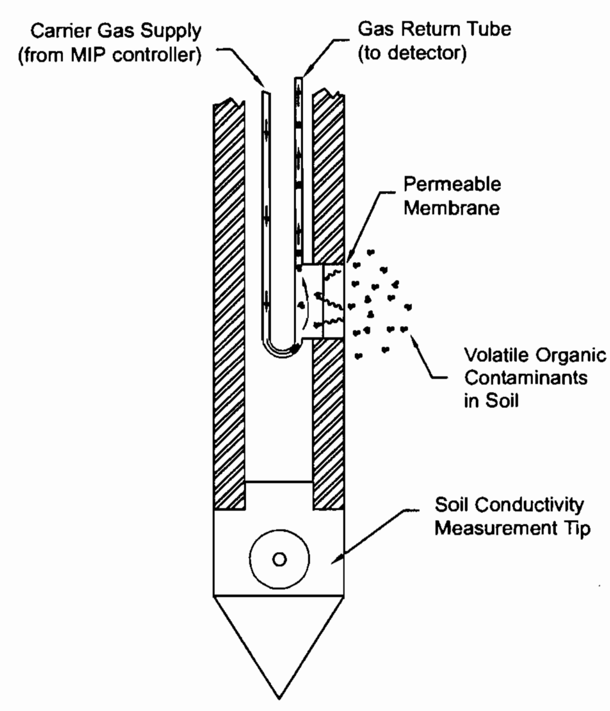


Figure 2.1
Schematic drawing of the MIP probe

3.0 Tools and Equipment

The following equipment is needed to perform and record an MIP log. Basic MIP system components are listed in this section and illustrated in Figure 3.1. Refer also to Appendix I for more required tools as determined by your specific model of Geoprobe® direct push machine.

3.1 Basic MIP System Components

Description	Quantity	Part Number
Field Instrument	(1)	FC4000
MIP Controller	(1)	MP3500
MIP/EC Acquisition Software	(1)	MP3517
MIP Probe	(1)	MP4510
Replacement Membrane	(1)	MP3512
Membrane Wrench	(1)	16172
LB Sample Tube	(1)	AT6621
Stringpot (linear position transducer)	(1)	SC160
Stringpot Cordset	(1)	SC161
MIP O-ring and Service Kit	(1)	MP2515
MIP Trunkline, 100-ft (30 m) length	(1)	MP2550
Extension Cord, 25-ft (8 m) length	(1)	SC153
Needle Valve	(1)	13700
24-in. Nafion Dryer Tube	(1)	12457

3.2 Anchoring Equipment

Description	Quantity	Part Number
Soil Anchor, 4.0-in. OD flight	(3)	10245
Anchor Foot Bridge	(1)	10824
Anchor Plate	(3)	10167
GH60 Hex Adapter (if applicable)	(1)	10809
Chain Vise	(3)	10075

3.3 Optional Accessories

Description	Quantity	Part Number
MIP Trunkline, 150-ft (46 m) length	(1)	13999
MIP Trunkline, 200-ft (61 m) length	(1)	15698
FID Compressed Air System	(1)	AT1004
Hydrogen Gas Regulator	(1)	10344
Nitrogen Gas Regulator	(1)	13940
Cable Rod Rack, for 48-in. rods	(1)	18355
Rod Cart Assembly, for 1.25-in. OD rods	(1)	SC610
Rod Cart Hitch Rack, for SC610	(1)	SC650K
Rod Cart Carrier, for SC610	(1)	SC675
Rod Wiper, for 5400 Series foot	(1)	AT1255
Rod Wiper, for 66 Series foot	(1)	18181
Rod Grip Pull Handle, for GH40 hammer	(1)	GH1255
Rod Grip Pull Handle, for GH60 hammer	(1)	9641
Water Transport System	(1)	19011

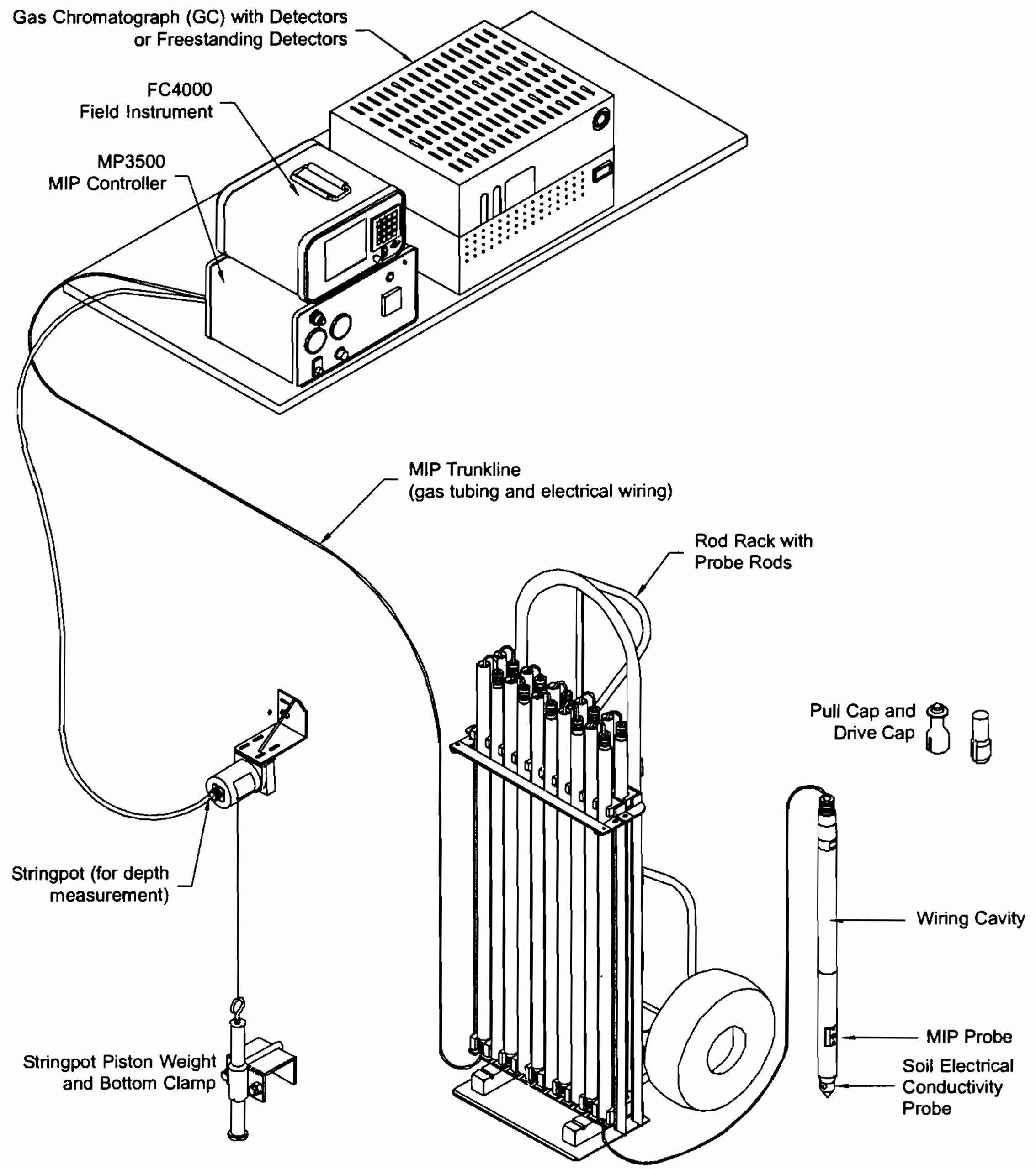


Figure 3.1
MIP system components

4.0: Quality Control - Response Testing

Response testing is an important quality control measure used to validate each log by proving that the integrity of the system is intact. Without running a response test, the operator will not know if the system is detecting the correct compounds or even if the system is working.

4.1 Preparation for Response Testing

Response testing is a necessary part of the MIP logging process because it ensures that the entire system is working correctly and also enables the operator to measure the trip time. Trip time is the time it takes for the contaminant to go from the probe, through the trunk line, and to the detectors. This time will need to be entered into the MIP software for depth calculations as described later in this document.

The following items are required to perform response testing:

- Neat sample of the analyte of interest (i.e.: benzene, TCE, PCE, etc.) purchased from chemical vendor
- Microliter syringes
- 25- or 50-mL Graduated cylinder
- Several 40-mL VOC vials with labels
- Testing cylinder made from a nominal 2-in. PVC pipe with a length of 24 in.
- 0.5 L plastic beaker or pitcher
- 25 mL Methanol
- Supply of fresh water, 0.5 L needed per test
- 5-gallon bucket filled with fine sand and water
- Stopwatch

Preparation of the stock standard is critical to the final outcome of the concentration to be placed into the testing cylinder.

1. Pour methanol into graduated cylinder to the 25 mL mark.

2. Pour 25 mL of methanol from graduated cylinder into 40-mL VOC vial.

3. Mix appropriate volume of desired neat analyte into 40-mL VOC vial containing 25 mL of methanol. The required volume of neat analyte for five common compounds is listed in Column 3 of Table 4.1. Use the equation at the then of this section to calculate the appropriate neat analyte volume for other compounds of interest.

4. Label the vial with name of standard (i.e. TCE, PCE, Benzene), concentration (50 mg/mL), date created, and created by (your name). This is the Stock Standard.

The equation used for making a stock standard is shown on the following page.

Table 4.1
Density and required volumes of neat compounds used to make a 50 mg/mL working standard into 25 ml of methanol

Compound	Density (mg/uL)	Volume of Neat Analyte Required to Prepare a Working Standard (uL)
Benzene	0.8765	1426
Toluene	0.8669	1442
Carbon Tetrachloride	1.594	784
PCE	1.6227	770
TCE	1.4642	854

25 mL (methanol) x 50 mg/mL = 1250 mg
1250 mg x 1/density of analyte = amount of neat material to be placed into 25 mL of Methanol

Example: Preparation of 50 mg/mL Benzene standard.
1250 mg x 1/0.8765 mg/uL = 1426 uL
Use 1426 uL of neat Benzene in 25 mL of Methanol to get a 50 mg/mL standard.

4.2 Response Test Procedure

With the standard prepared, the operator is ready to test the response of the probe as described below.

1. Immerse the probe into the 5-gallon bucket of fine sand and water to stabilize the baseline. This is necessary due to the sensitivity of the photoionization detector (PID) and the electron capture detector (ECD) to water.

2. Access the MIP Time software and view the detector vs. time data. The detector signals should be stable before proceeding.

3. Obtain 500 mL of water (either tap water or distilled) in a suitable measuring container.

Table 4.2
Volume of 50 mg/mL working standard and final concentration in 0.5 L test sample volume

Volume of 50 mg/mL Standard	Final Concentration of 0.5 L Sample (mg/L or ppm)
1000 uL	100
100 uL	10
10 uL	1

4. Use a standard volume specified in Table 4.2 to mix the desired test concentration. This is the Working Standard.

5. Pour the working standard into a nominal 2-inch x 24-inch PVC pipe and immediately insert the MIP into the solution (Fig. 4.1). Leave the probe in the test solution for 45 seconds. At the end of 45 seconds, place the probe back in the 5-gallon bucket of sand and water.

6. From the results on the MIP Time software the trip time and response time can both be measured (Fig. 4.2).

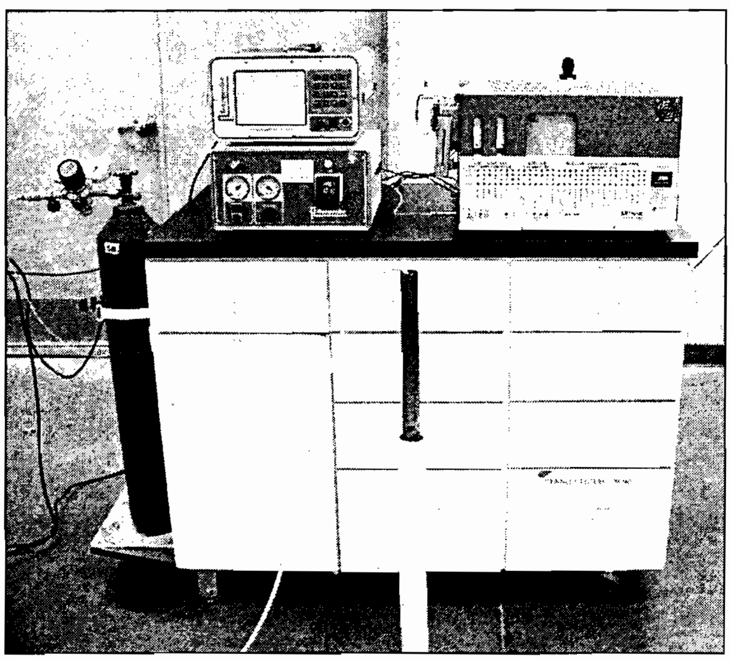


Figure 4.1
The MIP probe is placed in a PVC pipe containing the standard solution.

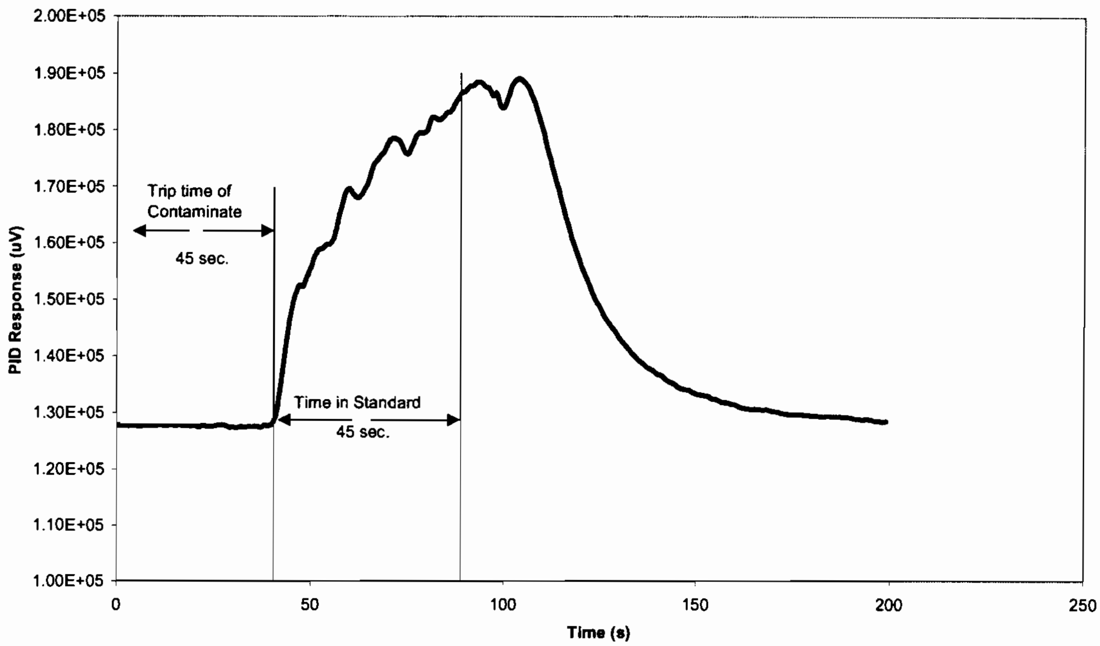


Figure 4.2
SRI PID Response Test - 10 ppm Benzene

5.0 Field Operation

1. Power on the generator.

2. Turn on any gases that will be used for the MIP system (i.e. nitrogen carrier gas, hydrogen for the FID, etc.). Check the flow rate of the system and psi on the mass flow controller. Compare these numbers to previous work.

3. Power on the detector or detectors and allow to warm up to set temperature (approximately 30 minutes).

4. Power on the MP2500 or MP3500 MIP Controller.

5. Power on the computer or the FC4000 Field Instrument.

6. Advance a pre-probe 3 to 4 feet into the subsurface at the location to be logged.

7. Remove the pre-probe and raise the probe foot of the direct push machine.

8. If advancing the MIP with percussion, raise the probe foot enough to slide the rod wiper plate underneath.

9. If pushing only, turn the desired amount of anchors into the subsurface and return the probe foot to the position from which the pre-probe was advanced. Leave the probe foot raised sufficiently to allow sliding the rod wiper underneath.

10. Place the rod wiper plate under the foot such that the opening is directly over the pre-probed hole. Lower the foot firmly onto the rod wiper.

11. If pushing only, position the anchoring bridge over the foot of the machine such that the anchors extend through the holes in the bridge (fig. 5.1). Install a chain vise at each anchor to secure the bridge.

