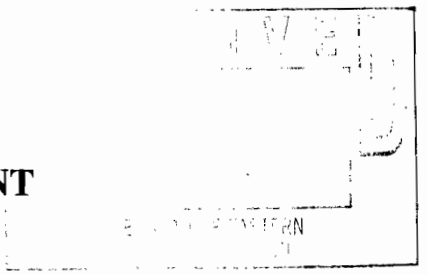
CDM

FINAL DRAFT



WORK PLAN
PRELIMINARY SITE ASSESSMENT
WORK PLAN
METCO SITE
(Site No.: 130179)
Hicksville, New York

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services
Standby Contract No. D004437
Work Assignment No. D004437-21

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Contents

Appendices

List of Tables

List of Figures

Section 1
Introduction

This Work Plan for the former Metco facility located at 325 Duffy Ave, Hicksville, NY was prepared by Camp Dresser & McKee (CDM) for the New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. The Work Plan was developed in accordance with the *"Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002"*.

In addition, NYSDEC has provided limited historical information about this site and has made requests and observations during a December 21, 2007 site reconnaissance visit with CDM representatives. The major focus of this Work Assignment is to conduct a Preliminary Site Assessment to determine whether historical operations and waste disposal practices may have left residual contamination on the property. NYSDEC has requested that a Hazardous Ranking System score be assigned to this Site based on information and data generated during this investigation.

The requested PSA scope of work includes:

- Public File Records Search
- A geophysical survey
- Collection and analysis of surface soil samples
- Collection and analysis of Subsurface Soil samples
- Installation and sampling of shallow soil vapor probes
- Installation, development and sampling of groundwater monitoring wells
- Conduct a Fish & Wildlife Resource Impact Analysis
- Report of findings

Detailed descriptions of each scope task are presented in Section 2 of this Work Plan.

This Work Plan is comprised of the following sections:

- Section 1 - Introduction

  This section presents the site description and history, containing the location, operational and remedial history as well as the project objectives

- Section 2 - Scope of Work

This section presents the scope of work for the following three tasks of this work assignment:

1. Task 1: Work Plan Develop
2. Task 2: Scope of Field Work
3. Task 3: Field Documentation and Reporting

- Section 3 - Project Schedule

  The project schedule for the performance of the above three tasks is presented in this section.

- Section 4 - Budget Estimate

  A detailed work assignment budget is presented in this section, itemized by tasks and sub-tasks utilizing schedule 2.11 in accordance with the contract's budget reporting requirements.

- Section 5 - Staffing Plan

  The staffing plan identifies the roles and responsibilities of the CDM project team. CDM has assembled a team of environmental engineers and scientists experienced in conducting the scope of work tasks effectively and efficiently.

- Section 6-Subcontracting

  This section identifies the services provided by subcontractors on this work assignment. The name and location of each proposed subcontractor is also presented in this section.

- Section 7- MBE/WBE Utilization Plan

  The Minority Business Enterprise (MBE) and Woman Business Enterprise (WBE) Utilization Plan is presented in this section. CDM's subcontractors have been carefully selected to provide the most reasonable cost-effective services while achieving the contract-specific MBE/WBE utilization goals.

The following appendices are also included in this Work Plan:

- Appendix A-Quality Assurance Project Plan

  The site-specific Quality Assurance Project Plan (QAPP) presented in Appendix A specifies the detailed procedures and methods used during the field investigation activities to promote quality during the execution of this work assignment.

- Appendix B-Health and Safety Plan

  The site-specific Health and Safety Plan (HASP) presented in Appendix B specifies the health and safety procedures to promote safe work practices are employed.

- Appendix C-Schedule 2.11

  The schedule 2.11 presented in Appendix C contains a detailed cost estimate by task and subtask of all work elements contained in this work assignment.

- Appendix D-Subcontractor Backup

  Appendix D contains individual quotes for drilling, laboratory and validation services to provide documentation for reasonable competitive costs.

1.1 Site Background and History

The following subsections describe the Metco site and provide a brief overview of the operational history of the site.

1.1.1 Location and Decscription

Located at 325 Duffy Ave in Hicksville, NY the former Metco facility occupies a 6.8 acre parcel in a mixed industrial, commercial and residential area. The site is relatively flat with approximately ninety percent of its surface area covered with concrete and/or asphalt. A small landscaped area is present along the northern portion of the site bordering Duffy Avenue. What appears to be a storm water recharge basin is located in the southeastern portion of the site. Review of the USGS Hicksville, NY Quadrangle map indicates that ground surface elevations range from 130 to 140 feet above mean sea level. General site conditions can be viewed in the aerial photograph present as Figure 1-1.

1.1.2 Operational History

No historical operations information is presently available. However, through waste manifests it has been determined that the former Metco facility generated waste types classified as D001, D002, D080, D010 and D011. In addition, wastes classified as F001 and F005 were also generated.

One of CDM's objectives in conducting the Public Record searches is to identify former practices at this site in order that a site history may be developed. In that regard, Freedom of Information letters were sent to the following local agencies on the afternoon of the initial site reconnaissance visit of December 21, 2007.

1.1.3 Remedial History

According to NYSDEC no previous investigations or remedial actions have been undertaken at this site.

1.1.3.1 Soil Quality

No information regarding soil quality is presently available for this site.

1.1.3.2 Groundwater Quality

No information pertaining to groundwater or groundwater quality is available for this site. During the December 21, site visit, no evidence of existing or abandoned monitoring wells was noted.

However, a review of CDM's regional Nassau County New York Groundwater model indicates that groundwater flows to the south/southwest at this location. Groundwater is expected to be encountered at a depth that fluctuates between 60 and 70 feet below grade.

1.1.4 Site Geology and Hydrogeology

CDM Investigations conducted at nearby locations indicate that subsurface materials at site consist of unconsolidated sands, silts, clays and gravel.

Based on documented groundwater measurements collected at nearby sites, the depth to groundwater is estimated to be 65 feet below grade and the groundwater flow direction is towards the south-southwest.

1.2 Project Objectives

The object of this Preliminary Site Assessment is to determine whether hazardous wastes have been disposed at this location and if so, determine whether the resulting contamination exceeds NYSDEC environmental quality standards. The reader should note that based upon information provided by NYSDEC, this investigation will focus only upon potential negative environmental impacts caused by the release of volatile organic contamination. If during the course of the public records files search or the field investigation, observations are made or measurements are collected that indicate that additional contaminant species should be evaluated, CDM shall make such recommendations to NYSDEC and adjust the scope of work and project costs accordingly.

In order to achieve the Work Assignment objectives, the following activities will be conducted:

- Task 1 – Work Plan Development

  The development of a site specific work plan which includes a site specific Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP).

- Task 2 – Scope of Work

  The investigation will include:

- Review of Public Record Files to determine the existence of site plans that indicate the presence of underground storage tanks, drains, dry wells, underground pipelines or other possible waste disposal receptacles. Files may also provide evidence of previous environmental complaints, violations, fines, penalties, or emergency response actions. As it is presently unclear what entities may have occupied this facility since its construction circa 1959, a file search may also allow us to develop a comprehensive site history and allow us to target specific contaminant suites or potentially responsible parties.

- Geophysical survey: consisting of ground penetrating radar (GPR), magnetometer and terrain conductivity instruments, a geophysical survey is planned to target specific areas of interest identified during the public records file search.

- Collect and analyze up to six (6) surface soil samples for semi-volatile organic compounds and metals.

- Advance soil borings to collect and analyze up to six (6) subsurface soil samples for volatile and semi-volatile organic compounds and metals.