12. With the software loaded, run a response test (Section 4.0) and record the height of the peak response and the trip time into a field notebook. Refer to Figure 4.2.

13. If the trip time is different than what was placed into the software, restart the software and enter the correct trip time.

14. Attach a slotted drive cap to the MIP drive head.

15. Insert the MIP point into rod wiper opening and drive it into the soil until the membrane of the probe is at ground level.

16. Connect the stringpot cable to the stringpot weight located on the probe foot and pull keeper pin so the weight drops to the ground.

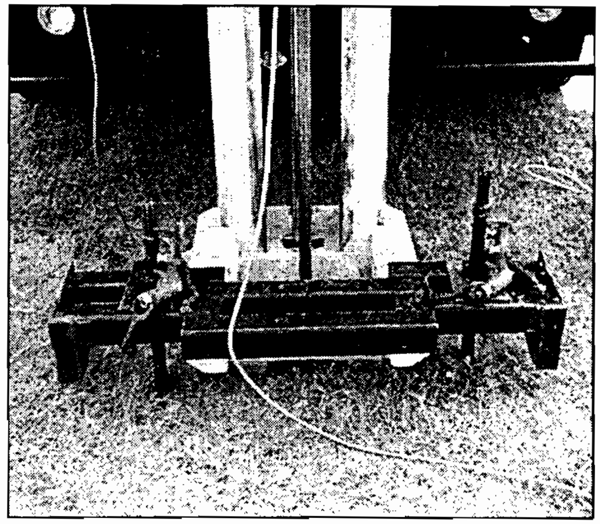


Figure 5.1
Anchor the probe foot to allow advancement of MIP probe by push only (no percussion).

NOTE: Do not allow the stringpot cable to retract into the stringpot housing at a high rate. This will ultimately damage the stringpot.

17. Record the system parameters in a field notebook at this time (i.e.. mass flow, trip time).

NOTE: If the mass flow reading drops or rises more than one psi, turn off the flow at the primary controller and remove the probe from the ground. If the temperature monitor quits heating or gives an error, remove the probe from the ground.

18. Place the trigger switch in the "ON" position.

19. Advance the probe at a rate of 1 ft/min to the predetermined log depth or until refusal is attained.

NOTE: Refusal is attained when it takes longer than 1.5 minutes of continuous hammering to advance the probe one foot. This is the maximum time to reach one foot of probe travel.

20. When the MIP log is complete, turn the trigger off and slowly return the stringpot cable into the stringpot housing.

21. Pull the probe rod string using either the Geoprobe® rod grip pull system or a slotted pull cap.

22. When the MIP reaches the surface, clean the face with water and run a response test. This response test should be written down in the field notes and compared to the initial test. This system check ensures the data for that log is valid.

23. Save the data to a 3.5-inch floppy disk and exit the MIP software.

24. Data from the MIP can now be graphed with Direct Image® MIP Display Log or imported into any spreadsheet for graphing.

6.0 Replacing a Membrane on the MIP Probe

A probe membrane is considered in good working condition as long as two requirements are met: 1) The butane sanity test result is greater than 1.0E+06 uV response, 2) Flow of the system has not varied more than 3 mL/min from the original flow of the system (a flow meter or bubble flow meter should be kept with the system at all times). If either one of these requirements are not met, a new face must be installed as follows.

1. Turn the heater off and allow the block to cool to less than 50° C on the control panel readout.

2. Clean the entire heating block with water and a clean rag to remove any debris.

3. Dry the block completely before proceeding.

4. Remove the membrane using the membrane wrench (Fig. 6.1). Keep the wrench parallel to the probe while removing the membrane to ensure proper engagement with socket head cap screw.

NOTE: Do Not leave the membrane cavity open for extended periods. Debris can become lodged in the gas openings in the plug.

5. Remove and discard the copper washer as shown in Figure 6.2. Each new membrane is accompanied by a new copper washer. **Do not reuse the copper washer.**

6. Inspect the open cavity for any foreign objects. Remove any objects present and clean the inside of cavity of any soil that was deposited on the wall of the block.

7. Insert the new copper washer around the brass plug making sure that it sits flat on the surface of the block.

8. Install the new membrane by threading it into the socket. Use the membrane wrench to tighten the membrane to a snug fit. Do not overtighten.

9. Turn the gas on and leave the heater off. Apply water to the membrane and surrounding area to check for leaks. If a leak is detected (bubbles are formed in the water), use the membrane wrench to further tighten the membrane.

10. Use a flow meter/bubble flow meter to check flow to the detectors. Record this value in a field notebook.

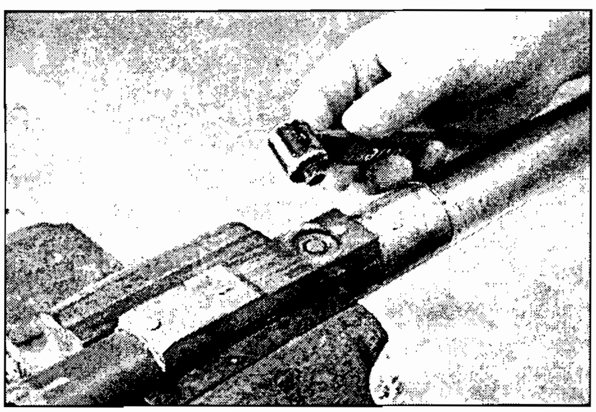


Figure 6.1
Unthread the membrane from the probe block.

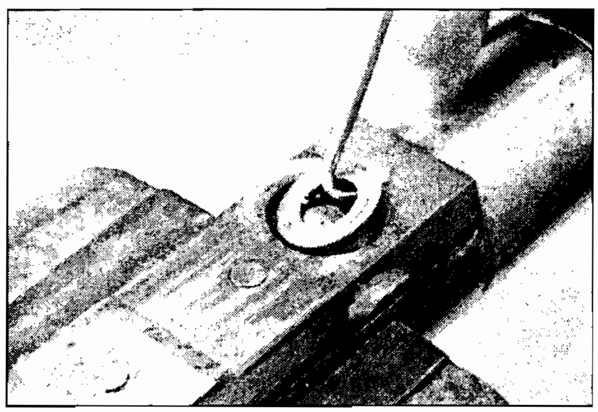


Figure 6.2
Remove and discard the copper washer.

Appendix I: Tools for Various Direct Push Machines

Model 5400 and 54DT Direct Push Machines

Description	***Part Number***
Stringpot Mounting Bracket	SC110
Stringpot Bottom Clamp	SC111
Stringpot Piston Weight	SC112
Slotted Drive Cap, for 1.25-in. rods	AT1202
Slotted Pull Cap, for 1.25-in. rods	AT1203
MIP Drive Adapter, for 1.25-in. rods	MP2512
MIP Drive Head	GW1516
Probe Rod, 1.25-in. x 48-in.	AT1248

Model 54LT Direct Push Machine

Description	***Part Number***
Stringpot Mounting Bracket	11433
Stringpot Bottom Clamp	SC111
Stringpot Piston Weight	SC112
Slotted Drive Cap, for 1.25-in. rods	AT1202
Slotted Pull Cap, for 1.25-in. rods	AT1203
MIP Drive Adapter, for 1.25-in. rods	MP2512
MIP Drive Head	GW1516
Probe Rod, 1.25-in. x 48-in.	AT1248

Model 5410 Direct Push Machine

Description	***Part Number***
Stringpot Piston Weight	SC112
Slotted Drive Cap, for 1.25-in. rods	AT1202
Slotted Pull Cap, for 1.25-in. rods	AT1203
MIP Drive Adapter, for 1.25-in. rods	MP2512
MIP Drive Head	GW1516
Probe Rod, 1.25-in. x 48-in.	AT1248

Model 6600, 66DT and 6610DT Direct Push Machines

Description	***Part Number***
Stringpot Mounting Bracket	16971
Stringpot Bottom Clamp	11751
Stringpot Piston Weight	SC112
Slotted Drive Cap, for 1.5-in. rods	15607
Slotted Pull Cap, for 1.5-in. rods	15164
Drive Cap Adapter, for GH60 and 1.25-in. rods	15498
MIP Drive Adapter, for 1.5-in. rods	18563
MIP Friction Reducer	18564
Probe Rod, 1.5-in. x 48-in.	13359

Geoprobe Systems®

A DIVISION OF KEJR, INC.

-Corporate Offices-
601 N. Broadway • Salina, KS 67401
1-800-436-7762 • Fax 785-825-2097
www.geoprobe.com

SENTINEL MOBILE LABORATORIES

SENTINEL MOBILE LABORATORIES, LLC – METHOD OVERVIEWS

HAPSITE METHOD OVERVIEW No. 3.0:

HAPSITE GCMS METHOD FOR VOLATILE ORGANIC COMPOUNDS IN MEMBRANE INTERFACE PROBE (MIP) NITROGEN EFFLUENT STREAM .

1.0 Introduction

The INFICON HAPSITE FIELD-PORTABLE GCMS is used to determine volatile organic compounds in the nitrogen effluent stream from the Membrane Interface Probe (MIP) site investigation technique/equipment. The method is applicable to a wide range of organic compounds that are volatile enough to be "airborne" under MIP conditions ie. compounds that will be liberated to the nitrogen stream via the heated subsurface probe. The method is appropriate for analysis of a range of compounds equivalent to those listed within USEPA 8260B.

2.0 Instrumentation

INFICON HAPSITE Field-Portable GCMS
Sample introduction via direct sampling of MIP derived tedlar bags by internal sampling pump.
Carrier gas = Nitrogen
Data System = Integral Intel Pentium processor and external Windows based laptop.
Built in National Institute of Standards and Technology (NIST) and AMDIS Mass Spectral Libraries.
Mass Spectrometer mass range = 1-300 AMU
Detector = Electron Multiplier
Vacuum System = Non evaporable getter pump (NEG pump)
GC column = 30m x 0.32 mm id.

3.0 MDLs

The method is capable of producing minimum detection levels of 1.0 ug/m3 or lower of target compounds in the MIP nitrogen effluent stream.

4.0 Method Summary

The method utilizes an Inficon Hapsite propriatory-configured sampling and analysis system that, through calibration, via volatilized standards of known concentrations in tedlar bags and

absorbtion onto a multi-phase trap and subsequent desorption of target compounds, column chromatographic separation of target compounds, fragmentation into ions and mass spectral matching, allows identification and concentration valuation of MIP nitrogen effluent samples.

Note that samples drawn into the sampling system are automatically spiked with internal standards such that an internal standard calibration can be utilized for quantification.

5.0 Quality control

The instrument is calibrated for target compounds utilizing a five point calibration (HAPSITE defined as a "Linear curve fit through origin"). The calibration range is from 0.5 ug/m3 to 100.0 ug/m3. The initial calibration curve has a deviation of < 10.0%.

The performance of the mass spectrometer (tuning) is verified at the beginning of every day and at the end of every 12 hour period.

Blanks (ambient air or instrument blanks as appropriate), calibration verification samples (+ or – 20% acceptibility criteria) and lab control samples are run with each batch of unknown MIP derived tedlar bag samples (dependant on any pre-defined project data quality objectives).

6.0 Analytical results

Project results can be presented in tabular and graphical (excel) format in the field as part of the MIP investigation.

END.

SENTINEL MOBILE LABORATORIES

EXPEDITED SITE ASSESSMENT (ESA) FIELD NOTE

Performance Enhancement of Tradition Membrane Interface Probe (MIP) Detection Using an Integrated HAPSITE® Portable Gas Chromatograph/Mass Spectrometer (GC/MS)

Background: MIP technology has revolutionized initial site assessments and has made it possible to determine instantly the location and extent of site contaminants. MIP is a system manufactured by Geoprobe Systems® for the detection and measurement of Volatile Organic Compounds (VOCs) in the subsurface. A heated probe carrying a permeable membrane is advanced to depth in soil. VOCs in the subsurface cross the membrane, enter into a carrier gas stream, and are swept to gas phase detectors (typically FID/PID/ECD) at ground surface for measurement. In spite of these advancements, MIP technology has encountered three limitations: 1. inadequate sensitivity, 2. inability to detect methyl tert-butly ether (MTBE), 3. inability to identify individual contaminants in-situ.

System Development: In order to solve these shortcomings, Sentinel Mobile Laboratories, LLC, and Vironex, Inc. in cooperation with Geoprobe®, Inc. and INFICON®, Inc. have successfully integrated the MIP and HAPSITE® portable Mass Spectrometer, two cutting-edge ESA technologies. The resulting service allows the site investigator to gain 100 times the sensitivity of traditional in-line FID/PID/ECD detectors, to detect MTBE, and - using GC/MS National Institute of Standard and Technology (NIST) library search technology - to 100% identify contaminants in-situ.

The initial work was performed at the Geoprobe® corporate headquarter in Salina, KS. Geoprobe® furnished technical resources/personnel, MIP equipment/probe and a direct push rig. INFICON®, Inc. supplied HAPSITE® instrumentation and technical reach-back. Sentinel Mobile Laboratories, LLC and Vironex, Inc. provided the technical expertise to integrate the MIP with the HAPSITE®.

System Improvements: The HAPSITE® offers system improvements in a number of ways. First, the HAPSITE® utilizes an integrated three-phase carbon trap which concentrates the MIP effluent allowing for increased sensitivity. (Note: this trapping concept is already being used with traditional detectors in an attempt to increase MIP sensitivity). Second, the mass spec is a universal

detector that is able to detect and confirm the presence of MTBE. Traditional PID/FID detectors are unable to reliably detect MTBE due to their inherent design. The FID is prone to many false positives and the PID has insufficient ionization potential to detect MTBE at all but the highest concentrations. The third, and most important improvement that the integrated MIP-HAPSITE® system offers is the ability for 100% in-situ identification of subsurface contaminants. This is accomplished by comparing the mass spectrum of an unidentified component against a reference library such as the National Institute of Standard and Technology (NIST) Mass Spectral Database.

Laboratory Testing Results: The first phase of laboratory testing was to determine the sensitivity of the integrated MIP-HAPSITE® system using standards prepared in 500 mL of water. Geoprobe® uses this technique to simulate real world MIP field response. The goal was to see to what extent the sensitivity could be increased in the typical 45-second exposure time that is used for the FID/PID/ECD response testing outlined in Geoprobe's® MIP Standard Operating Procedure (SOP).

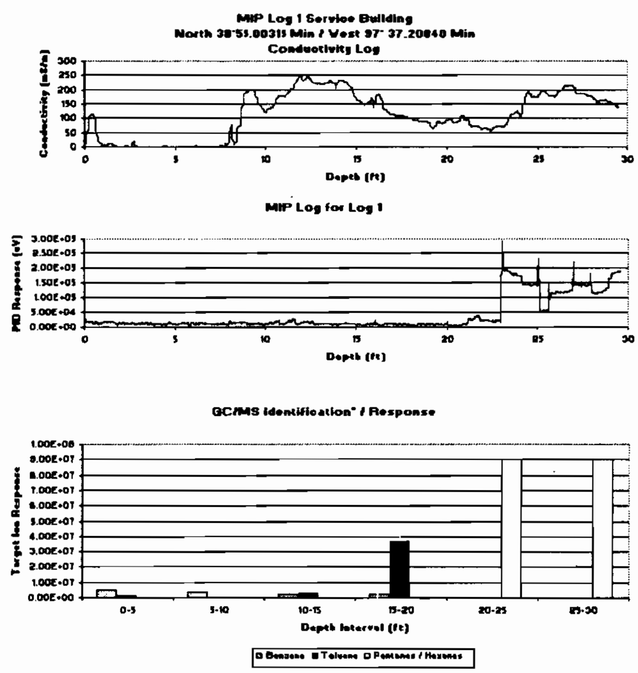
The MIP carrier gas flow was split 50:50 and sent equally to traditional in-line PID/DELCD detectors and to the HAPSITE®. This approach allows for real time contaminant logging data as well as for incremental (typically 5-10 ft interval) GC/MS trapping/speciation data collection (see figure 1 for example).

Figure 1. Example of traditional MIP data integrated with incremental GC/MS data.

Real Time Conductivity Logging Data
(Lithology of Subsurface)

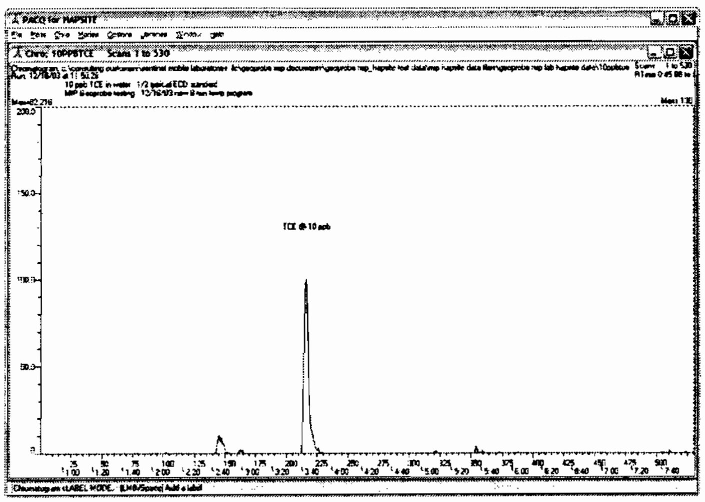
Real Time PID Logging Data
(Note response @ 23-30 feet)

Incremental HAPSITE® GC/MS Data
(In-Situ identification of contaminates)



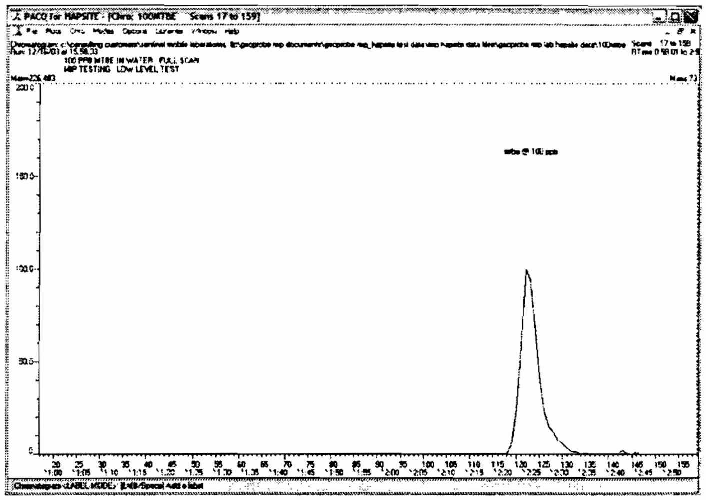
After some initial experimentation to add make-up Nitrogen flow to the HAPSITE® MIP carrier flow, allowing seamless entry of MIP carrier gas onto the HAPSITE® three-phase carbon trap, testing began. Trichloroethane (TCE) was chosen for the sensitivity testing because it is a common chlorinated contaminant encountered in the field. The Geoprobe® MIP SOP uses a TCE standard at 1000 ppb prepared in 500 mL of water to perform low level response testing. This concentration was sequentially cut in half until the HAPSITE® GC/MS no longer responded. It was determined that a 10 ppb TCE standard was well within the sensitivity range of the HAPSITE® GC/MS and would be used for subsequent response testing (see Figure 2). This represents a 100-time increase in sensitivity over the traditional FID/PID/ECD in-line detectors.

Figure 2: 100 Times Increase in Sensitivity with HAPSITE® Integrated MIP System (Usual MIP challenge is @ 1000 ppb TCE)



The second phase of the laboratory testing was to determine if MTBE could be detected using the integrated MIP-HAPSITE®. An initial high-level 1000 ppb standard was prepared in 500 mL of water. It was determined that MTBE easily passed across the membrane and was trapped by the HAPSITE®. The subsequent laboratory work with MTBE determined a workable response test level. It was determined that a conservative reproducible response test level would be at 100 ppb in 500 mL of water (See Figure 3).

Figure 3: Ability to Detect MTBE (Current MIP Configuration is Unable to Detect MTBE)

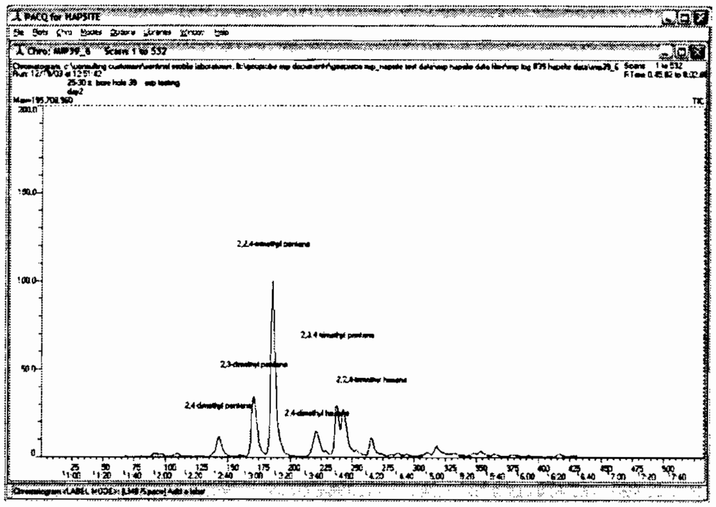


Field Testing Results: A real world test was then needed to verify the laboratory results. Geoprobe® had done previous MIP testing at a field within their facility, where it was known that a large PID response could be obtained at a depth of 25-30 feet.

A series of MIP pushes was performed with the integrated MIP-HAPSITE® configuration. As in the lab testing the MIP flow was split 50:50 being sent equally to the traditional PID/DELCD detectors and the HAPSITE®.

As expected a large PID response (indicating aromatic hydrocarbons) was encountered at 25 ft. The HAPSITE® was able to concentrate the MIP flow from 25-30 feet and speciate the aromatic hydrocarbons that caused the PID response (see Figure 4). Previous to this test Geoprobe® had not known what compounds were causing the PID response. It may have been large concentration of a highly regulated compound such as benzene or as it turns out large concentration of hexanes and pentanes, which are not highly regulated. This site demonstrated the value of 100% identification of contaminants in-situ.

Figure 4: Example of Output from Contaminated Zone (No DELCD response/Large PID Response)



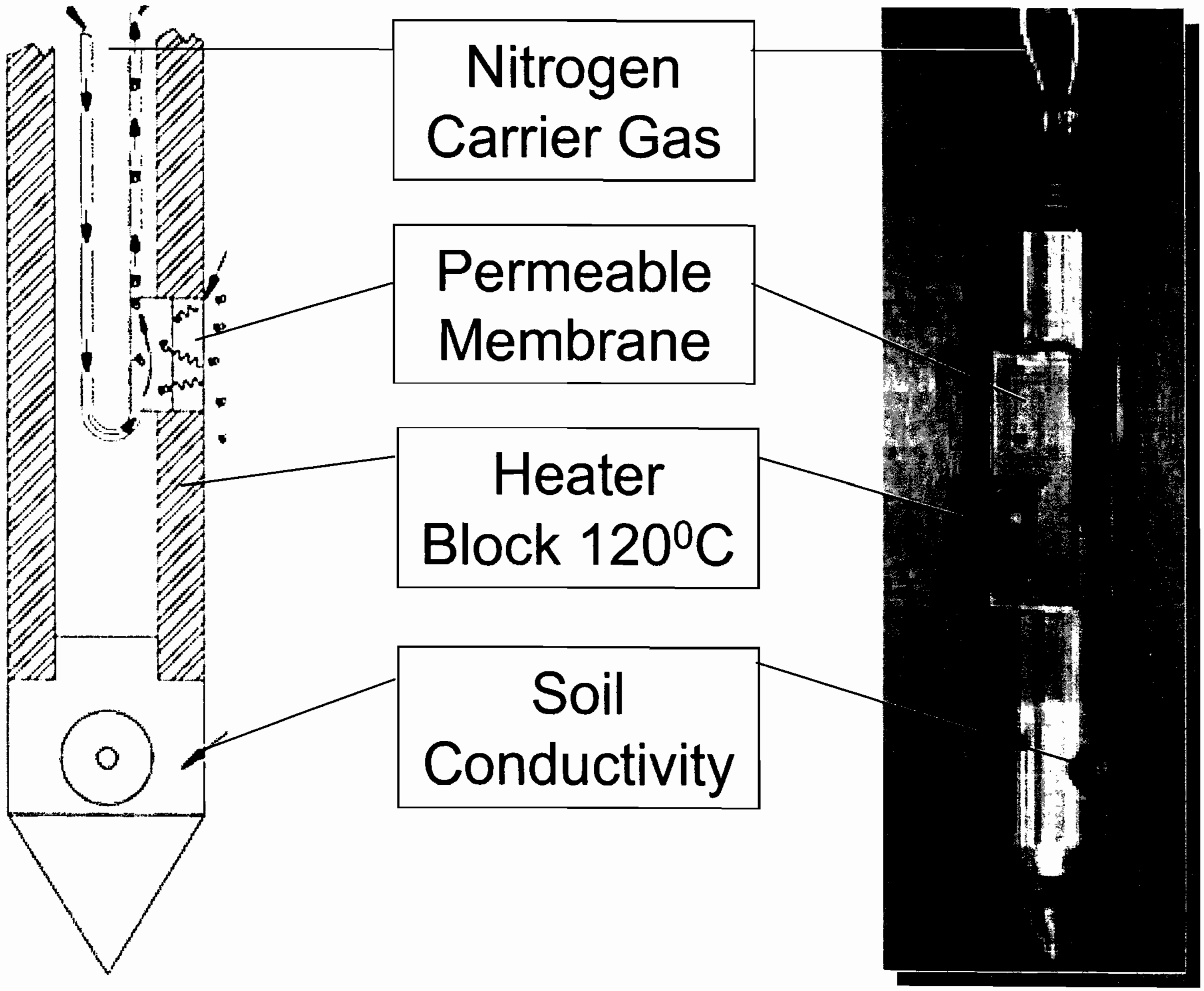
This real world field test has shown the viability of an integrated MIP-HAPSITE® system. The next step is to perform several case studies that would allow us to demonstrate the three above listed enhancements in real world scenarios.

Real World Case Studies: No case study has been performed as of the time of writing this report. Sentinel Mobile Laboratories, LLC and Vironex, Inc. are planning to incorporate this technology into several real world case studies over the next several months in order to prove the technology. Sites will be selected which will allow the three advancements to be tested. Any input from site investigators regarding suitable sites would be appreciated and carefully considered.

Written By: Kenneth Dockery, HAPSITE® Operations Manager
Sentinel Mobile Laboratories, LLC.

Special Thanks: Jonathan Terpening, Geoprobe® Systems
Charles Sadowski, INFICON, Inc.

Membrane Interface Probe



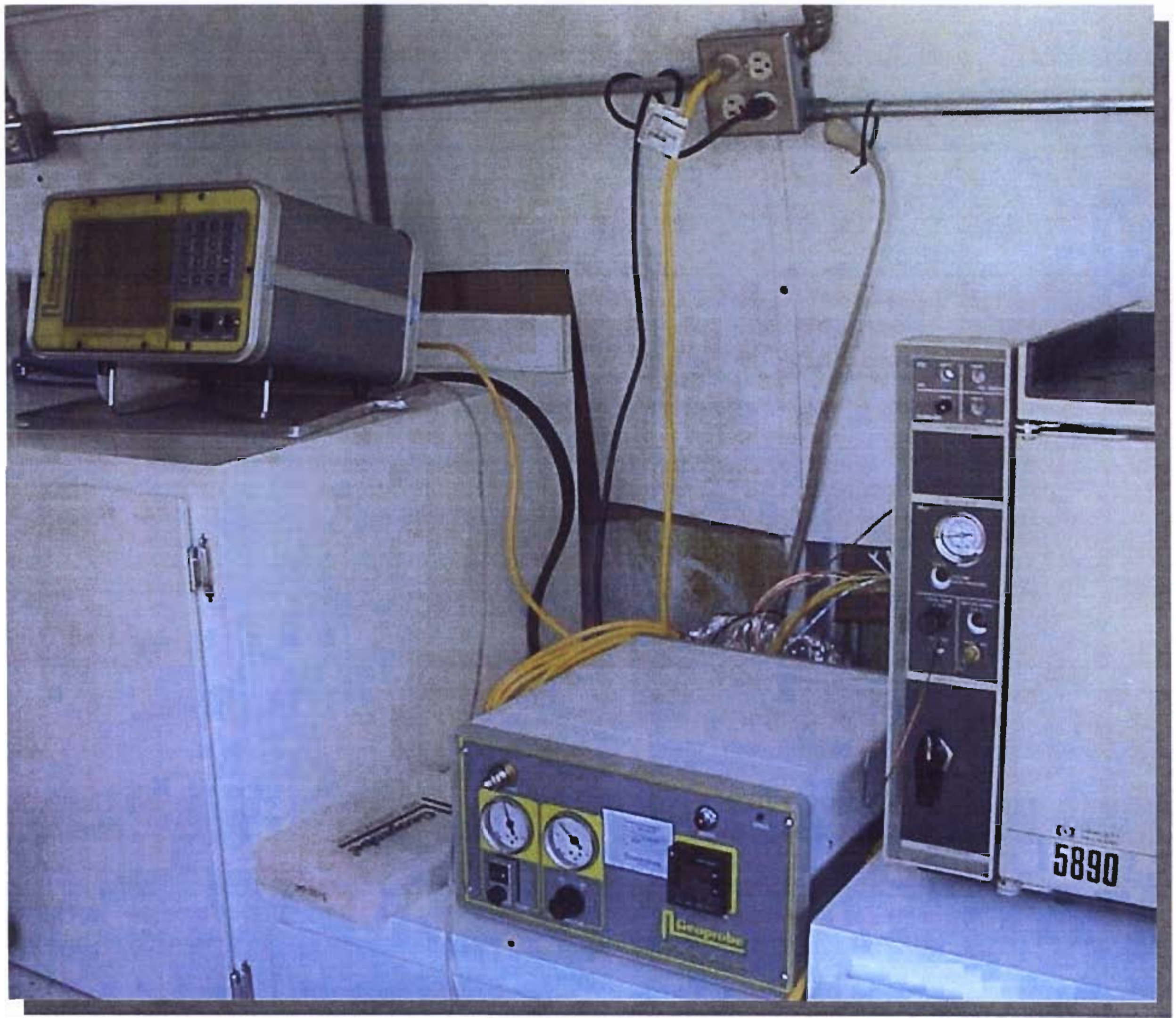
Detectors

	Contaminants	Detection Ranges
PID Photo Ionization	Double-Bonded Compounds (gasoline, BTEX, High level PCE & TCE)	1 - 20,000 ppm Qualitative
FID Flame Ionization	Hydrocarbons (gasoline, BTEX methane, butane, landfill gases)	1 - 100,000 ppm Qualitative
ECD Electron Capture	Halogenated Compounds (Low-Level TCE, PCE, VC)	0.25 – 10 ppm Qualitative
Field Portable GC-MS	Speciated VOCs including MTBE	100 x PID/ECD sensitivity 100% ID of unknowns Quantitative