- Soil Vapor Sample Collection, install soil vapor probes and collect soil vapor samples at six (6) locations from two (2) depth intervals within each borehole; the shallow sample at approximately eight (8) feet bgs and the deep sample at sixty (60) feet bgs. The shallow sample depth is intended to duplicate the soil vapor conditions that would be encountered at basement level and be of interest to the Department of Health. The deep location is intended to collect a sample of soil vapor just above the capillary fringe which may indicate the presence of groundwater contamination and be of particular interest to NYSDEC. Analyses will be for TO-15 parameters.

  Groundwater Sample Collection: install, develop, and sample up to three (3) new monitoring wells for VOC's and SVOC's via Methods 8260 and 8270. Sample analyses for metals will also be conducted.

- Investigative Derived Waste: properly handle and containerize the waste derived from the investigation which will include, but is not limited to spent PPE, decontamination fluids, soil cuttings, well development and purging water.

- Decontamination Procedures: for all non-dedicated/disposable equipment, CDM will perform the decontamination procedure as outlined in the Health and Safety Plan and also referenced in the generic QAPP.

- Identify and field locate all sample locations

■ Task 3 – Field Documentation and Reporting

Following the performance of the field investigation and the receipt of laboratory analytical data, CDM will present the results in a Preliminary Investigation report. This report will adhere to guidelines provided in DER-10 section 3.13 to include:

- A description of the tasks performed
- Results of the sampling and analysis
- Description of the geophysical survey results
- All pertinent field data
- Hazardous Ranking System score
- Conclusions and recommendations

and if requested by NYSDEC

- A Fish and Wildlife Resource Impact Analysis (for which, no costs have been included herein).

CDM shall finalize the report following receipt of the validated analytical data by an independent third party and after receipt of comments from NYSDEC.

In addition, CDM will provide NYSDEC with the following reports at their prescribed frequency:

- Monthly status reports, quarterly MBE/WBE status reports and monthly cost control reports

Section 2
Scope of Work

2.1 Task 1 - Work Plan Development

This Work Plan includes a site specific Quality Assurance Project Plan (QAPP) presented in Appendix A and a site specific Health and Safety Plan (HASP) presented in Appendix B. The QAPP presents the field activities that will be performed, defines the procedures and methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data. The HASP describes the site health and safety procedures governing the field activities that will be performed.

2.2 Task 2 – Scope of Work

The scope of work for this Work Assignment is described below. The reader is advised that this Work Plan is a flexible and evolving document. Scope changes may be necessary based upon field conditions, observations, weather and other factors. Any changes to the approved scope of work will be communicated to the NYSDEC on-site representative for approval prior to implementation. Cost impacts will also be identified at the time approved scope changes are implemented. The planned scope of work is presented below. **Figure 2-1** depicts the site, approximate direction of groundwater flow, and the proposed investigation locations that are discussed in the following sections.

2.2.1 Geophysical Survey

CDM will oversee and supervise the performance of a surface geophysical survey that will cover an area not to exceed three (3) acres in area. The specific site(s) for this survey have not been identified at the time of this writing. It is expected that site records housed at the Building Department will lend some insights to the location(s) of the waste disposal systems used by Metco or its predecessors. Once identified, these areas will be surveyed to identify underground storage tank areas or dry wells. It is anticipated that the geophysical survey will focus in areas to the east, south and west sides of the facility.

2.2.2 Soil Vapor Sample Collection

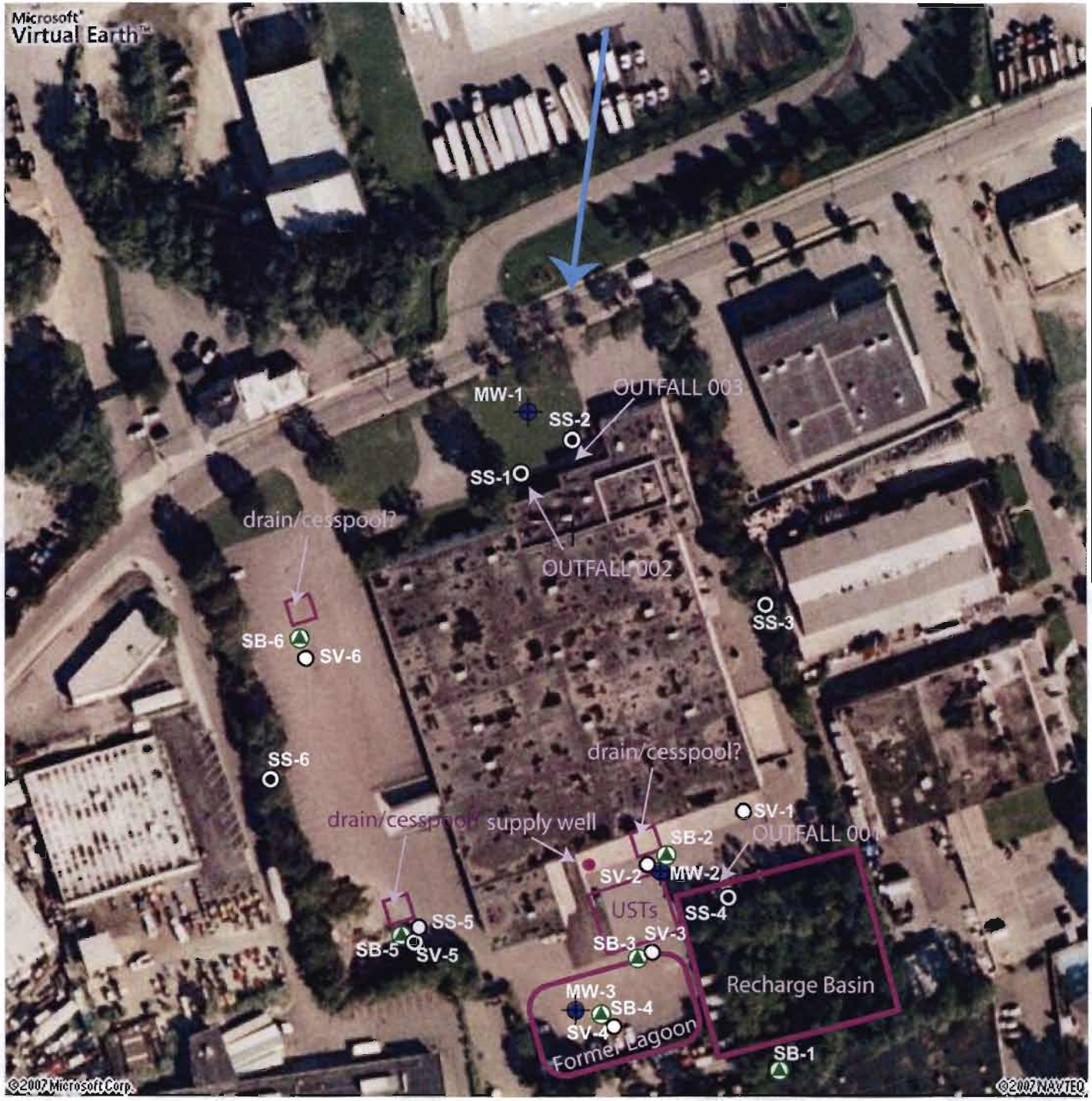
Environmental samples will be collected in accordance with the "Draft Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated February 2005" and the "Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002".

Preliminary sample results will be available under normal turn around times (21 days) and final validated results will be provided within their standard turnaround times (30 days).

Soil vapor samples will be collected at six (6) locations selected by CDM and approved by NYSDEC. Selection of these locations will be contingent upon results of file review. Two separate vapor boreholes will be co-located at each location to collect the two vapor samples. A shallow borehole will be advanced to approximately 8 feet below site grade; and a deeper borehole to a depth approximating 2 feet above the water table interface (estimated to be approximately sixty five (65) feet below grade). The shallow and deep co-located vapor boreholes will be drilled at a single drilling location. Drilling will be initiated at the subsequent location prior to initiating the collection of vapor samples from the first location. This phased approach will be utilized to minimize standby time during the sample collection process. Soil vapor boreholes will be drilled using direct-push technology to drive steel rods equipped with a detachable steel drive point to the desired depth. The soil vapor sampling procedure for both the shallow (8 feet below grade) and deep (60) feet below grade) locations is provided in the QAPP (Appendix A).