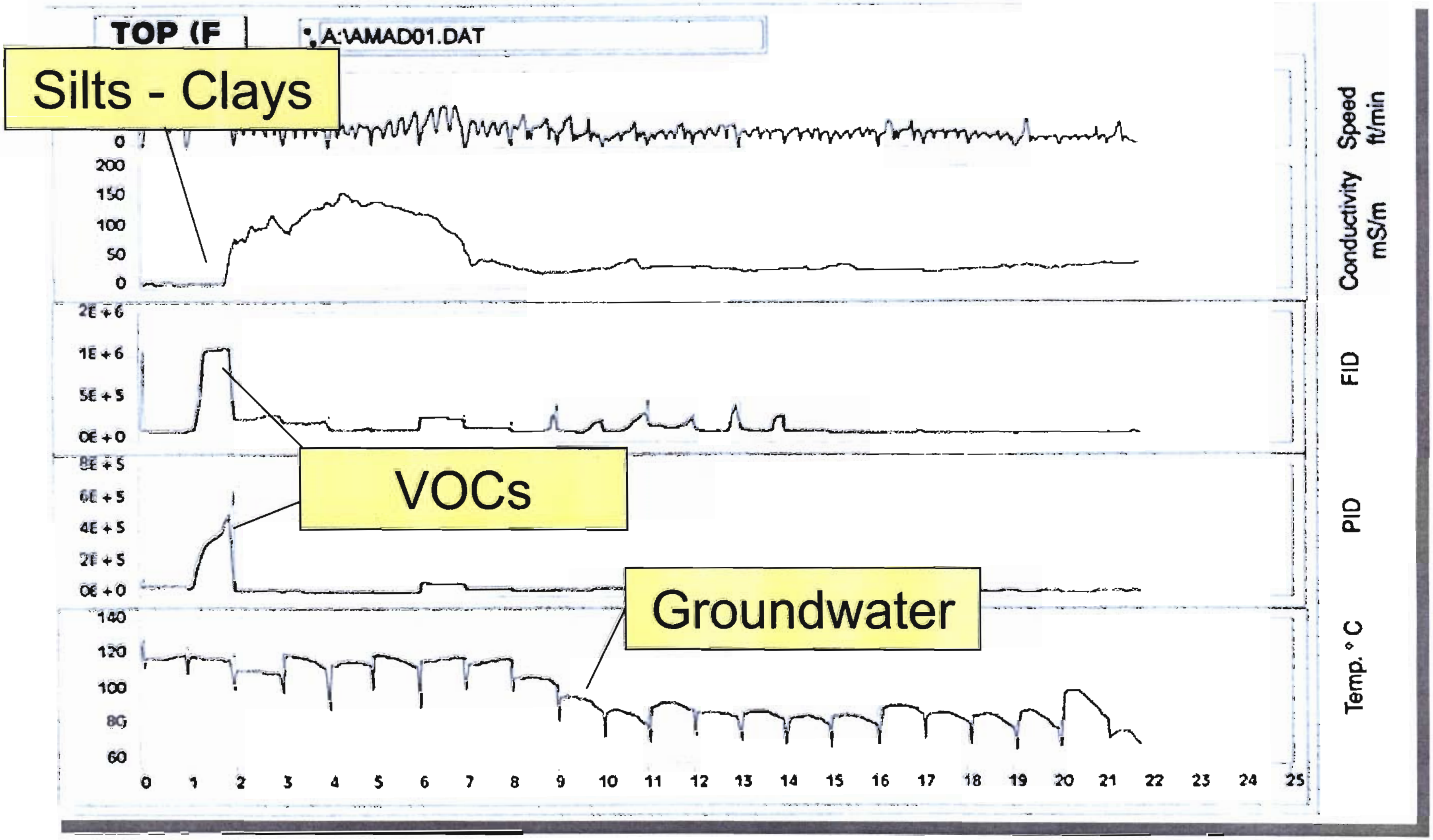
HAPSITE - March, 2004

Vironex.com

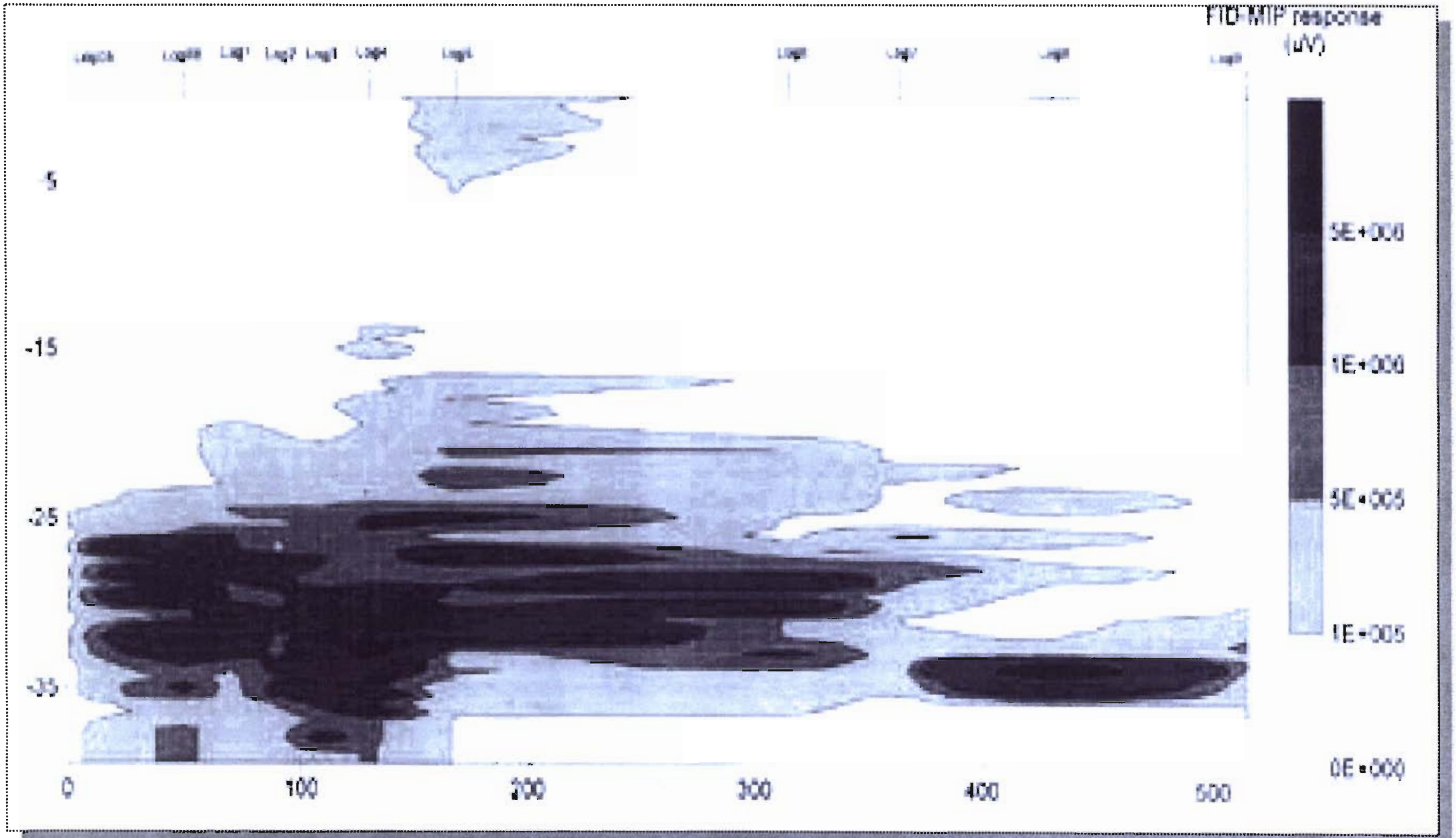
MIP Equipment



MIP Real Time Data Display

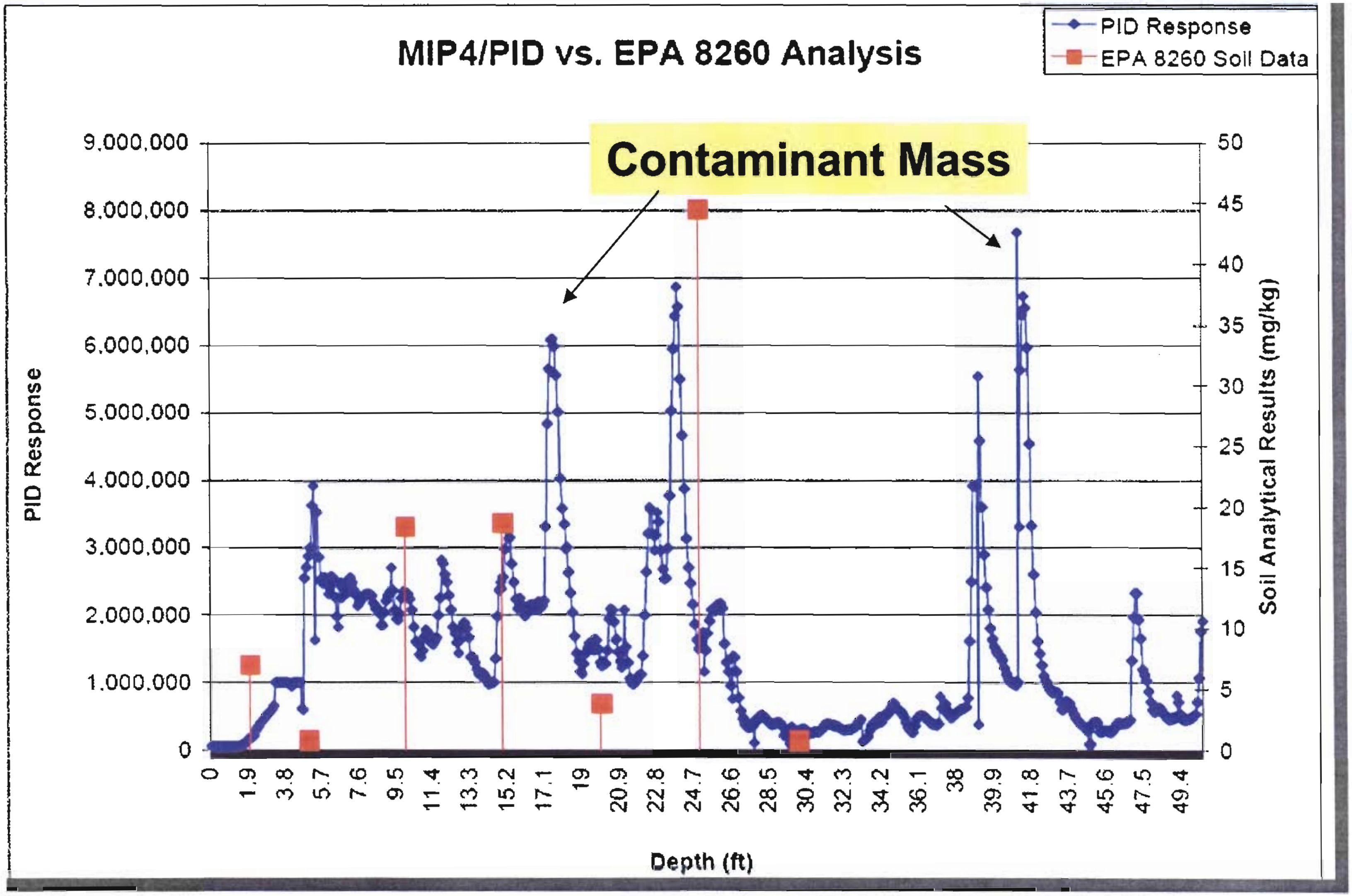


Contaminant Mass Identification – FID Qualitative



Vironex .com

PID Soil Confirmation Samples – Vadose Zone

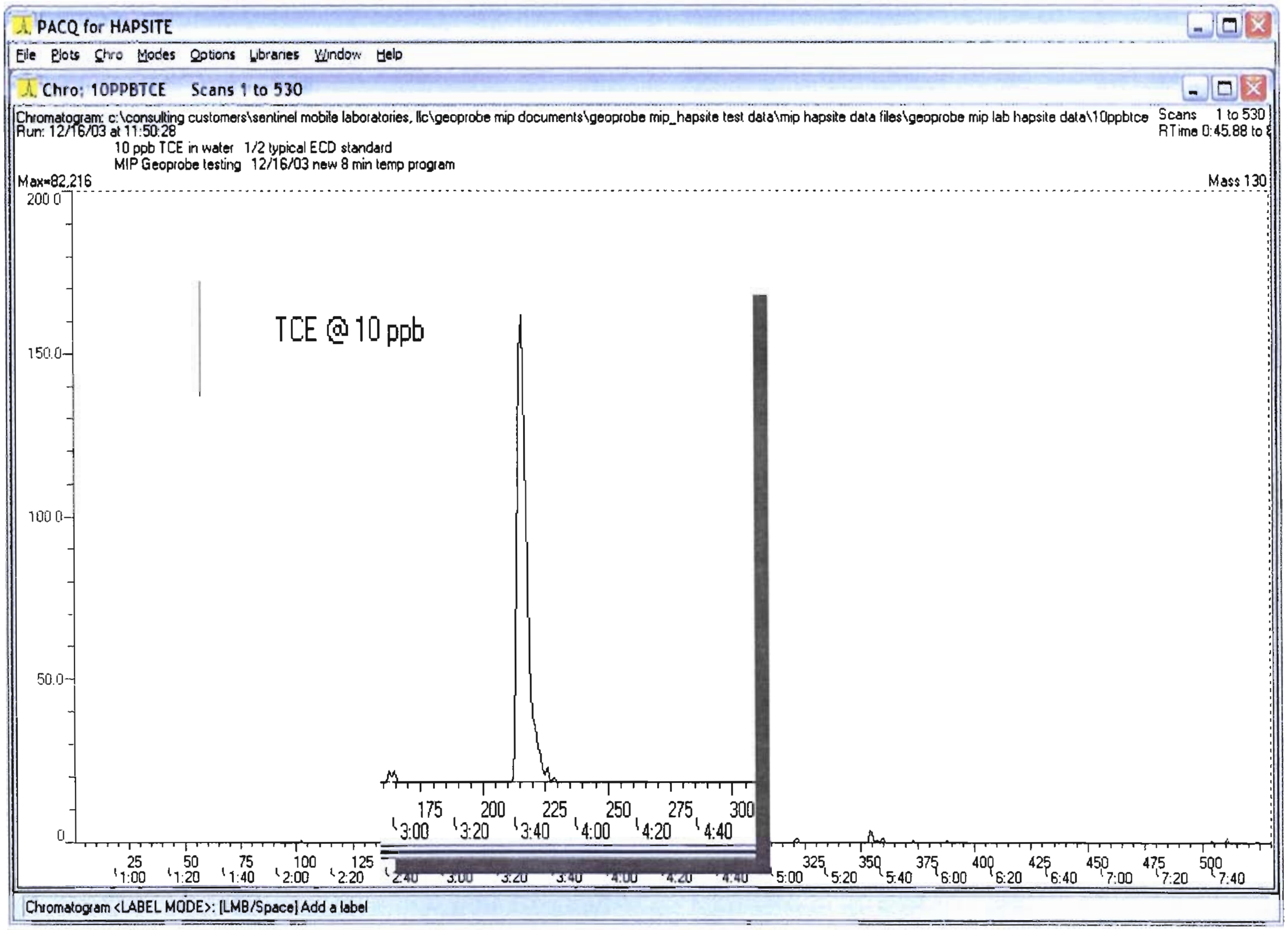


HAPSITE Portable GC-MS & Headspace Sampling System

Vironex.com

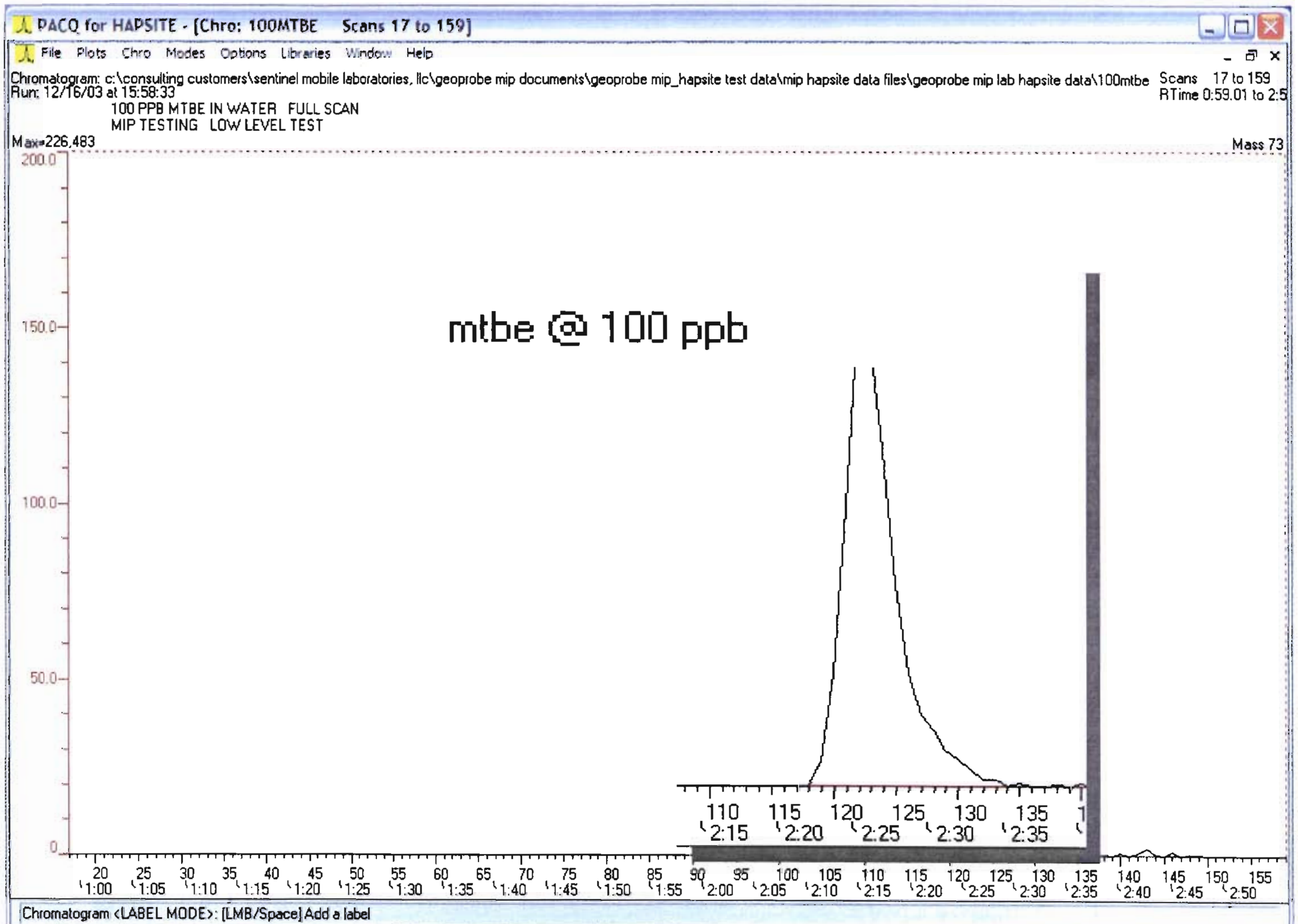
Membrane Interface Probe

X 100 Increase in Sensitivity with HAPSITE Integrated MIP System

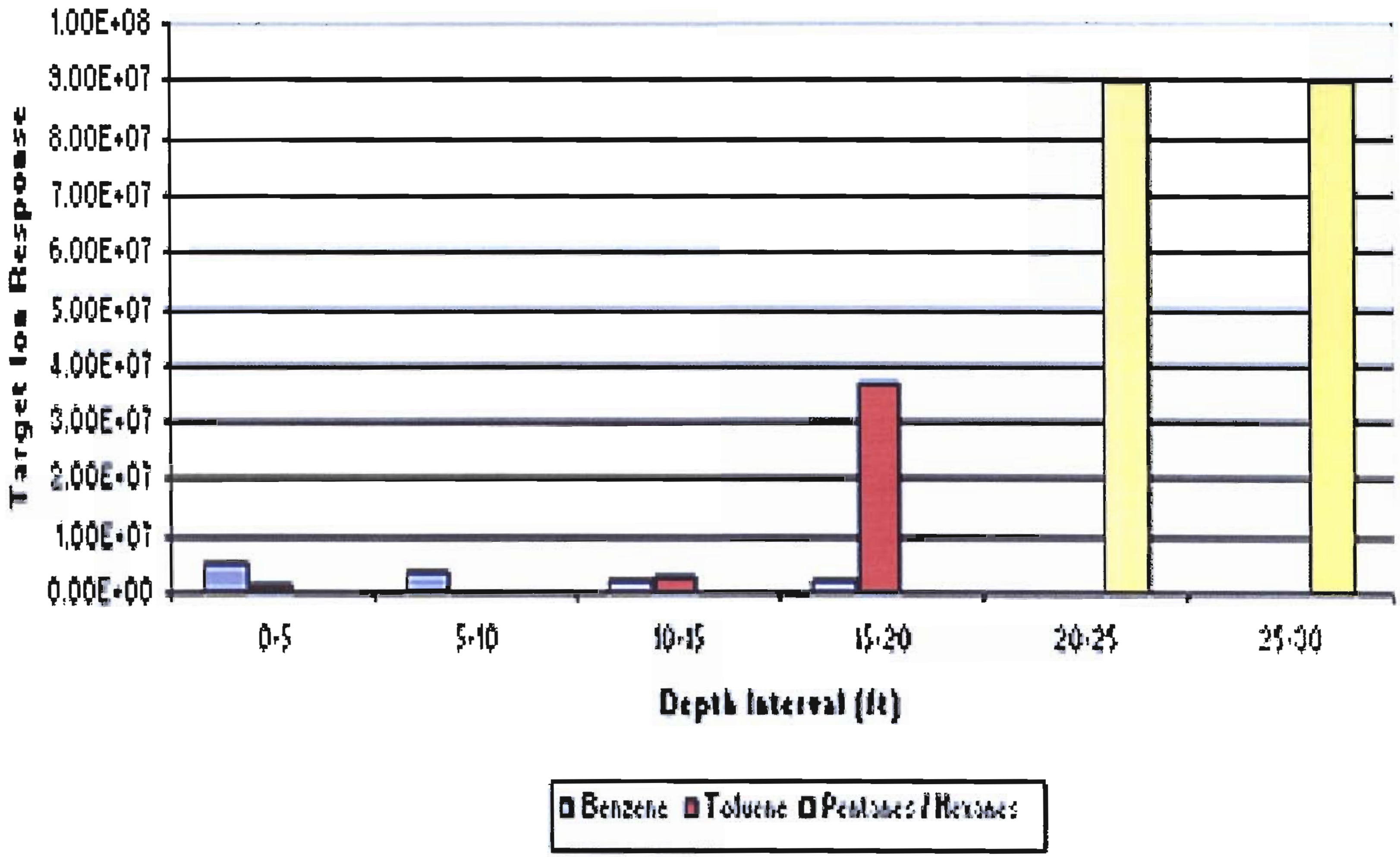


Vironex.com

Ability to Detect MTBE



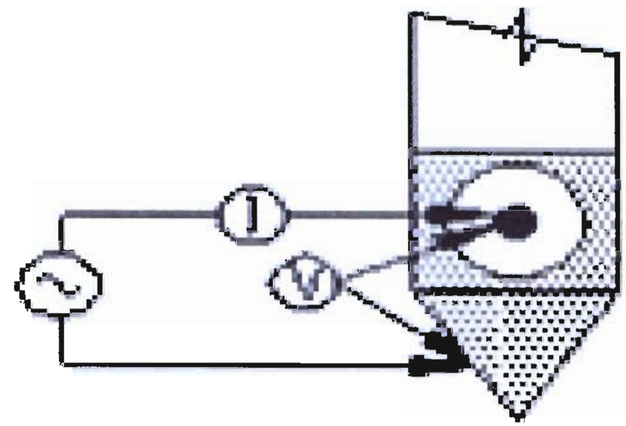
MIP HAPSITE - Quantitative



Vironex

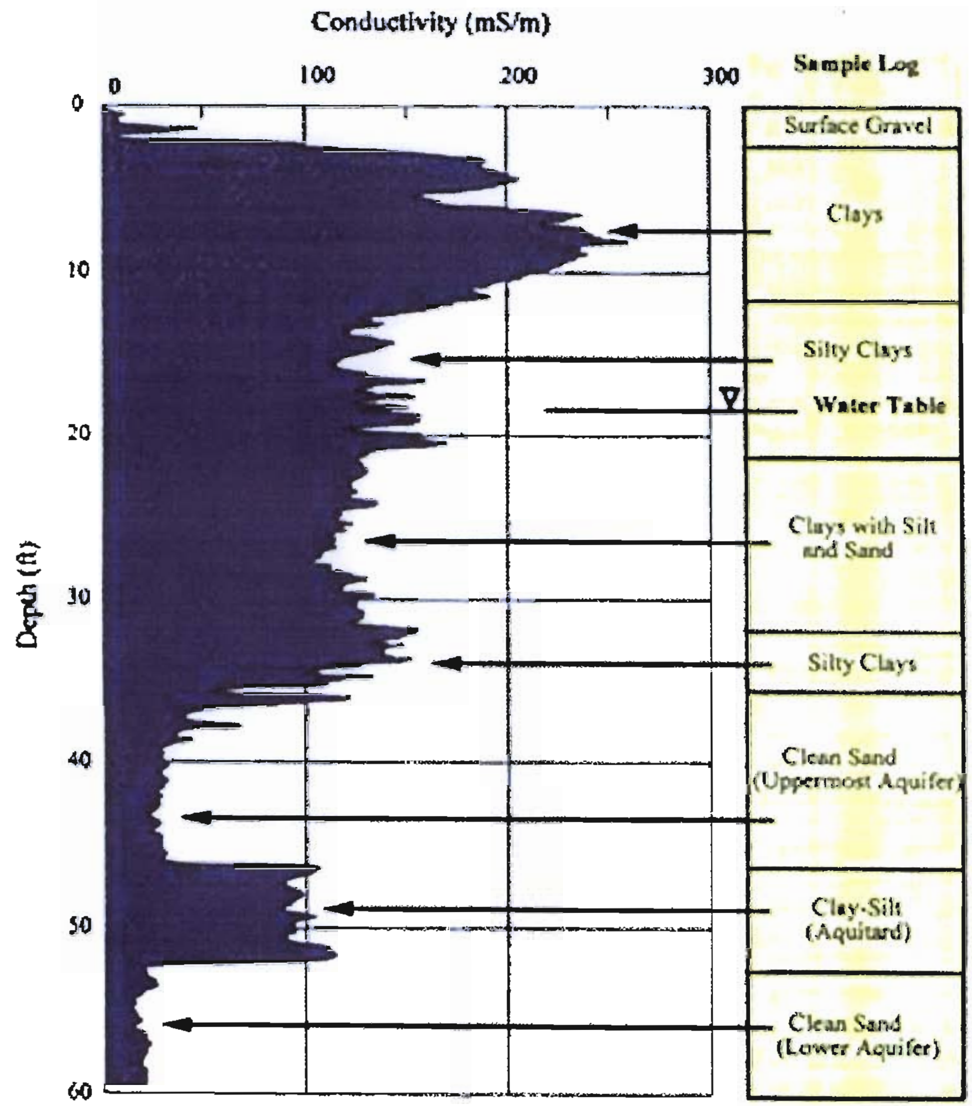
Soil Conductivity

- The soil Ec uses a dipole measurement arrangement
- Alternating current is passed from the center of the probe to the probe body
- The voltage response of the soil to current is measured across the same two points
- Lower conductivities indicate sands, while higher conductivities indicate silts and clay



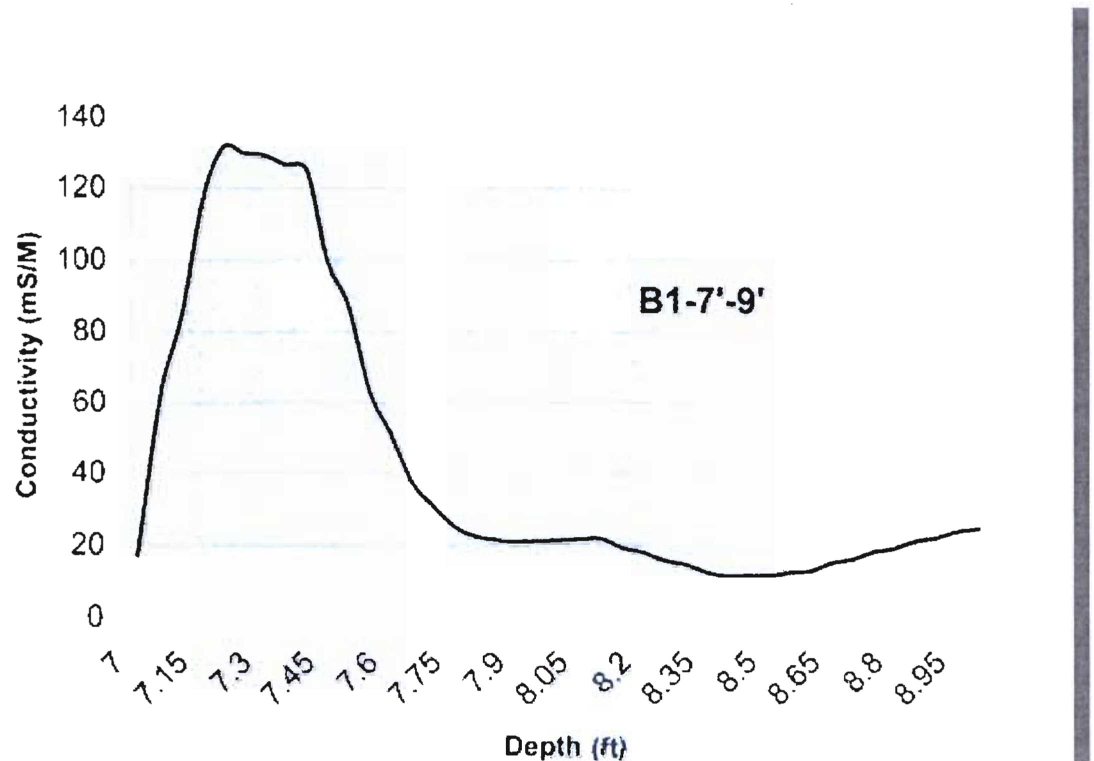
Vironex

Soil Ec Log Explanation



Vironex.com

Soil Conductivity Confirmation



Vironex.com

Exhibit B

Soil Boring Log

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

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

Exhibit C

Ground Water Sampling Log

O'Brien & Gere Engineers, Inc. — **Standard Ground Water Sampling Log**

Date ____________________
Site Name ____________________
Location ____________________
Project No. ____________________
Personnel ____________________

Weather ____________________
Well # ____________________
Evacuation Method ____________________
Sampling Method ____________________

Well Information:

Depth of Well * ____________ ft.
Depth to Water * ____________ ft.
Length of Water Column ____________ ft.
Volume of Water in Well ____________ gal.(s)
3X Volume of Water in Well ____________ gal.(s)

Water Volume /ft. for:
______ 2" Diameter Well = 0.163 X LWC
______ 4" Diameter Well = 0.653 X LWC
______ 6" Diameter Well = 1.469 X LWC

Volume removed before sampling ________ gal.(s)
Did well go dry? ________

* Measurements taken from [ ] Well Casing [ ] Protective Casing [ ] ________ (Other, Specify)

Instrument Calibration:

pH Buffer Readings
4.0 Standard ________
7.0 Standard ________
10.0 Standard ________

Conductivity Standard Readings
84 S Standard ________
1413 S Standard ________

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm	Turbidity Readings Ntu
initial	initial	initial	initial	initial

Water Sample:
Time Collected ________

Physical Appearance at Start
Color ________
Odor ________
Turbidity (> 100 NTU) ________
Sheen/Free Product ________

Physical Appearance at Sampling
Color ________
Odor ________
Turbidity (> 100 NTU) ________
Sheen/Free Product ________

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

Appendix B

Quality Assurance Project Plan

Quality Assurance Project Plan

Plainview Industrial Park Site
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State Department of Environmental Conservation