The tubing will be connected to a vacuum system which is a combined diaphragm pump and calibrated gauge system specifically designed for soil gas sampling. The tubing is fitted with a needle valve regulator which can easily be throttled to a flow rate of less then 100 milliliters (ml) per minute. Syringes will be utilized to purge the tubing if obtaining a flow rate of 100 ml/min is difficult with vacuum/volume system. Approximately three probe volumes (i.e. volume of sample probe and tubing) will be purged at a flow rate less than 100 ml per minute. The poly tubing has an inside diameter of ¼ inch and a volume of 9.65 ml/foot. Purging for the eight (8) foot vapor locations assuming 3 feet of extra tubing at the surface to work with yields a purging volume of 318.45 ml over a 3.18 minute time frame. A tedlar bag will be filled toward the end of the purge volume to be screened using the PID meter. The PID readings will be observed and recorded on the appropriate field form. The vacuum/volume system will be disconnected and the end of the tubing will be connected directly to the summa canister intake valve. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated.

The flow rate during sampling will not exceed 100 milliliters per minute to minimize outdoor air infiltration during sampling. During soil vapor sampling collection, an out door ambient air sample will be collected. The soil vapor samples will be sent to an off-site laboratory for VOC analysis via EPA Method TO-15. All samples will be analyzed by an ELAP certified laboratory. The analysis for air samples will achieve detection limits of 1 $\mu g/m^3$. For specific parameters identified by the NYSDOH, where selected parameters may have a higher detection limit (e.g. acetone), the higher detection limits will be designated by the NYSDOH. A NYSDEC ASP Category B



Key

- **MW** — Proposed monitoring well locations
- **SB** — Proposed soil boring locations
- **SS** — Proposed surface sample locations
- **SV** — Proposed soil vapor sample locations
- Approximate direction of groundwater flow

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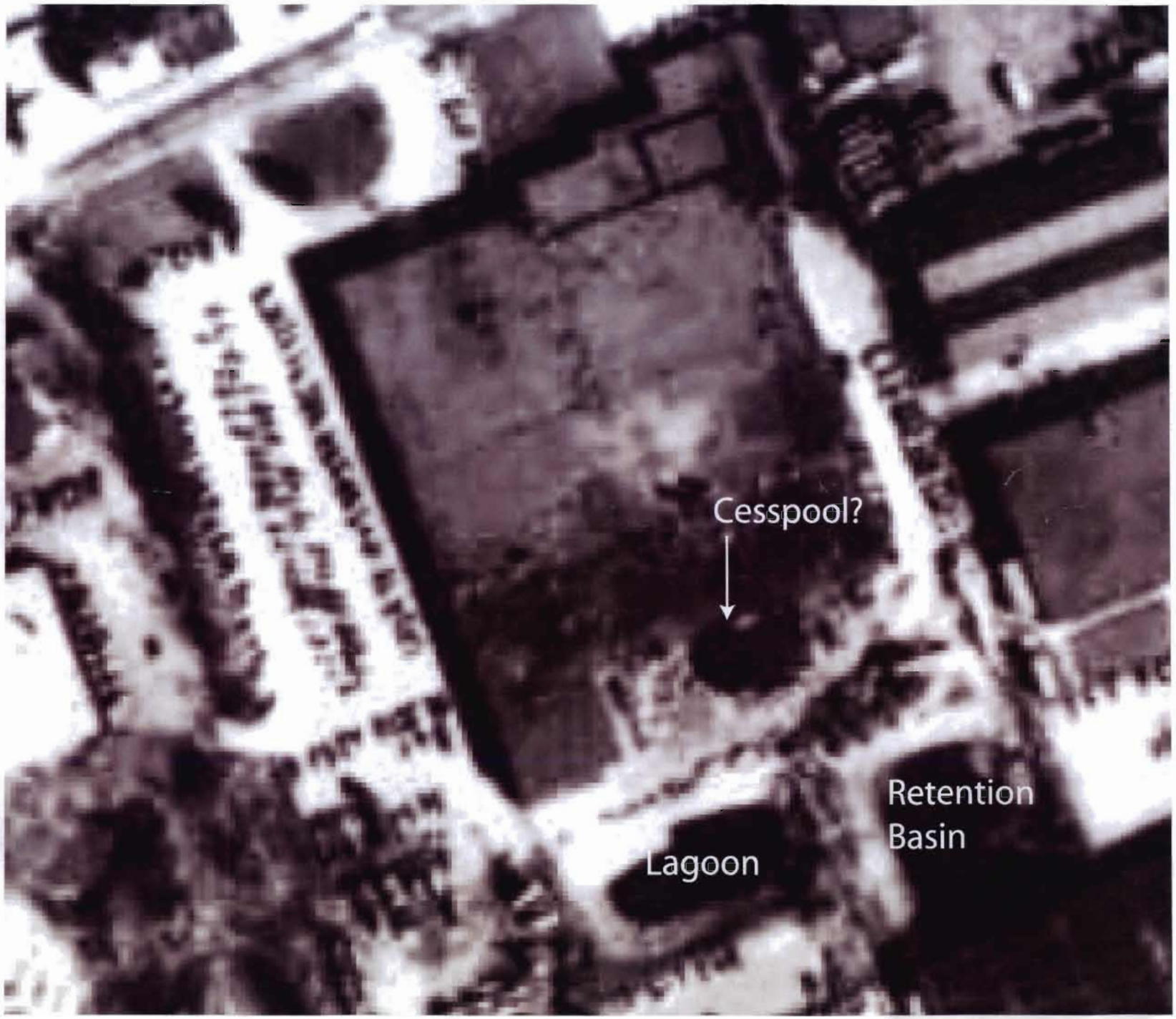
Figure 2-1

Proposed Investigation Locations
NYSDEC
Metco Site
325 Duffy Avenue, Hicksville, NY


Cesspool?
Retention
Basin
Lagoon

data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

Upon completion of the sampling, the sample tubing will be removed and the soil vapor boring (1.5 inches in diameter) will be backfilled with indigenous soil and/or clean sand and marked with a stake/flag, which will be labeled, surveyed and illustrated on the site map so that it can be located at a later date. Borings performed in paved or concrete areas will be backfilled and refinished at the ground surface with concrete or cold patch.

(If requested by DEC, the CDM field crew may direct the driller to attempt to collect a grab sample of groundwater before efforts are taken to backfill the soil vapor borehole. No costs have been included for these efforts. However with the temporary existence of an open borehole immediately above the water table, this concept should be explored further as it provides an opportunity to sample of groundwater with minimal additional effort and cost).

Analytical Program (see table 2-1)

- Six shallow soil vapor samples for TO-15 analysis
- Six (6) deep soil vapor samples for T0-15 analysis
- QA/QC

2.2.3 Surface Soil Sample Collection

CDM proposes to collect up to six (6) surface soils samples for chemical analysis. Surface soil samples will be collected from the zero to two-inches below ground surface. Sampling procedures are presented in the QAPP. As the site is covered with asphalt/concrete, there is limited access to surface soils. CDM proposes to collect samples in the vegetated and landscape areas and in the recharge area in the southeast corner of the site seen in Figure 2-1. Other locations may be found to be suitable for surface soil sample collection following the public records file review.

Alternatively, CDM proposes only to collect surface soils samples if the public records file review suggests that areas of concern exist near the surface. In these/this case(s), the analytical parameters will be dependent upon the information found. For cost purposes, CDM will analyses any surface soils samples for SVOC's via Method 8270 and Metals.

Analytical Program

- Six (6) surface soil samples for semi-volatile organic analysis, Method 8270; and Metals, Method 7000.
- QA/QC

2.2.4 Subsurface Soil Collection

The costs for a subsurface soils investigation via direct push drilling techniques have been included in this Work Plan. The value of such an exercise is currently in question unless potential underground utilities plans obtained during the Public Records File search can be evaluated to determine the locations of areas of concern. FOIL requests have been sent to the local Building Department and other local agencies, though responses have yet to be received.

The locations of the direct-push subsurface borings will be based on findings from the file review. All core samples will be field screened for contamination. The sample showing the highest level of contamination will be sent to the lab for analysis. Only one sample per borehole is expected to be sent for analysis.

Analytical Program

- Six (6) subsurface soil samples for VOC analysis by Method 8260; SVOC's via Method 8270 and Metals via Method 7000.
- Plus QA/QC

2.2.5 Groundwater Sample Collection

Groundwater samples will be collected from three (3) proposed new wells via hollow stem auger techniques to install 2-inch diameter PVC wells with ten (10) foot screens. Detailed groundwater sampling procedures are provided in the QAPP (Appendix A) and have been previously reviewed and approved by NYSDEC. CDM will field located each potential well site prior to mobilization. The NYSDEC on-site representative is expected to provide approval for each well site.

The groundwater samples will be sent to an off-site laboratory for VOC analysis via EPA Method 8260. All samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

Upon completion of the sampling, the wellheads will be surveyed for horizontal and vertical controls. Depth to water level measurements will be collected subsequently and used to develop conceptual groundwater flow diagrams.

Analytical Program

Three (3) groundwater samples for VOC analysis by Method 8260; SVOC's via Method 8270 and Metals via Method 7000.

2.2.6 Investigative Derived Waste

Soil cuttings, well development and well purge water will be placed and dispersed on the ground unless visible contamination or elevated PID readings are observed. If contamination is present, investigative derived waste (IDW) will be contained and analyzed to determine the appropriate disposal methods.

2.2.7 Decontamination Procedures

All non-dedicated equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Additional cleaning of the equipment with steam may be needed under some circumstances. Decontamination fluids will be discharged to the ground surface unless a visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be staged in an appropriate container and disposed of appropriately.

2.2.8 Sample Location

CDM will utilize a global positioning system (GPS) hand-held unit to identify the project sample locations. If interference is encountered due to poor GPS signal strength, field measurements will be collected from fixed locations (e.g. corner of the building, fence, etc.). Subsequently, these data will be used to update the sample locations on the site map.

2.2.9 Sample Identification, Laboratory Analysis and Validation

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Site specific procedures are described in the QAPP (Appendix A).

All samples will be analyzed by a NYSDOH approved Environmental Laboratory Approval Program (ELAP) certified laboratory. Air samples will be analyzed for VOC using EPA Method TO-15. The analysis for air samples will achieve detection limits of 1 $\mu g/m^3$ for each compound. For specific parameters identified by the New York State Department of Health (NYSDOH), where the selected parameters may have a higher detection limit (e.g., acetone), and the higher detection limits will be designated by the NYSDOH. Groundwater samples will be analyzed for VOC by EPA Method 8260. Soil samples will be analyzed in accordance with TAGM #4046 for VOC by EPA method 8021B, SVOC by EPA method 8270C, and metals by EPA method 7000. A NYSDEC Analytical Services Protocol (ASP) Category B data deliverable will be provided for these analyses (Table 2-1).

All samples collected will be validated in accordance with NYSDEC Data Usability Summary Report (DUSR) guidance by a party that is independent of the laboratory which performed the analyses and CDM. A usability analysis will be conducted by a qualified data validator and a DUSR will be submitted to the NYSDEC.

2.3 Task 3 – Field Documentation and Reporting

2.3.1 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, and purge forms used during the field activities, will be submitted to the NYSDEC as part of the final report. Field and

sampling procedures, including installation of the sample boreholes, existing monitoring wells, etc., will be photo-documented.

2.3.2 Reporting

A total of four copies of a draft letter report will be submitted that documents the work conducted and presents the results of the sample analysis for review and comment by NYSDEC and NYSDOH. Upon receipt of the comments, CDM will revise the draft report and print the four final copies and submit to NYSDEC. One copy of the final report; text, tables, maps, photos, etc., will be submitted as a single pdf file. All electronic files will be submitted to NYSDEC on a compact disc. The site investigation data will be submitted in the most recent version of the NYSDEC Electronic Data Deliverable (EDD) with the final report submission. Currently this is the USEPA Region 2 EDD dated December 2003.

Section 3
Project Schedule

The following tabulation provides the proposed project schedule and key milestones for this work assignment. As currently planned, field work will be initiated within two weeks of written receipt of final work plan approval. Field activity duration is estimated to be four work days assuming no delays are experienced due to inclement weather, site access problems, or for other unforeseen reason.

The scheduled submittal dates for deliverables are based on standard laboratory turnaround times of four weeks, and turnaround for data validation of three weeks.

Project Milestone	**Date**
Issue Work Assignment (WA)	
Acknowledge Receipt of WA	5 Days after Issuance
Work plan development session	December 21, 2007
Submit Task 1 (Draft Work Plan) Deliverable	March 21, 2008
DEC/DOH Comment on Draft Work Plan	April 28, 2008
Submit Task 1 (Final Work Plan) Deliverable	May 16, 2008
Notice to Proceed (NTP)	May 30, 2008
Commence Task 2 Field Work	June 30, 2008
Task 2 Field Work Completed	August 18, 2008
Task 3 Submit Draft Report	November 10, 2008
Approve Draft Report	30 Days after Draft Report Submitted
Task 3 Submit Final Report	30 Days after Approval of Draft Report

Section 4
Budget Estimates

Estimated Budget and Level of Effort (LOE) Summary
Metco
325 Duffy Avenue
Hicksville, New York
Site No. 130179

Task Items	Description/Cost	Dollars
1	Work Plan Development	$13,161.49
2	Scope of Field Work	$104,230.45
3	Field Documentation and Reporting	$20,581.13
	Total Estimate Budget (Tasks 1 - 3)	**$137,973.07**

Appendix C presents the detailed costs by task and subtask on the NYSDEC schedule 2.11.

General Assumptions:

- Field work will be performed from late-June to mid-August, 2008. NYSDEC will provide CDM with property access for all on-site work.
- All costs are based upon the scope and schedule provided in this Work Plan. Costs associated with project delays or expedited schedules beyond CDM's control are not assumed.
- CDM will provide four hard copies by mail and one electronic file (pdf) by e-mail for each report submitted to the NYSDEC.

Task 1 - Work Plan Development:

- Only conference calls are anticipated to be necessary for this phase. Meetings are not assumed to be required for this task.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required. It is assumed that all comments can be addressed in 2 hours.
- Project management, subcontractor procurement, scheduling, budgeting, administrative activities are included in this task.

- A portion of the previous CDM effort regarding subcontractor procurement and contract negotiations are included in this task budget per conversations with the NYSDEC Contract Administrator.

Task 2 – Scope of Work:

- Surveying will not be necessary for this work assignment. Horizontal control will be required for the monitoring wells.
- No schedule delays are assumed due to inclement weather or equipment failure.
- Only one mobilization/demobilization is assumed to be required for each subcontractor.
- Drilling, direct push sampling, analytical and validation and if necessary, IDW disposal will be subcontracted.
- Assumed that direct push techniques are capable for reaching the desired depths for sample collection.
- CDM will provide oversight during field activities.
- It is assumed that the site-markout will be able to determine all utility lines in the area of the proposed borings. Costs are not included for site-specific markout. It is assumed that the general utility markout will be sufficient to avoid all utility lines in the proposed sampling locations.
- CDM assumes that all material and equipment staged in access areas will be removed to allow easy access to all sampling locations by direct push equipment.
- Decontamination wastes and other investigative derived waste will not be required to be containerized and simple on-site disposal is assumed. No analytical, transportation or disposal of IDW is assumed.
- Delays due to the site owner or public are not assumed.
- Continuous air monitoring has been included in this cost estimate as follows: one PID and one dust meter will be staged downgradient and one dust meter will be staged upgradient of the exclusion zone and will be set to log continuously throughout the duration of drilling activities. This is in accordance with the NYSDOH Community Air Monitoring Plan (provided in HASP in **Appendix B**).
- A geophysical survey will be in areas that measure less than three acres in size.
- Analytical parameters for groundwater and subsurface soils will be VOC's only. SVOC's will be analyzed for the surface soil samples; TO-15 analysis for vapors.