May 2005

O'BRIEN & GERE

Quality Assurance Project Plan

Plainview Industrial Park Site
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State
Department of Environmental Conservation
Albany, New York

May 2005

O'BRIEN & GERE
ENGINEERS, INC.

Contents

List of Tables

1. General

The quality assurance project plan (QAPP) provided below presents the seven elements of site-specific information required by DER-10 *Technical Guidance for Site Investigation and Remediation* (DER-10 QAPP, NYSDEC 2002). A *Generic QAPP* prepared for Standby Contract #D004090 (Standby Contract QAPP, O'Brien & Gere 2005) is provided separately. The Standby Contract QAPP provides supplemental and more detailed laboratory information, including corrective action tables for laboratory analyses associated with investigation activities. The combination of the DER-10 QAPP and the Standby Contract QAPP address data management for the Plainview Industrial Park Preliminary Site Characterization (PSC, Work Assignment #D004090-24).

2. Project Scope and Goals

2.1. Overall Site Investigation or Remediation Strategy

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

- Evaluate the nature and extent of volatile organic chemical (VOC) contamination within the Park on a preliminary basis. The media consist of soil vapor, ground water, soil, and sediment.
- Evaluate environmental data, including comparison to New York State screening values:
  - Ground water data will be compared to applicable screening values provided in TOGS 1.1.1 (NYSDEC 1998).
  - Soil data will be compared to applicable screening values provided in TAGM 4046 (NYSDEC 1994).
  - Sediment data will be compared to applicable screening values provided in the Technical Guidance for Screening Contaminated Sediments (NYSDEC 1999).
  - Soil vapor data will be compared to applicable screening values specified by the USEPA's Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Ground water to Soils (USEPA 2002).
- Provide data that NYSDEC can use to evaluate if a remedial Investigation of the Park is warranted.
- Provide documentation of laboratory data that will allow for data validation of 10% of the laboratory data. Data validation results will be reported in a data usability summary report (DUSR) and incorporate results into data summaries.

Refer to Table B-1 for sampling efforts, objectives, analyses, data uses, and analytical levels.

2.2. Project Organization

Personnel assigned to the project are listed in Table B-2.

2.3. Sampling Procedures and Equipment Decontamination Procedures

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

2.4. Sample Locations

A map of the Site showing tentative sampling locations is provided as Figure 2 of the Preliminary Site Characterization (PSC) Work Plan.

2.5. Analytical Methods/Quality Assurance Summary

Table 2 of the PSC Work Plan provides a summary of the analytical methods and quality assurance samples for soil vapor, soil, groundwater, and sediment. Additional information regarding sample containers, preservation, holding times, and QC sample frequency are provided in Table B-3.