Task 3 - Field Documentation and Reporting:

- Only conference calls are anticipated to be necessary for this phase. Meetings are not assumed to be required for this task.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required.
- During site work, digital photographs and field notes will be kept.
- A report will be developed including a description of work conducted with field notes, photos, validated analytical data, figures, field measurements, and summary tables/purge forms
- It is assumed that only four data tables will be produced (one for surface soils, one for soil vapor, one for subsurface soils and one for groundwater). and one figure having results necessary for the report.

Section 5
Staffing Plan

5.1 Project Manager – David J. Keil, PG

The Project Manager, Mr. David Keil, will have the overall responsibility for the technical and financial aspects of this project. He will assign technical staff, maintain control of the project budget and schedule, prepare monthly progress reports, review and approve project invoices, evaluate the technical quality of the project deliverables as well as the adherence to QA/QC procedures and manage subcontractors. He will serve as CDM's point of contact for this project.

5.2 Program Manager – Michael A. Memoli, P.E., DEE

The primary responsibilities for program management activities rest with the Program Manager (PRM). The Program Manager, Mr. Memoli, will have ultimate contract responsibility for the project, including responsibility for the technical content of all engineering work. Mr. Memoli will direct, review and approve all project deliverables, schedule staff and resources, resolve scheduling conflicts and identify and solve potential program problems. He will be directly accountable to NYSDEC's Division of Hazardous Waste Remediation for program execution. He has authority to assign staff, negotiate and execute contracts and amendments, as well as execute subcontracts. The PRM will communicate directly with CDM's Project Manager.

5.3 Program Quality Assurance Manager – Jeniffer M. Oxford

The Program Quality Assurance Officer, Ms. Jeniffer Oxford, will monitor QC activities of program management and technical staff, as well as identify and report needs of corrective action to the Program Manager. She will also conduct an internal review of all project deliverables prepared by CDM staff and sign off on the final investigation reports.

5.4 Health and Safety Officer – Christopher S. Marlowe, C.I.H., Q.E.P

The Program Health and Safety Officer, Mr. Chris Marlow, will review and make recommendations to the Subcontractors on health and safety plans for compliance with OSHA requirements. He will develop a Health and Safety plan for CDM and NYSDEC employees, handle over-sight activities, evaluate the performance of health and safety officers and maintain required health and safety records. He will report to the Program Manager

5.5 Field Manager – Melissa Koberle

The Field Manager, Ms. Melissa Koberle, will be responsible for overseeing and coordinating field activities. This will include, but is not limited to: overseeing the

installation of monitoring wells, coordinating drill work, coordinating work with other subcontractors and monitoring health and safety conditions in accordance with the approved Health and Safety Plan. She is directly accountable to the Project Manager.

5.6 Field Technician – Anthony Grove

The Field Technician, Mr. Anthony Grove, will assist the Field Manager with the coordination of field work including, but not limited to: maintaining field data, collecting vapor samples, collecting groundwater samples, shipping samples, and preparing chain of custody forms. He is directly accountable to the Project Manager.

5.7 Project Geologist – Cristina Ramacciotti

The Project Geologist, Ms. Cristina Ramacciotti, will assist the Project Manager with the work plan draft and final, as well as general engineering tasks related to field work, subcontractor coordination, reporting, etc. She is directly accountable to the Project Manager.

Section 6
Subcontracting

Appendix D presents a comparison of quotes from various subcontractors. CDM proposes to engage subcontractors to provide the following services for this work assignment:

6.1 Direct Push Probe/Well Drilling – Aztech Technologies

At this time, CDM is proposing to use Aztech Drilling (WBE) as the direct push and well drilling subcontractor. They are located at 5 McCrea Hill Road, Ballston Spa, New York 12020.

6.2 Analytical Laboratory - Chemtech

At this time, CDM is proposing to use Chemtech (MBE) as the analytical laboratory subcontractor. They are located at 284 Sheffield Street, Mountainside, NJ 07092.

6.3 Data Validation – Nancy Potak

At this time, CDM is proposing to use Nancy Potak (WBE) as the data validation subcontractor. She is located at 1796 Craftsbury Road, Greensboro, Vermont 05841.

6.4 M/WBE Reporting – Kenneth Shider

At this time, CDM is proposing to utilize Ken Shider (M/WBE consultant) to prepare the quarterly M/WBE reports that are required by NYSDEC.

6.5 Geophysical Survey Services – Enviroprobe Services Incorporated

At this time, CDM is proposing to utilize Enviroprobe Services Incorporated to to perform the geophysical survey work. They are located at 221 Haddon Avenue, Westmont, New Jersey 08108.

6.6 IDW Disposal – Innovative Recycling Technologies, Inc.

At this time, CDM is proposing to utilize Innovative Recycling Technologies, Inc. as the IDW disposal subcontractor. They are located at 690 North Queens Avenue Lindenhurst, NY 11757.

Section 7
MBE/WBE Utilization Plan

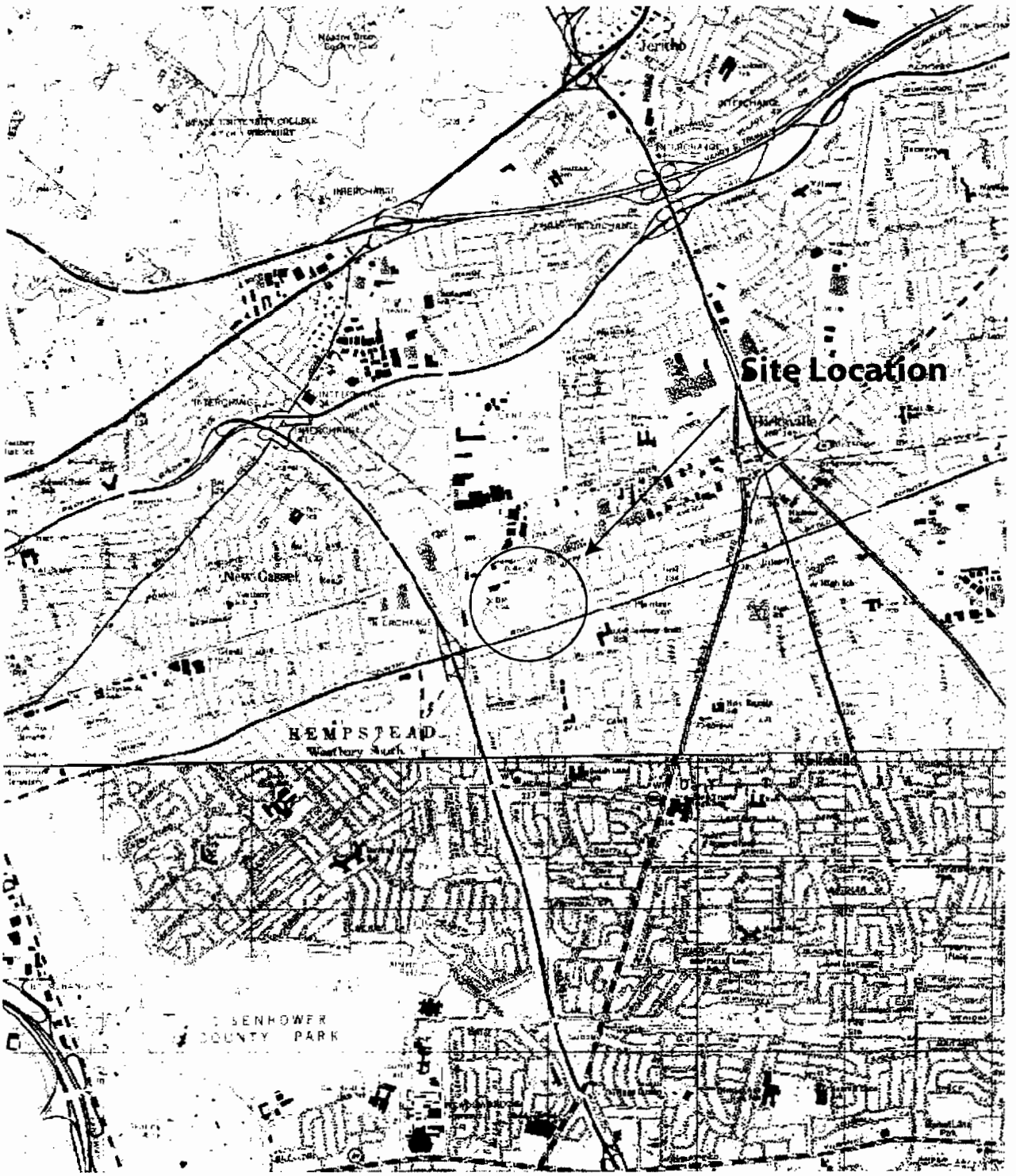
To meet the requirements of the MBE/WBE program, CDM has prepared the following utilization plan:

Total Dollar Value of the work assignment	**$137,973.07**
MBE Percentage Goal	15%
MBE Dollar Value Goal	$20,695.96
WBE Percentage Goal	5%
WBE Dollar Value Goal	$6,898.65
Combined MBE/WBE Percentage Goal	20%
Combined MBE/WBE Dollar Value Goal	$27,594.61

Minority and woman-owned firms are expected to participate as follows:

Services to be Provided	Description of Services	Subcontractor Name and Contact Information	Proposed Subcontract Price
WBE - Drilling	Well Installation	Aztech Technologies, Inc. Matthew Darcangelo (518) 885-5383	$31,068.12
Laboratory Analysis –	Vapor, Water and Soil Sample Analysis	Chemtech Joe Dockery (908) 789 8900	$15,554.70
Kenneth Shider	M/WBE Quarterly Reports	Kenneth Shider (518) 269-2207	$599.97
WBE - Data Validation	DUSR	Nancy Potak (802) 533-9206	$1,806.00
		TOTAL	**$49,028.79**

FIGURES



UTM 18 622663E 4512924N (NAD27)
USGS Hicksville (NY) Quadrangle
Projection is UTM Zone 18 NAD83 Datum

Figure 1-1
Site Location Map
NYSDEC
Metco Site
325 Duffy Avenue, Hicksville, NY

Key

- **MW** Proposed monitoring well locations
- **SB** Proposed soil boring locations
- **SS** Proposed surface sample locations
- **SV** Proposed soil vapor sample locations
- Approximate direction of groundwater flow

N

Figure 2-1

Proposed Investigation Locations

NYSDEC
Metco Site
325 Duffy Avenue, Hicksville, NY

TABLES

Table 2-1
Analytical Program Summary
Metco Site
Hicksville, New York

Analytical Parameter	Sample Matrix	Number of Samples	Analytical Method	Field Duplicates (b)	MS/ MSDs	Field Blank/ Ambient Air Blank (b)	Trip Blanks (c)	Container	Sample Preservation	Holding Time
GROUNDWATER SAMPLES										
Volatile Organic Compounds	Groundwater	11	EPA 8260B	1	1	3	3	3 - 40ml clear glass vial with Teflon septum	HCl to pH <2; Cool to 4°C	14 days
Semi-volatile Organic Compounds	Groundwater	11	EPA 8270C	1	1	3	0	1000 ml amber glass bottle with teflon lined cap	Cool to 4°C	7/40 days
Metals	Groundwater	11	EPA SOW ILM04.2	1	1	3	0	1-500 ml plastic with plastic cap	HNO_3 < 2	180 days
SOIL SAMPLES										
Volatile Organic Compounds	Soil	15	EPA 8260B	2	1	2	3	3 - 40 ml glass VOC with plastic cap with Teflon septum with 25 ml methanol (prepared by lab)	Cool to 4°C	14 days
Semi-volatile Organic Compounds	Soil	15	EPA 8270C	2	1	2	0	1 - 8 ounce glass jar with plastic cap	Cool to 4°C	14 days
Metals	Soil	15	EPA SOW ILM04.2	2	1	2	0	1 - 2 ounce glass jar with plastic cap	Cool to 4°C	180 days
SOIL VAPOR SAMPLES										
Volatile Organic Compounds (VOCs)	Air	16	EPA TO-15	2	0	1	0	1.4L SUMMA canisters with flow regulators		30 days

Notes:
(a) A minimum of 5% of all samples will be collected in duplicate.
(b) Field blanks are collected at a frequency of 1 per day.
(c) Trip blanks are collected at a frequency of 1 per sample cooler or 1 per every five days.

Appendix A

CDM Generic Quality Assurance Project Plan
for NYSDEC Contract No. D004437

CDM GENERIC QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR NYSDEC STANDBY CONTRACT NO. D-004437

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services

Prepared by

Camp Dresser & McKee
Raritan Plaza I, Raritan Center
Edison, New Jersey

Revised February 2008

CDM

Contents

List of Tables

List of Attachments

Section 1
Introduction

This Generic Quality Assurance Project Plan (QAPP) is the documentation of the quality assurance/quality control (QA/QC) procedures required to complete projects under New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. Site specific procedures will be included as an attachment to the site specific Work Plan for that site.

1.1 Purpose

The principal purpose of this document is to specify quality assurance/quality control (QA/QC) procedures for the collection, analysis, and evaluation of data that will be legally and scientifically defensible.

1.2 Objectives

The QAPP provides general information and procedures applicable to the activities and analytical program detailed in each site-specific Work Plan. This information includes definitions and generic goals for data quality and required types and quantities of QA/QC samples. The procedures address field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA reporting specific to the analyses performed by the laboratories subcontracted by CDM.

Section 2
Project Organization and Responsibility

2.1 Overview

The project management organization for each project is to provide a clear delineation of functional responsibility and authority. The project manager for CDM is the primary point of contact with the regulatory agency. He/she is responsible for development and completion of the site-specific investigation, project team organization and supervision of all project tasks. In this role, he/she will communicate directly with NYSDEC staff.

For the fieldwork, field teams consisting of CDM personnel and subcontractors will be assembled and will be responsible for implementing all aspects of the fieldwork. Several key activities will be performed as part of the field and analytical work. These activities include:

- Ensuring that sample collection, testing and data collection procedures are performed according to DEP-10 requirements
- That health and safety procedures as outlined in the site-specific health and safety plan (HASP) are followed
- That the field QA/QC procedures are implemented
- That laboratory analysis, data validation, data processing, and data QC activities are performed in accordance with NYSDEC guidelines.
- That minority business enterprise/women business enterprise (MBE/WBE) goals are achieved.

2.2 Responsibility

The primary responsibilities for program management activities rest with the Program Manager (PRM). The Program Manager will have ultimate contract responsibility for the project, including responsibility for the technical content of all engineering work. The program manager will direct, review and approve all project deliverables, schedule staff and resources, resolve scheduling conflicts and identify and solve potential program problems. He will be directly accountable to NYSDEC's Division of Hazardous Waste Remediation for program execution. He has authority to assign staff, negotiate and execute contracts and amendments, as well as execute subcontracts. The PRM will communicate directly with CDM's Project Manager.