The water, soil, and sediment environmental samples will be submitted to O'Brien & Gere Laboratories, Inc. in Syracuse, New York for analyses as listed in Table 2 of the PSC Work Plan. Soil vapor samples collected for off-site analysis will be submitted to Centek Laboratories in Syracuse, NY. Detection limits for the water, soil, and sediment analyses that will be performed are presented in Tables 5A, 5B and 5D though 5K in the Standby Contract QAPP (O'Brien & Gere 2005). The detection limits for soil vapor that will be utilized by Centek Laboratories are presented in Table B-4. NYSDEC Analytical Services Protocol (ASP) Exhibit E quality control requirements will be used to perform the sample analysis, including the non-contract laboratory program (CLP) analyses, utilizing the laboratory interpretation of the requirements as they apply to USEPA Methods.

2.6. Sampling Methods, Storage, and Handling

Site specific sampling methods are presented in Section 2 of the Field Activities Plan (FAP).

2.7. Laboratory Data

Laboratory data in electronic format is discussed in the Work Plan and the Standby Contract QAPP (O'Brien & Gere 2005).

Table B-1. *Sampling efforts, objectives, analyses, data uses, and analytical level**

Sampling Effort	***Objectives***	***Types of analysis***	***Data Uses***	***Analytical Level***
Soil vapor sampling/In-field analysis	Identify potential source areas of site-related constituents	VOCs	Guide soil investigation.	Screening and chemical speciation
Soil vapor sampling/Off – site laboratory	Confirm soil vapor samples and supplement soil, sediment, and ground water data	VOCs	Support overall site characterization.	Definitive
Ground water sampling	Investigate the areal distribution and concentration of site-related constituents in perched ground water and potential migration	VOCs	Support overall site characterization.	Definitive
Soil sampling	Identify potential source areas of site-related constituents in the soil.	VOCs	Identify potential source areas	Definitive
Sediment sampling	Identify potential source areas of site-related constituents in the sediment.	VOCs	Support overall site characterization. Evaluate leach pools as potential source areas	Definitive

Notes:

* Indicates that the Work Plan and FAP are to be consulted for types of analysis and objectives.

VOCs indicates volatile organic compounds.

Table B-2. *Project organization and responsibilities*

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

Table B-2. *Project organization and responsibilities*

Field Coordinator	John Hunt	• Oversee field and related activities as described in the FAP. • Responsible for leading, coordinating, and supervising day-to-day field activities of the sampling personnel. • Coordinate with O'Brien & Gere Project Manager on technical issues. • Coordinate with laboratory prior to collection and shipment of samples. • Develop and implement field-related sampling plans and schedule. • Implement quality control (QC) of technical data including field measurements. • Implement QC of project-specific chain of custody documentation. • Adhere to work schedules. • Authorize and approve text and graphics required for field efforts. • Coordinate and oversee technical efforts of subcontractors. • Identify and resolve problems at the field team level in consultation with the O'Brien & Gere Project Manager. • Implement and document corrective action procedures and provide communication between the sampling personnel and upper management.
Sampling Personnel	Joseph Button, CPG	• Responsible for documentation of proper sample collection protocols, sample collection, field measurements, equipment decontamination, and chain of custody documentation. • Supervise or act as the field sample custodian. • Report to O'Brien & Gere Field Coordinator.
Data Management	Trevor Staniec	• Responsible for assisting with the development of data collection documentation procedures (*e.g.* chain of custody) to support data management needs. • Responsible for data management activities including execution of electronic data deliverables (EDD) to develop a project database and verification of data QC. • Coordinate with laboratory to resolve data quality issues, as necessary. • Assist in the coordination of QA/QC efforts between Engineers and the laboratory.
Data Validation		
Data Quality Reviewer	Nancy Potak or Judy Harry	• Validate data. • Prepare a Data Usability Summary Report (DUSR) describing overall data quality and usability for intended uses.
Laboratories		
Project Supervisor: O'Brien & Gere Laboratories, Syracuse, NY Centek Laboratories Syracuse, NY	Tom Alexander Russ Pelligrino	• The project supervisor is the point of contact between Engineers and O'Brien & Gere Laboratories.
Laboratory QA Coordinator(s): O'Brien & Gere Laboratories, Syracuse, NY	Mike Petterelli	• Responsible for laboratory QA/QC activities associated with the project. • Verify that analyses are conducted within the appropriate holding times. • Verify that laboratory custody procedures are followed. • Monitor daily precision and accuracy records.

Table B-2. *Project organization and responsibilities*

Centek Laboratories Syracuse, NY	Russ Pelligrino	• Maintain detailed copies of procedures. • Reschedule analyses based upon unacceptable data accuracy or precision • Identify and implement corrective actions necessary to maintain QA standards. • Conduct initial validations and assessments of analytical results and report the findings directly to the O'Brien & Gere Laboratories Project Supervisor. • Perform final QC of laboratory EDD prior to submittal to Engineers. • Approve final laboratory reports prior to delivery to Engineers.
Laboratory Sample Custodian: O'Brien & Gere Laboratories, Syracuse, NY Centek Laboratories Syracuse, NY	 Heather Scott Mike Palmer	• Verify proper sample entry and sample handling procedures by laboratory personnel. • Set up sampling coolers and containers. • Receive and inspect incoming sample containers. • Sign appropriate documentation. • Verify accuracy of chain-of-custody forms. • Notify Laboratory QC Coordinator of sample receipt and inspection. • Assign each sample a unique identification number and enter each into the sample receiving log. • Control and monitor access and storage of samples.

Table B-3. *Field sampling summary*

Parameter (method)	Matrix	Sample containers	Preservation	Holding times	Number of environmental samples	QC sample frequency			
						Field duplicate	Trip Blank	MS/MSD or Duplicate	Equipment Blank
VOCs	Soil Vapor	MIP-GC/MS mobile unit	None	Real time analysis	See Work Plan*	NA	NA	NA	NA
VOCs (USEPA Method TO15)[2]	Soil Vapor	Canisters as prepared in Method TO-15.	None	14 days from collection	See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	1 per cooler containing samples for VOCs	One MS/MSD per 20 samples or one per matrix (for less than 20 samples)	Per sampling event, one per 20 samples, as required.
VOCs (USEPA Method 8260B)[1]	Ground water	3 - 40-milliliter glass vials with Teflon® lined septum caps	4°C, 0.008% ascorbic acid in the presence of residual chlorine, HCl to pH<2	10 days VTSR	See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	1 per cooler containing samples for VOCs	One MS/MSD per 20 samples or one per matrix (for less than 20 samples)	Per sampling event, one per 20 samples, as required.
VOCs	Soil				See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)			
VOCs	Sediment				See Work Plan*	One per 20 samples or one per matrix (for less than 20 samples)	NA	One MS/MSD per 20 samples or one per matrix (for less than 20 samples)	Canister Blank and sampling system certified in laboratory. (per USEPA TO15)

Note:
* Indicates that the Work Plan and FAP are to be consulted for samples that will be collected for each specific site.
VTSR indicates verified time of sample receipt at the laboratory.
MS/MSD indicates matrix spike/matrix spike duplicate sample.
VOCs indicates volatile organic compounds.
MIP indicates Membrane Interface Probe technology. MIP is a direct-push, real-time soil screening technology.
NA indicates not applicable

References:

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

Table B-4. *Centek Laboratory PQLs and MDLs for volatile organic compounds (USEPA Method TO-15) and screening criteria for air samples*

Parameter	PQL (µg/cubic meter)	MDL (µg/cubic meter)
Chloromethane	2.99	5
Vinyl chloride	2.85	5
Bromomethane	2.86	5
Chloroethane	2.28	5
Acetone	0.85	5
1,1-Dichloroethene	2.39	5
Methylene chloride	1.74	5
Cis- 1,2-Dichloroethene	1.53	5
Trans-1,2-Dichloroethene	1.89	5
1,1-Dichloroethane	1.47	5
Chloroform	1.31	5
1,1,1-Trichloroethane	1.46	5
Carbon tetrachloride	1.62	5
1,2-Dichloroethane	1.39	5
Benzene	1.29	5
Trichloroethene	1.6	5
1,2-Dichloropropane	1.53	5
cis-1,3-Dichloropropene	1.43	5
Toluene	1.27	5
trans-1,3-Dichloropropene	1.3	5
1,1,2-Trichloroethane	1.02	5
Tetrachloroethene	1.18	5
Chlorobenzene	1.29	5
Ethylbenzene	1.18	5
P- xylene	0.99	5
O- xylene	1.11	5
Styrene	1.16	5
1,1,2,2-Tetrachloroethane	0.94	5

Notes:
PQL indicates practical quantitation limit.

MDL indicates method detection limit.

PQLs and MDLs were performed by Centek Laboratories and are current as of April 2005.
* Indicates that PQL and MDL will be determined at a later date.

Reference for screening criteria: USEPA. November 2002. USEPA's Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Ground water to Soils.

Source: O'Brien & Gere Engineers, Inc.

Health and Safety Plan

Health and Safety Plan

Plainview Industrial Park Site Preliminary Site Characterization Work Assignment #D004090-24 New York

New York State Department of Environmental Conservation

May 2005

O'BRIEN & GERE

Health and Safety Plan

Plainview Industrial Park Site
Preliminary Site Characterization
Work Assignment #D004090-24
New York

New York State
Department of Environmental Conservation
Albany, New York

May 2005

O'BRIEN & GERE ENGINEERS, INC.

Contents

List of Tables

List of Figures

1. Introduction

This Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) personnel while performing Preliminary Site Characterization activities for at the Plainview Industrial Park, Nassau County, New York.

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

The health and safety considerations of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. Documentation of the subcontractor's HASP will be obtained prior to the start of the subcontractor's work.

1.1. Site Location and Description

The Park is about 140 acres and is comprised of approximately 75 one and two-story buildings used for a variety of commercial and industrial activities. Most of the buildings are surrounded by paved areas used for roads or parking. The locations and general layout of the buildings are shown on Figure 2. The primary chemicals of concern at the site are low levels of perchloroethylene (PCE), trichloroethylene (TCE), 1,2-dichloroethylene (1,2-DCE), 1,1-DCE, and trichloroethane (TCA) in ground water. Because of their low concentration, it is not anticipated that these chemicals will pose a health hazard to workers.

1.2. Implementation of Health and Safety Plan

The requirements and guidelines presented in this HASP are based on a review of available information and an evaluation of potential on-site hazards. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 and 29 CFR Part 1926. The protective equipment selection was made according to Subpart I of 29 CFR 1910. O'Brien & Gere personnel are required to read this HASP before beginning work on site. This HASP will be available for inspection and review by O'Brien & Gere employees while work activities are underway.

When conducting the site investigation activities listed in the Work Plan, O'Brien & Gere personnel will comply with this HASP. On-site O'Brien & Gere personnel will notify the O'Brien & Gere Site Safety and Health Coordinator (SSHC) of matters of health and safety. The SSHC is responsible to the Project Manager for monitoring activities, monitoring compliance with the provisions of this HASP, and for modifying this HASP to the extent necessary if site conditions change.

This HASP is specifically intended for guiding the conduct of O'Brien & Gere activities defined in the Work Plan. Although this HASP can be made available to interested persons for informational purposes, O'Brien & Gere does not assume responsibility for the interpretations or activities of any persons or entities other than employees of O'Brien & Gere.

The health and safety considerations of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. Documentation of the subcontractor's HASP will be obtained prior to the start of the subcontractor's work.

1.3. Project Organization

All personnel involved in the Preliminary Site Characterization activities, implicitly have a part in implementing the HASP. Among them, the Project Officer, the Project Manager, the Corporate Associate for Safety and Health, the SSHC, and the Site Supervisor have specifically designated responsibilities. Their names and telephone numbers are listed in Table 1-1. Other key O'Brien & Gere project personnel, the project's organization, and other primary contacts for the project are presented in the Work Plan.

Key project personnel and their responsibilities with regard to the sampling activities are discussed below.

Project Officer

James R. Heckathorne, P.E. is the Project Officer. The Project Officer is responsible for the overall administration and technical execution of the project. The Project Officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

Project Manager

Jeffrey E. Banikowski, CPG, is the Project Manager. The Project Manager reports to the Project Officer and is directly responsible for the technical progress, financial control and safety performance of the project.

Manager of Corporate Health and Safety

Mr. Jeff Parsons, C.I.H. is the Corporate Associate for Safety and Health. Mr. Parsons will be responsible for general oversight and support on safety-related issues. Procedural changes and modifications to this HASP must be approved by Mr. Parsons.

Site Safety and Health Coordinator

The O'Brien & Gere Site Safety and Health Coordinator (SSHC) for this investigation will be designated by the O'Brien & Gere Project Manager. The SSHC for O'Brien & Gere employees reports to the O'Brien & Gere Project Manager, coordinates his activities with the O'Brien & Gere Manager of Corporate Health and Safety and establishes operating standards and coordinates overall project safety and health activities for the site. The SSHC reviews project plans and revisions to plans to determine that safety and health procedures are maintained throughout the investigation. The SSHC audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager.

Specifically, the SSHC is responsible for the conducting the following actions:

- Provide a complete copy of the HASP at the site before the start of activities;
- Familiarize workers with the HASP;
- Conduct on-site health and safety training and briefing sessions;
- Document the availability, use, and maintenance of personal protective and other safety or health equipment;
- Maintain safety awareness among O'Brien & Gere employees onsite and communicating safety and health matters to them;
- Review field activities for performance in a manner consistent with O'Brien & Gere policy and this HASP;
- Monitor health and safety conditions during field activities;
- Coordinate with emergency response personnel and medical support facilities;
- Notify the Project Manager and Manager of Corporate Health and Safety of the need to initiate corrective actions in the event of an

emergency, an accident, or identification of a potentially unsafe condition;

- Notify the Project Manager of an emergency, an accident, the presence of a potentially unsafe condition, a health or safety problem encountered, or an exception to this HASP;

- Recommend improvements in safety and health measures to the Project Manager; and,

- Conduct safety and health performance and system audits.

The SSHC has the authority to recommend that the Project Manager take the following actions:

- Suspend field activities or otherwise limit exposures if the health or safety of any O'Brien & Gere employee appears to be endangered;

- Notify O'Brien & Gere personnel to alter work practices that the SSHC deems to not protect them; and,

- Suspend an O'Brien & Gere employee from field activities for violating the requirements of this HASP.

Site Supervisor

The Site Supervisor, designated by the O'Brien & Gere Project Manager, will be responsible for the implementation of sampling programs. The site supervisor will be responsible for overall site coordination including field sampling collection and chain-of-custody. The Site Supervisor will report directly to the Project Manager or designee.

Table 1-1 *Project personnel.*

Name and Title	***Telephone***
James R. Heckathorne, P.E. Project Officer Syracuse, New York	(315) 437-6100
Jeffrey E. Banikowski, CPG Project Manager Syracuse, New York	(315) 437-6100
Jeff Parsons Manager of Corporate Health & Safety Syracuse, New York	(315) 437-6100 (315) 391-0638 (cell)
Site Safety & Health Coordinator Syracuse, New York	(315) 437-6100
NYSDEC Key Personnel Joseph Jones Project Manager Albany, New York	 (518) 402-9621

2. Hazard Analysis

General site chemical and environmental hazards are summarized in Section 2.1. Specific health and safety considerations for field tasks detailed in the Field Activities Plan (FAP), contained in Appendix A of the Work Plan, are presented in separate subsections as outlined below:

- ground water field activities (Section 2.2)
- soil sampling (Section 2.3)
- soil gas sampling (Section 2.4)
- sediment sampling (Section 2.5)

Both the potential health and safety hazards and the hazard and contaminant control procedures for each task of the Preliminary Site Characterization are discussed in the sections below.

2.1. General Site Hazards

2.1.1. Chemical Hazards

Chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site constituents of potential concern (COPC's). Site COPC's may include the following: low levels of PCE, TCE, 1,2-DCE), 1,1-DCE, and TCA in ground water. As noted earlier, because of their low concentration, it is not anticipated that these chemicals will pose a health hazard to workers.

The potential for unprotected personnel for inhalation of these during intrusive site operations is low. The potential for unprotected personnel for dermal contact with soils, sediments or water containing COPCs during drilling and sampling operations is also. Proper use of personnel protective equipment is intended to reduce potential exposure to site contaminants.

2.1.2. Potential Environmental and Physical Hazards

Prior to initiating activity, the site conditions will be discussed with all employees. Hazards will be identified and protective measures will be explained.

Environmental hazards, in addition to site contaminants, include site fauna and flora. Aggressive fauna, such as ticks, fleas, mosquitoes, bees, wasps, spiders and snakes may be present at the site. Poison ivy and poison oak may also be present.

Physical Hazards involved with field activities are primarily associated with the site environment. The work area presents hazards of slips, trips, and falls from scattered debris and irregular walking surfaces. Weather related hazard include wet, muddy, slick, walking surfaces and unstable soil, sunburn, lightning, rain, snow, ice, and heat and cold related illnesses. There exists a potential for incidents involving personnel struck by or struck against objects resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces during activities may involve slip, trip, and fall hazards.

Materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion and laceration hazards. A common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique, must be employed.

Working surfaces that are slippery can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect working surfaces and keep working surfaces clear of debris and moisture.

2.1.3. Hazard and Contaminant Control

For each field task, Level D personal protective equipment (PPE) is to be worn initially. Protective equipment will also include boots with good treads. Personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping. Eye protection will be worn to minimize splashing into eyes during the collection of water samples. The specific requirements for Level D PPE are presented in Section 4.

The primary hazards for contaminant exposure for each task are summarized on Table 2-1. If odors are observed during field activities, air monitoring with a PID should be conducted to evaluate the concentrations that are present. Action levels for upgrading PPE are presented in Section 6.2.

Field equipment will be inspected and in proper working condition. Mechanical assistance will be provided for large lifting tasks. Ground Fault Circuit Interrupter (GRCI) will be used on all electric power tools and extension cords in outdoor work locations. Electrical extension cords will be protected or guarded from damage (*i.e.*, cuts from other machinery) and be maintained in good condition.

2.2. Ground Water and Soil Boring Field Activities

A component of field operations will consist of the installation of soil borings and ground water and sub-surface soil sample collection. The physical hazards of this operation are primarily associated with operation of the drill rig and contact with potentially contaminated soil and water.

2.2.1. Potential Health Hazards and Contaminants

Hazards generally associated with well drilling operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the drill rig, and overhead electrical and telephone wires which can be hazardous when the drill rig boom is in the upright position. Moving parts on the drill rig may catch clothing. High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in disrepair or incorrectly assembled.

During the retrieval of augers, if used, the possibility exists for splashing of exposed subsurface materials onto the workers and release of dust and volatile materials onto workers' bodies and into the workers' breathing zones.

Other hazards that may be encountered include exposure to vapors and contact with hazardous materials during monitoring well installations and ground water sampling.

There is the potential for arm and back strain during the purging of the wells.

2.2.2. Hazard and Contaminant Control

Level D PPE requirements presented Section 2.1 apply to this task unless potential exists for contamination, then modified Level D will apply. Personnel must wear hard hats and ear muffs and/or earplugs when working near operating heavy machinery. Prior to approaching a drill rig, loose clothing will be secured.

O'Brien & Gere personnel will remain upwind from the vehicle exhausts to the extent practicable unless required by sampling work. The breathing zone will be periodically monitored for volatile organic vapors using a PID during invasive activities. Subsequent monitoring will be in accordance with Chapter 6 of this HASP.

To avoid contact with overhead lines, the drilling subcontractor will be required to lower the drill rig boom prior to moving the rig. The drilling subcontractor will be required to verify the location of underground utilities with both the facility and the local power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise. Contractor should maintain 20' clearance to overhead power lines and not approach closer than OSHA minimums.

Back strain can be prevented by employing proper lifting and bailing techniques. Heavy equipment, such as pumps and generators, will only be lifted with the legs, preferably using two or three personnel.

2.3. Surface Soil Sampling

2.3.1. Potential Health Hazards and Contaminants

The primary potential exposure pathway during surface soil sampling is inhalation of contaminated dusts.

2.3.2. Hazard and Contaminant Control

General PPE requirements presented Section 2.1 (Level D) apply to this task. In addition, field personnel should be positioned upwind of the sampling location to avoid dusts.

2.4. Soil Gas

2.4.1. Potential Health Hazards and Contaminants

Soil gas samples will be collected at select locations in accordance with the work plan. Hazards generally associated with the soil gas sampling include strains associated with handling and driving the soil gas samplers, pinching of hands or fingers associated with handling the soil gas equipment, and potential exposure to soil vapor during soil gas point installation.

2.4.2. Hazard and contaminant control

General PPE requirements presented Section 2.1 (Level D) apply to this task. In addition, field personnel should be aware of physical hazards associated with the installation of the soil gas samplers and use proper lifting techniques to minimize muscle strains.

2.5. Sediment Sampling

Samples of sediments will be collected from two drainage basins for subsequent analysis and evaluation of potential site impacts. The physical hazards of this operation are primarily associated with the coring activities and sample collection methods and procedures utilized (if any).

Health and safety procedures for water related work (Section 2.8) apply to the sediment sampling tasks.

2.5.1. Potential Health Hazards and Contaminants

Sediments that are collected may contain contaminants. The potential exists for release of these materials into the atmosphere at levels that may present an inhalation hazard. The contaminants may be spread through the air and absorbed through direct contact.

Other physical hazards associated with probing/coring and sampling procedures are strains/sprains resulting from sample collection, and potential eye hazards resulting from splashes during sample collection activities.

2.5.2. Hazard and Contaminant Control

General PPE requirements and guidance for upgrading level of PPE are presented in Section 2.1 apply to this task. Control of water hazards are discussed in Section 2.8.

Chemical odors may be observed during sediment collection activities. If odors are noted, field personnel should move away to prevent exposure. Generally, odors will be noted before a PID will detect exposure. If the odors do not dissipate, subsequent monitoring will be in accordance with Section 6.2 of this HASP to evaluate the proper level of protection required.

The potential for slipping on wet surfaces will be reduced by keeping work surfaces dry. Also, boots with good treads will be worn and personnel will be reminded to remain alert in the area where they are walking to decrease the chance of slipping.

2.6. Water Hazards

2.6.1. Potential Health Hazards

In land-based field operations, proper training and equipment are essential to completing a project efficiently and safely. This also holds true for operations conducted on or adjacent to bodies of water. O'Brien & Gere is strongly committed to ensuring all employees conducting work adjacent to bodies of water are familiar with the hazards of water operations and the proper protective measures that must be taken to prevent injury.

2.6.2. Wading Hazard Control

Wading will be permitted if water depths are three feet or less. When wading, a personal floatation device must be worn and a shore observer will be present. In unfamiliar areas, a sediment probe should be used to evaluate water depth and bed conditions before wading those areas. Bed surfaces may be slippery and uneven, proceed with caution at all times. A lifeline attached to a stationary point on shore will be used if wading in water depths of 2.5 feet to 3.0 feet. Additional caution is required when using a lifeline.

Table 2-1. *Personal protection requirements for the Preliminary Site Characterization*

Task	Description of primary health concerns	PPE Level	Monitoring	Action Level
Installation of soil borings, soil vapor sampling	Inhalation due to volatilization or dust, absorption by skin contact.	Initial Level D including hard hat, hearing protection (Section 4)	Organic vapor monitoring (Section 6.1)	See section 6.2 of HASP.
	Past disposal practices may have resulted in concentration of site constituents in subsurface materials.	Modified Level D if site conditions require		See section 6.2 of HASP. See section 6.2 of HASP.
Ground Water Sampling	Inhalation due to volatilization, absorption by skin contact Isolation of groundwater from contact with air and relatively low flow velocities increases the potential for elevated concentrations of site constituents compared to surface water.	Level D (Section 4) Modified Level D if site conditions require	Organic vapor monitoring (Section 6.1), if odors observed.	See section 6.2 of HASP

Table 2-1. *Personal protection requirements for the Preliminary Site Characterization*

Sediment sampling	Inhalation due to volatilization or dust, absorption by skin contact. Concentration of site constituents may have occurred in lagoon sediment.	Level D including water proof waders Personal floatation device. Modified Level D if site conditions require	Organic vapor monitoring (Section 6.1), if odors observed.	See section 6.2 of HASP.

Notes:
PID = photoionization detector
HASP = Health and Safety Plan
Sections referred to in parentheses ( ) are found in the HASP.

3. Personnel Training

3.1. Site Workers

O'Brien & Gere employees performing the activities listed in the Work Plan must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the date of site work, completion of an approved, 8 hour, refresher course on health and safety at hazardous waste operations is required.

3.2. Management and Supervisors

In addition to the requirements described in Section 3.1 for O'Brien & Gere site workers, O'Brien & Gere field supervisors performing on-site operations must have completed an off-site training course of at least 8-hr meeting the requirements of 29 CFR 1910.120(e) on supervisor responsibilities for safety and health at hazardous waste operations.

3.3. Emergency Response Personnel

O'Brien & Gere employees who respond to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(l). Skills such as cardiopulmonary resuscitation (CPR), mouth-to-mouth rescue breathing, and basic first aid skills may be necessary. Off site personnel who respond to emergencies on site will be briefed on potential site hazards by the SSHC before being permitted to enter the buffer and exclusion zones.

3.4. Site-Specific Training

Site-specific training will be provided to each O'Brien & Gere employee and reviewed before implementing field assignments. O'Brien & Gere personnel will be briefed daily by the Site Supervisor or by the SSHC as to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas;
- Selection, use, testing, and care of the body, eye, hand, foot and respiratory protective equipment being worn and the limitations of each;
- Emergency response procedures and requirements;
- Emergency notification procedures and evacuation routes to be followed; and,
- Procedures for obtaining emergency assistance and medical attention.

3.5. Training Certification

A record of employee training completion will be maintained by the SSHC for each O'Brien & Gere employee who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and site-specific training for on-site O'Brien & Gere employees.

4. Personnel Protection

The basic level of personal protective equipment (PPE) to be used during field activities associated with implementation of the Preliminary Site Characterization is OSHA Level D for non-intrusive work that does not involve handling contaminated materials or exposure to contaminated dust or water. PPE may be upgraded based on air monitoring results or at the discretion of the Project Manager and based on the SSHC's recommendations. A downgrade of PPE must be approved by the SSHC and the Project Manager.

If the SSHC determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the equipment or procedures specified in this or other sections of this HASP, the work will be stopped. O'Brien & Gere personnel will be removed from the site until the exposure has been reduced or the level of protection has been increased.

O'Brien & Gere respirator users have been trained, medically approved and fit tested to use respiratory protection. Respirators issued are approved for protection against dust and organic vapors by the National Institute for Occupational Safety and Health (NIOSH). Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators in use will be changed at the end of each workday that an air-purifying respirator is worn, unless the SSHC determines that a change is not necessary. The user will inspect the integrity of air-purifying respirators daily and record the inspection per the O'Brien & Gere Quality Assurance Manual.

4.1. Protective Equipment Description

The level of personal protective equipment is categorized as Level A, B, C, or D, based upon the degree of protection required. For each level, hard hats will be required if dangers related to overhead objects may be present. For drilling and test pitting activities, hard hats will be worn at all times. For other tasks, hard hats will be worn, as necessary. The following is a brief summary of the two levels that may be used on this site.

Level C - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air-purifying respirators are met. The following constitute Level C equipment:

- NIOSH approved full-face air purifying respirator with organic vapor/acid gases cartridges and P100 filters;
- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed;
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or Chemical resistant (latex or neoprene) boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary; and,
- Face shield when not wearing a full-face respirator.

Modified Level D - A work uniform providing additional skin protection when respiratory protection is not necessary. The following constitute Modified Level D equipment:

- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed (Tyvek could be eliminated for tasks where there are no splash hazards or where the legs and torso will not contact contaminated materials);
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or chemical resistant (latex or neoprene) boot covers;
- Optional chemical resistant boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary;

- Escape mask (optional); and,
- Face shield when not wearing other eye protection.
- Respirator.

Level D - A work uniform affording minimal protection, used for nuisance contamination only. The following constitute Level D equipment:

- Coveralls or other appropriate work clothing;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Safety glasses or chemical splash goggles as necessary;
- Cut resistant gloves;
- Hearing protection, if necessary; and
- Hard hat, if necessary.

4.2. Protective Equipment Failure

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSHC must be notified and, after reviewing the situation, is to determine the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSHC determine that the failure affects the safety of workers, the work site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSHC will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.

5. Medical Monitoring

5.1. Medical Surveillance Program

O'Brien & Gere has implemented a medical monitoring program in accordance with 29 CFR 1910.120. The O'Brien & Gere program is designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to determine the employee's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations are administered on a post-employment and annual basis and as warranted by symptoms of exposure or specialized activities. The examining physician is required to make a report to O'Brien & Gere of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. O'Brien & Gere maintains site personnel medical records as required by 29 CFR 1910.120 and by 29 CFR 1910.1020, as applicable.

O'Brien & Gere employees performing the activities listed in the Work Plan of this document have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910.120 overlap those of 29 CFR 1910.134, the more stringent of the two will be enforced.

5.2. Respirator Clearance

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.

6. Air Monitoring

Unidentified organic vapors may be present in the investigation areas. Real time monitoring of these substances may be conducted on-site by, or under the supervision of, the SSHC. The SSHC will evaluate whether the personal protective measures employed during field activities are appropriate and will modify the protective measures accordingly. The SSHC will be responsible to maintain monitoring instruments throughout the investigation.

Personal monitoring must be conducted in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face piece.

6.1. Field Instrumentation and Sampling

Field health and safety air sampling for the Preliminary Site Characterization will consist of organic vapor monitoring using a PID (Section 6.1.1) according to provisions of Section 2 and Table 2-1.

6.1.1. Photoionization Detector (PID)

The air will be monitored with a portable PID equipped with a 10.2 electron volt detector to determine the presence and concentration of organic vapors before sampling, during intrusive field activities (monitoring well installations and test pit excavations). PID monitoring is conducted in the *work zone*.

PID monitoring will be initiated before starting invasive activities and sampling and, if the action levels are exceeded, continuously in the breathing zone of the worker performing these activities.

Personnel monitoring samples will be collected in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face piece. The sampling strategies may change if work tasks or operations change. Monitoring instruments will be checked for appropriate response, in accordance with the manufacturer's instructions, before use each sampling day.

Hazard Monitored: Organic gases and vapors.

Application: Detects the presence and total concentration of many organic gases and vapors.

Detection Method: Ionizes molecules using UV radiation, produces a current that is proportional to the number of ions present.

General Care and Maintenance: Recharge daily or replace the battery. Regularly clean the lamp window. Regularly clean and maintain the instrument and its accessories. Turn the function switch to "stand-by" and allow the instrument to "warm up" for 5 min.

Typical Operating Time: 10 hours, or 5 hours with strip chart recorder.

6.1.2. Combustible Gas Meter (CGM)s

During the test pitting activities, the air will be monitored continuously with a CGM to assess the presence and concentration of combustible gases and vapors. The CGM will be programmed to sound an alarm when the combustible gas concentration exceeds 10% of the lower explosive limit (LEL) for methane.

Hazard monitored. Combustible gases and vapors.

Application. Measures the concentration of combustible gases or vapors.

Detection method. One method uses a filament, usually made of platinum, that is heated by burning the combustible gas or vapor. The increase in heat is measured. Another method ionizes gases and vapors in a flame. A current is produced in proportion to the number of carbon atoms present.

General care and maintenance. Recharge daily or replace the battery.

Typical operating time. 10 to 12 hours on one battery charge.

6.2. Action Levels

Action levels presented in this section are intended primarily for the protection of workers implementing the Preliminary Site Characterization activities. The action levels are used to determine when activities should stop, to determine when site evacuation is necessary, to select emergency response levels, and to change PPE levels.

6.2.1. Organic Vapors

Organic vapors may be released during intrusive activities such as soil boring installation. A PID will be used to determine the presence of organic vapors.

PID monitoring

The breathing zone will be monitored continuously when VOC levels in the sampling zone exceeds 5 ppm above background. Actions, such as keeping the sampling upwind of motors and fuel areas will be implemented to reduce potential interference due to vapors that may be associated with motor operation.

PPE will upgraded to Level C which includes air purifying respirators and chemical resistant clothing (Section 4) when the VOC concentration in the respective breathing zone exceeds 5 ppm above background as indicated on the PID. If the measured VOC concentration is greater than or equal to 50 ppm above background, the workers will leave that work area.

Table 6-1 *Vapor monitoring requirements in brief*

Total VOC Concentration (ppm)	Method	Monitoring Zone	Monitoring Requirements	PPE
<5	PID	Work zone	Periodically in the work zone at minimum 30-minute intervals	Level D
>5	PID	Work zone	Continually in the work zone	Level C
>50	PID	Work zone	Vacate area	Vacate area.