The Project Manager will have overall responsibility for the technical and financial aspects of this project. He/she will assign technical staff, maintain control of the project budget and schedule, prepare monthly progress reports, review and approve project invoices, evaluate the technical quality of the project deliverables as well as the

adherence to QA/QC procedures and manage subcontractors. He/she will serve as CDM's point of contact for this project.

The Program Quality Assurance Officer will monitor QC activities of program management and technical staff, as well as identify and report the needs for corrective action to the Program Manager. She will also conduct an internal review of all project deliverables prepared by CDM staff and sign off on the final investigation reports.

The Program Health and Safety Officer will review and make recommendations to the Subcontractors on health and safety plans for compliance with OSHA requirements. He will develop a Health and Safety plan for CDM and NYSDEC employees, handle over-sight activities, evaluate the performance of health and safety officers and maintain required health and safety records. He will report to the Program Manager.

The Health and Safety Site Supervisor/Coordinator will be responsible for ensuring that the Health and Safety Plan is implemented during field activities and that a copy of the site-specific Health and Safety Plan are maintained at the site at all times. He/she is also responsible for upgrading or downgrading personnel protection based on actual conditions at the time of the investigation. The Coordinator must also present an overview of the Health and Safety Plan to field personnel prior to initiating any field activities and is responsible for insuring that field personnel sign off on this plan. He/she will contact the Program Health and Safety Officer if any questions or issues arise during the field activities that he/she cannot answer.

2.3 Subcontractors

The following subcontractor services may be required as part of the site investigations and performed by subcontractors under CDM's supervision:

- Geophysical Survey
- Geoprobe Installation
- Drilling
- Well Installation
- Groundwater Sampling
- Chemical Analytical Services
- Site Survey
- Investigation Derived Waste Removal

Section 3
Field Procedures

CDM's points of contact for the field investigation are the Site Manager and the onsite NYSDEC representative. Any minor changes in sampling activities that are within the proposed scope of the project will be documented each day in the field logbook and signed by both representatives. Any modifications that are inconsistent with the approved work plan are to be approved by NYSDEC prior to implementation.

3.1 Documentation (Field Log Book)

Information recorded in field log books include observations, data, calculations, time, weather, description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain descriptions of wastes, biota, geologic material, and site features including sketches maps, or drawings as appropriate.

3.1.1 Preparation

In addition to this QAPP, site personnel responsible for maintaining logbooks must be familiar with other site specific standard operating procedure (SOPs). These should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation.

Prior to use in the field, each logbook should be marked with a specific control number. The field notebook will then be assigned to an individual responsible for its care and maintenance.

Field logbooks will be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. The following information will be recorded inside the front cover of the logbook:

- Field logbook document number
- Activity (if the log book is to be activity-specific)
- Person and organization to whom the book is assigned, and phone number(s)
- Start date

3.1.2 Operation

The following is a list of requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the log book. If data collection forms are specified by an activity-specific plan, this information need not be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.

- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.

- Do not erase or blot out any entry at any time. Before an entry has been signed and dated, any changes may be made but care must be taken not to obliterate what was written originally. Indicate any deletion by a single line through the material to be deleted.

- Do not remove any pages from the book.

- Record as much information as possible.

- Specific requirements for field logbook entries include:

    - Initial and date each page.
    - Initial and date all changes.
    - Multiple authors must sign out the logbook by inserting the following:

- Above notes authored by:

    - (Sign name)
    - (Print name)
    - (Date)

- A new author must sign and print his/her name before additional entries are made.

- Draw a diagonal line through the remainder of the final page at the end of the day.

- Record the following information on a daily basis:

    - Date and time
    - Description of activity being conducted including station (i.e., well, boring, sampling location number) if appropriate
    - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
    - Level of personnel protection to be used

Entries into the field logbook will be preceded with the time (written in military units) of the observation. The time should be recorded at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form. In these cases, the logbook must reference the automatic data record or form.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities.
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personnel protection equipment.

3.1.3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks, copies of completed pages will be made periodically (weekly, at a minimum) and submitted to the project manager. Documents that are separate from the logbook will be copied and submitted regularly and as promptly as possible to the project manager. This includes all automatic data recording media (printouts, logs, disks or tapes) and activity-specific data collection forms required by other SOPs.

At the conclusion of each activity or phase of site work, the individual responsible for the log book will ensure all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook will be submitted to the records file.

3.2 Sample Collection, Documentation and Identification

The following procedures describe proper sample collection, and documentation to be included in field notebooks. Documentation includes describing data collection activities, logging sample locations, sample IDs, container labeling and chain-of-custody forms. Procedures for sample classification to insure proper labeling of samples are also included.

3.2.1 Responsibilities

The field manager and/or field technician is required to oversee drilling of the boreholes, collection of vapor, groundwater, and air samples, fill out field book logs, submit samples for analysis, COC forms and labeling of any waste-containing drums, if required. Also, the field manager and/or field engineer is required to adhere to the Site-Specific Health & Safety Plan. Field book entries should state starting time of monitoring, equipment used and results.

3.2.2 Sample Collection

3.2.2.1 Water Samples

- VOCs, if analyzed, are to be sampled first. Pour water slowly into the 40-ml vial, tipping the vial and allowing water to run down the side to prevent aeration. Fill until a meniscus forms and tightly seal the vial. Invert the vial and check for bubbles. If bubbles are present, add water and repeat. It may be necessary to discard the vial and use another if bubbles continue to appear.

- Remaining bottles should then be filled, again preventing aeration.
- If filtering is required (filtering is sometimes requested when samples are to be analyzed for metals and turbidity is high), use a dedicated 0.45 micron filter for each sample and filter prior to preservation.
- Label bottles with sample designation, project, date, time, preservative and required analysis. Clear tape may be used to cover the completed label.
- Place sample in a cooler with ice to maintain temperature at 4°C +/- 2°C. Samples will be maintained at this temperature throughout the sampling and transportation period. Chain of Custody and shipping procedures are discussed in See Section 3.3.

3.2.2.2 Soil/Sediment/Sludge Samples

- VOCs, if analyzed, are to be sampled first. Fill the jar completely such that there is no air space. VOCs must not be homogenized.
- For the remaining parameters, homogenize the samples with a decontaminated stainless bowl (Section 3.12) and trowel prior to filling the remaining bottles. Use of dedicated disposable trowels is permitted.
- Label bottles with sample designation, project, date, time, preservative and required analysis. Clear tape may be used to cover the completed label.
- Place sample in a cooler with ice to maintain temperature at 4°C +/- 2°C. Samples will be maintained at this temperature throughout the sampling and transportation period. Chain of Custody and shipping procedures are discussed in Section 3.3.

3.2.2.3 Soil Vapor/Ambient Air Samples

- Soil Vapor samples will be collected with 1.4-liter summa canisters, with 2-hour flow controllers (regulators) and particulate filters (if required). Flow rate shall not exceed 200 ml/min.
- Sub slab soil vapor samples will be collected with 6-liter summa canisters, with 24-hour flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.
- Soil Vapor samples will be collected with 6-liter summa canisters, with flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.
- Indoor and outdoor ambient air samples will be collected with 6-liter summa canisters, with flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.

- Instantaneous grab samples may also be collected, as permitted by NYSDEC.
- Record vacuum prior to and at conclusion of sampling. Prior to sampling, vacuum should be 28-30 inches.
- At conclusion of sampling, vacuum should be 5 inches Hg +/- 1 inch Hg.
- Label summa canister and prepare for shipping. Summa canisters are not chilled or otherwise preserved.