7. Site Control

7.1. Site Security

Site security will be monitored and controlled by the Project Manager, the Site Supervisor, and the SSHC. Their duties will include limiting access to the work area to authorized personnel, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to each work site to prevent persons who may be unaware of site conditions from exposure to hazards. Work area control procedures may be modified as required by site conditions.

7.2. Site Control

Work zones will be required during site activities identified in this HASP. The following two categories of work zones will be established at each sampling point: an exclusion zone and a buffer zone. The area outside of these two areas will be considered the support zone.

7.2.1. Exclusion Zone

The exclusion zone is where sampling activities and boring installations are conducted. The SSHC will identify this zone. It must be an area sufficient to perform the work while excluding the public.

7.2.2. Buffer Zone

The buffer zone contains personnel and equipment decontamination stations and staging areas. The buffer zone will be located upwind of the work activities. It will only be large enough to contain equipment and personnel necessary to keep potentially contaminated media and materials away from the public.

7.2.3. Support Zone

The support zone contains support facilities, extra equipment, transport vehicles, and additional personnel and equipment necessary to manage and perform work activities. If necessary, the support and buffer zones will be merged.

7.3. Site Access Procedures

Access to the area of sampling or drilling will be limited to those personnel required. Such personnel are anticipated to include, but will not necessarily be limited to, O'Brien & Gere employees or subcontractors and those representatives as designated by the NYSDEC or local agencies. Site access will be monitored by the SSHC, who will maintain a log-in sheet. The log will include O'Brien & Gere and other personnel on the site, their arrival and departure times and their destination on the site.

7.4. Site Communications

A cellular telephone will be used during activities to facilitate communications for emergency response and other purposes and to serve as the primary off-site communication network.

7.5. Confined Space Entry

No entry of permit required confined spaces is expected while O'Brien & Gere personnel perform the tasks listed in the FAP. A confined space is defined as a space that has limited or restricted means for entry (for example tanks, vessels, silos, storage bins, hoppers, vaults, and pits) and is not designed for continuous employee occupancy.

8. Decontamination

8.1. Personnel Decontamination Procedures

The SSHC will be responsible for supervising the proper use and decontamination of PPE. The SSHC will also establish and monitor the decontamination line.

Decontamination involves scrubbing with a soap and water solution followed by rinses with potable water. Decontamination will take place on a decontamination pad. Dirt, oil, grease, or other foreign materials that are visible will be removed from surfaces. Scrubbing with a brush may be required to remove materials that adhere to the surfaces. Splash protection garments will be washed with soap and potable water before removal. Non-disposable garments will be air dried before storage. Waste waters from personnel decontamination will be disposed of with the waste waters from equipment decontamination. Respirators will be sanitized as well as decontaminated each day before re-use. The manufacturer's instructions will be followed to sanitize the respirator masks.

The following decontamination protocol, or one providing a similar level of decontamination, will be followed depending upon the needs of the project:

Station 1: Equipment Drop

Provide an area covered with a plastic drop cloth. Deposit equipment used on-site including tools, sampling devices and containers, monitoring instruments, radios and clipboards on the plastic drop cloth. During hot weather a cool down station with chairs, fans, and replenishing beverages may be set up in this area.

Station 2: Outer Garment, Boots, and Gloves Wash and Rinse

Establish a wash station for gloves, boots, and the protective suit (when worn). Scrub outer boots, outer gloves, and protective suit with detergent and water. Rinse with potable water.

Station 3a: Outer Boot and Glove Removal

Provide seating for use during the removal and collection of outer boots. Remove outer boots. Deposit them in a container with a plastic liner. If the boots are to be reused after cleaning, place them in a secure location near the work site. Provide a location for removal, collection, and disposal of outer gloves. Remove the outer gloves. Deposit them in a container for disposal.

Station 3b: Filter or Cartridge Exchange

This station will be established only if respirators are worn. The worker's respirator cartridges and filters can be exchanged, new outer gloves and outer boots donned, and joints taped at this station. From here the worker can return to work duties in the exclusion zone.

Station 4: Outer Garment Removal

This station will only be provided if a protective outer garment is worn. Provide a bench to sit on during the removal of the protective garment. If the garment is disposable, deposit it in a container with a plastic liner; otherwise, hang it up to air dry.

Station 5: Respirator Removal

This station will be established only if respirators are worn. Remove the respirator. Avoid touching the face with gloved fingers. Deposit the respirator on a plastic sheet.

Station 6: Inner Glove Removal

Remove and dispose of inner gloves. Deposit them in a container with a plastic liner. If the gloves are to reused, place them in a secure location near the work site, preferably in a plastic container.

Station 7: Field Wash

Provide a place for a field wash. Wash hands and face thoroughly. Shower if body contamination is suspected.

8.2. Emergency Decontamination Procedures

Although no contact with chemicals that present a hazard is anticipated for the field program, this section has been included in the event of an emergency. The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Minimum decontamination will consist of detergent washing, rinsing and removal of contaminated outer clothing and equipment. If time does not permit the completion of all of these actions, it is acceptable to remove the contaminated clothing without washing it. If the situation is such that the contaminated clothing cannot be removed, the person should be given required first aid treatment, and then wrapped in plastic or a blanket prior to transport to medical care. If heat stress is a factor in the victim's illness/injury, outer clothing will be removed from the victim immediately

8.3. Monitoring Equipment Decontamination Procedures

Sampling equipment used for health monitoring purposes will be cleaned of visible contamination and debris before initial use on site, between uses, and after final use. Monitoring equipment that contacts contaminated media will be decontaminated after each use by a low phosphate detergent brushing followed by a clean water rinse. After decontamination, monitoring equipment will be stored separately from personal protective equipment. Decontaminated or clean equipment not in use will be covered with plastic and stored in a designated storage area in the support zone.

8.4. Decontamination Supplies

The following supplies will be available on site for the decontamination of personnel and equipment:

- Plastic drop cloths;
- Plastic bags or DOT-approved fiberboard drums to collect non-reusable protective clothing;
- Plastic wash tubs;
- Soft bristled long-handle brushes;
- DOT-approved drums or appropriate other containers, to collect wash and rinse water;
- Hand spray units for decontamination;
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators; and,
- Washable tables and benches or chairs.

8.5. Collection and Disposition of Contaminated Materials

Cuttings and field decontamination wastes are to be collected, drummed, and disposed of in accordance with the procedures in the FAP. Investigation derived waste will be managed as described in the FAP.

8.6. Refuse Disposal

Site refuse will be contained in appropriate areas or facilities. Trash from the project will be properly disposed.

9. Emergency Response

9.1. Notification of Site Emergencies

Please refer to Appendix X for detailed instructions and contact information for the four individual sites.

9.2. Responsibilities

The SSHC is responsible for responding to, or coordinating the response of off-site personnel to, emergencies. In the event of an emergency, the SSHC will direct notification and response, and will assist the Site Supervisor in arranging follow-up actions. Upon notification of an exposure incident, the SSHC will call the hospital, fire, and police emergency response personnel for recommended medical diagnosis, treatment if necessary, and transportation to the hospital.

Before the start of investigation activities at the Nassau and Suffolk County sites, the SSHC will:

1. Confirm that the following safety equipment is available: eyewash station, first aid supplies, and a fire extinguisher

2. Have a working knowledge of the O'Brien & Gere safety equipment.

3. Confirm the most direct route to Hospital identified (Figure 9-1) is prominently posted with the emergency telephone numbers (Table 9-2).

4. Confirm that employees who will respond to emergencies have been appropriately trained.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The Project Manager, assisted by the SSHC and the Site Supervisor, must investigate the incident as soon as possible. The Project Manager will determine whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager, the SSHC, and the Site Supervisor.

9.3. Accidents and Injuries

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSHC will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on-site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters. In addition, the O'Brien & Gere Manager of Corporate Health and Safety will be notified within 24-hours of an accident involving O'Brien & Gere personnel and/or its subcontractors.

9.4. Safe Refuge

Before commencing site activities the SSHC will identify the location that will serve as the place of refuge for O'Brien & Gere workers in case of an emergency evacuation. During an emergency evacuation, personnel in the exclusion zone should evacuate the work area both for their own safety and to prevent hampering rescue efforts.

9.5. Fire Fighting Procedures

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available in the support zone during on-site activities. This is intended to control small fires. When a fire cannot be controlled with the extinguisher, the exclusion zone will be evacuated, and the fire department will be contacted immediately. The SSHC or the Site Supervisor will determine when to contact the fire department.

9.6. Emergency Equipment

The following equipment, selected based on potential site hazards, will be maintained in the support zone for safety and emergency response purposes:

- Fire extinguisher;
- First aid kit; and,
- Eye wash bottles.

9.7. Emergency Site Communications

Hand and verbal signals will be used at the site. Portable telephones will be available during site activities for emergency response communications.

9.8. Security and Control

Work zone security and control during emergencies, accidents, and incidents will be monitored by the SSHC or the Site Supervisor. The duties of the SSHC or the Site Supervisor include limiting access to the work zones to authorized personnel and overseeing emergency response activities.

10. Special Precautions and Procedures

The activities listed in the Work Plan may expose personnel to both chemical and physical hazards. The hazards associated with specific site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness training, and administrative and engineering controls. Other general hazards that may be present on a hazardous waste work site are discussed below.

10.1. Heat Stress

The timing and location of this project may be such that heat stress could pose a threat to the health and safety of site personnel. The SSHC will implement work and rest regimens so that O'Brien & Gere Engineers personnel do not suffer adverse effects from heat. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere Engineers personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the support zone.

10.2. Cold Injury

The project requires work over water and thus the timing and location of this project may be such that cold injury could pose a threat to the health and safety of site personnel. Factors that influence the development of a cold related injury include ambient temperatures, wind velocity and wet clothing and skin. The SSHC will implement work and rest regimens so that O'Brien & Gere Engineers personnel do not suffer adverse effects from cold. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment.* Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere Engineers personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the support zone.

10.3. Heavy Machinery/Equipment

O'Brien & Gere employees performing site activities may use or work near operating heavy equipment and machinery. Respiratory protection and protective eyewear may be worn during portions of work activities. Since this protective equipment reduces peripheral vision of the wearer, O'Brien & Gere Engineers personnel should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

10.4. Additional Safety Practices

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

1. Contact with potentially contaminated surfaces should be avoided whenever possible. Workers should minimize walking through puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground.

2. Medicine and alcohol can mask the effects of exposure to certain compounds. Consumption of prescribed drugs must be at the direction of a physician.

3. O'Brien & Gere Engineers personnel and equipment in the work areas will be minimized consistent with effective site operations.

4. Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.

5. Activities in the exclusion zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate personal protective equipment who can perform the following activities:

   - Provide partner with assistance
   - Observe partner for sign of chemical or heat exposure
   - Periodically check the integrity of partner's PPE
   - Notify others if emergency help is needed.

6. The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

10.5. Daily Log Contents

The Project Manager and the SSHC will establish a system appropriate to the investigation areas that will record, at a minimum, the following information:

1. The O'Brien & Gere Engineers personnel and other personnel conducting the site activities, their arrival and departure times, and their destination at the investigation areas
2. Incidents and unusual activities that occur on the site such as, but not limited to, accidents, breaches of security, injuries, equipment failures and weather related problems
3. Changes to the Work Plan and the HASP
4. Daily Information such as:
    - Work accomplished and the current site status
    - Air monitoring results

Emergency Response
Green Island Tree Service – Huntington Station

Notification of site emergencies

In an emergency, site personnel will signal distress either by yelling or with three blasts from a horn (vehicle horn, air horn and so forth). The SSHC, Site Supervisor, or the Project Manager will immediately be notified of the nature and extent of the emergency.

Table 9-2, located on the following page, contains emergency telephone numbers. This table will be kept with the portable telephone and updated as needed by the SSHC. The portable telephone will be used to notify off-site personnel of emergencies. The operating condition of this telephone will be determined daily before initiation of activities.

Directions to the New Island Hospital from the site are provided in the table below and on Figure 9-1.

Table 9-1. *Directions to the New Island Hospital*

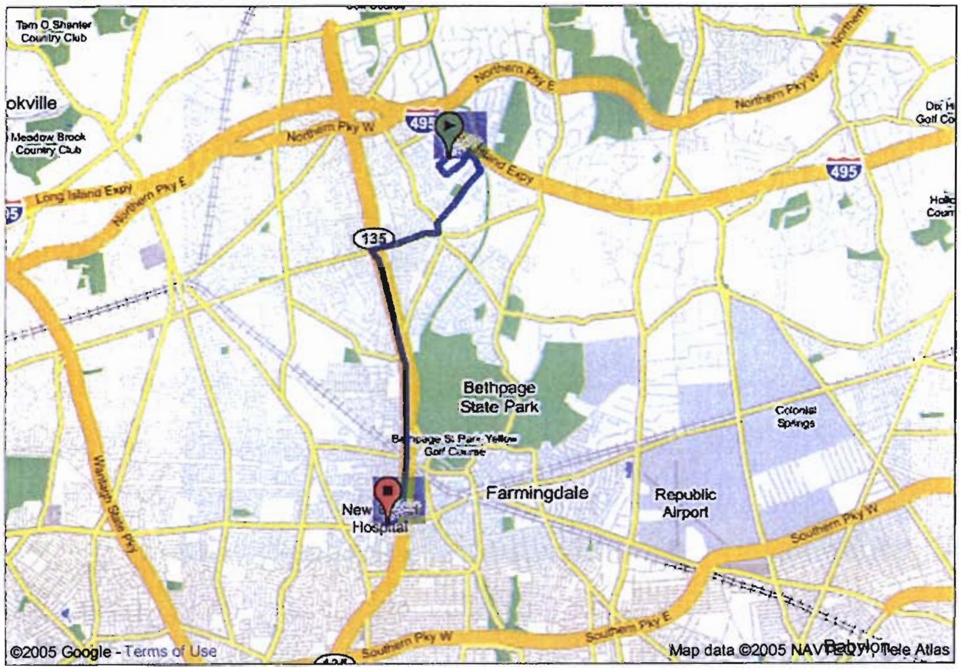
Directions	***Approx. Distance***
Exit the Park at Executive Drive	0.3 miles
Turn Left at Maetto Hill Rd	0.1 miles
Turn Right on Old Country Road	0.8 miles
Turn left into the RT-135 S entry ramp	3.2 miles
Take NY 24 west exit 7W to Hempstead	0.2 miles
Bear right on Hempstead Tpke	0.1 miles
Total mileage (approximate)	4.7 miles

Should someone be transported to a hospital or doctor, a copy of this HASP should accompany them.

Table 9-2. *Emergency response contact list – Green Island Tree Service Site.*

Agency	***Contact/Function***	***Phone Number***
Levittown Policae	Report Incidents	911
NYS Police Dept.	Report Incidents	911 or 1-800-342-4357
Suffolk County Sheriff's Depart.	Report Incidents	911
Plainview Fire Department	Report Fire	911
Jewish Home & Hospital 8 Todd Ct Huntington Station, NY	Main Information	631-424-5272
USEPA Emergency Response Team		212-340-6656
CHEMTREC	Chemical Emergencies	1-800-424-9300
NYSDEC Albany, NY	Emergency	1-800-342-9296
Emergency NYSDEC Project Contact	Joseph Jones	1-518-402-9621
Oil Spill		1-800-457-7362
Poison Control Center		1-800-336-6997
Chemical Emergency Advice		1-800-424-9300
National Spill Response Center		1-800-424-8802

Driving directions
from *100 Commercial Street Plainview NY*
to *4295 Hempstead Tpke, Bethpage, NY 11714*



Start address:	100 Commercial St Plainview, NY 11803
End address:	4295 Hempstead Tpke Bethpage, NY 11714
Distance:	6.1 mi (about 9 mins)

1. Head **southwest** from **Commercial St** - go **0.1 mi**
2. Bear **left** at **Skyline Dr** - go **0.1 mi**
3. Bear **left** at **Express St** - go **0.4 mi**
4. Turn **right** at **Executive Dr/Columbus Pl** - go **0.3 mi**
5. Turn **right** at **Washington Ave** - go **0.8 mi**
6. Turn **left** at **Manetto Hill Rd** - go **0.1 mi**
7. Turn **right** at **Old Country Rd** - go **0.8 mi**
8. Turn **left** into the **RT-135 S** entry ramp to **Seaford** - go **3.2 mi**
9. Take the **N.Y. 24 West** exit **7W** to **Hempstead** - go **0.2 mi**
10. Bear **right** at **Hempstead Tpke** - go **0.1 mi**

Figure 9-1. Hospital Route Map