3.2.3 Field Notebooks

Complete thorough notes of all field events are essential to a timely and accurate completion of this project. The field manager and/or field engineer is responsible for accounting for particular actions and times for these actions of the subcontractor while in the field. Also, identification (numbers and description) of field samples duplicates samples, and blank samples should also be noted in the field book. For a particular workday, the field book should contain the following:

- Field personnel name, contractors name, number of persons in crew, equipment used, weather, date, time, and location at start of day (boring number).
- Sample identification number, depth, amount of sample recovery, PID readings and soil descriptions.
- Description of any unusual surface or subsurface soil conditions
- Record of Health and Safety monitoring; time, equipment and results
- Record of site accidents or incidents
- Record of any visitors
- Potential of delays
- Materials and equipment used during borehole installation
- Final daily summary of work completed including list of samples obtained
- Completion of daily QA/QC log sheet
- Contractor downtime, decontamination time, equipment breakdowns, movement tracking throughout the day, etc.
- Any other data that may be construed as relevant information at a later date.

The field logs should confirm the subcontractor's data. Field notes should be photocopied weekly and returned to the project manager.

If a borehole is completed as a monitoring well, simply note this on the form, and complete the monitoring well log. Examples of completed boring logs should be reviewed and adequate blank log forms obtained.

Monitoring well logs are required in addition to the boring log form if the borehole is completed as a monitoring well. These are to be completed in the field after a monitoring well is installed. They should include data such as screen length, riser length, materials used, etc. Examples of monitoring well logs should be reviewed and adequate blank log forms obtained.

3.2.4 Drum Labeling

Labeling of drums is essential for tracking hazardous materials. The responsibility of the contractor is to collect, handle, and store the drums, but the responsibility of field personnel is to label these drums appropriately. There is a significant cost implication if drums are not property labeled. Unknown material must be disposed of as hazardous waste if any hazardous waste is found on-site.

The following drum labeling procedures are to be adhered to:

- Field staff shall secure packing list envelopes to the side of the drum(s) at the completion of a boring.

- Field staff shall print with an indelible marker on information cards all information pertaining to the contents of the drum(s). If more than one drum is collected from the same borehole, each information card shall be numbered sequentially in parenthesis starting with the number one after the boring number. The information shall include:

    - Program Area
    - Boring No.(s)
    - Date collected
    - Description of contents (i.e., soil cuttings, well water, etc.)
    - Amount of water (specify in inches)
    - Fullness of drum (not including free liquid, specify in fractional form)

- Field staff shall insert information card into packing list envelope. The packing list envelope shall be sealed at this time.

- Field staff shall record in field book all information pertaining to the contents of the drum that was printed on the information card.

- Program manager, upon receipt of the analytical data for the drums, shall prepare a summary table of the analytical results on a weekly basis, and provide the designated coordinator.

- Based on the tabulated information the designated coordinator will determine and prepare the appropriate storage labels required:
  - Hazardous Waste label
  - Non-hazardous label
- The designated coordinator will fill out these labels.
- Field staff shall attach these labels to the appropriate drums. If the information cards inside the packing list envelopes are damaged, they shall be reprinted at this time.

It is noted that waste material is expected to be transported off-site during excavation. No investigation derived wastes are expected to be drummed.

3.2.5 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). The sample identification for all samples will begin with the Site ID for the site.

The following terminology shall be used for the **soil** sample identification:

SITE ID - BORING/SAMPLE LOCATION ID – DEPTH

The sample ID for the soil vapor and groundwater samples will then include the sample type designation, followed by the sample number. The following terminology shall be used for the **soil vapor** sample identification:

SITE ID - SV- #
SITE ID – SV - #

Where there are shallow and deep samples at a location, the shallow samples will be designated "S" and the deep samples designated "D".

The following terminology shall be used for the **groundwater** sample identification:

SITE ID - MONITORING WELL ID - DEPTH (for monitoring well samples)
SITE ID – GW - BORING ID - DEPTH (for temporary well point or hydro-punch samples)

For sub-slab and indoor air samples, the site ID will be followed by the sample type designation, the sample number and then the date. The following terminology shall be used for the **structure** sample identification:

SITE ID-SS-xx-DATE (for sub-slab locations)

SITE ID-IA-xx-DATE (for indoor ambient air)
SITE ID-A-xx-DATE (for outdoor ambient air)

Field blank and **trip blank** samples will be designated as follows:

SITE ID-FB-DATE (for field blanks)
SITE ID-TB-DATE (for trip blanks)

Field **duplicates** will be designated by using the next consecutive sample number for the site.

3.3 Chain-of-Custody Procedures

This section describes the procedures used to ensure that sample integrity and chain-of-custody are maintained throughout the sampling and analysis program. Chain-of-custody (COC) procedures provide documentation of sample handling from the time of collection until its disposal by a licensed waste hauler. This documentation is essential in assuring that each sample collected is of known and ascertainable quality.

The COC begins at the time of sample collection. Sample collection is documented in the field notebooks in accordance with the specified SOP. At the same time, the sampler fills out the label on the sample container with the following information:

- Sample ID code
- Required analyses
- Sampler initials
- Date and time of sample collection

3.3.1 Chain-of-Custody Forms

The COC forms are a paper trail system that follows the samples collected and indicates which laboratory analyses are to be performed on which samples. Each sample should be clearly labeled and listed on the COC. The laboratory will only perform analyses on samples indicated and all other samples should be indicated with a "HOLD" designation. By labeling a sample "HOLD", the laboratory will store the sample until further instruction is given. Do not check the request for analysis blocks on the COC for samples designated with "HOLD" Status. Never indicate duplicate or blank samples on a COC.

It is the responsibility of the field manager to coordinate COC forms and supply copies of all COC to the project manager for data management use.

A COC form is filled out for each sample type at each sampling location. Each time the samples are transferred to another custodian or to the laboratory, the signatures of the people relinquishing the sample and receiving the sample, as well as the time and date, are documented. Labels will be filled out with an indelible, waterproof, marking pen.

3.3.2 Chain-of-Custody Records

The COC record is a three-part form. The laboratory retains the original form and the person relinquishing the samples keeps a copy of the form at the time of sample submittal. This form is then returned to the project manager or person in charge of data coordination.

The COC Record will be placed in a Ziplock bag and placed inside of all shipping and transport containers. All samples will be hand delivered or shipped by Federal Express to the laboratory specified by the field manager. Samples should be packed so that no breakage will occur (e.g. placed upright in the cooler surrounded by packing materials). Sample vials may be placed on their sides if frozen. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

3.4 Field Quality Control Samples

In order to maintain QA/QC in both the field and the laboratory, additional samples such as trip blanks, duplicates, field blanks, performance evaluation samples and background samples will be collected. Each type of QA/QC sample is described below. Details of the QA/QC samples collected will be provided to the project data validator for use in their evaluation.

3.4.1 Quality Control for Soil Sampling

Approximately twenty percent of all soil samples analyzed should be QA/QC samples. These samples act as a verification of appropriate field and laboratory procedures. These samples should be recorded in the field book but should not be identified on the Chain-of-Custody (COC) form other than with an MD (Miscellaneous Discrete). All QA/QC samples should be numbered sequentially with other field samples on the soil log form. The following is a breakdown of types of QA/QC samples that are to be taken:

3.4.1.1 Duplicate Samples

Approximately ten percent of all soil samples analyzed should be duplicate samples. Soil duplicates shall be field-homogenized samples. To ensure laboratory "blind" analyses, duplicate samples will be identified with the next sequential sample number on sample containers and the COC forms. The actual identification of the duplicate samples shall be recorded in the field book. Duplicate samples are collected from the same split spoon sampler, homogenized in the field and analyzed for the same compounds.

3.4.1.2 Field Blanks

Approximately two percent of all soil samples analyzed should be field blanks. Rinsate blanks are collected after a sample is taken and the equipment used (i.e., split spoon sampler) has been decontaminated. Distilled water is then poured over the decontaminated sampling equipment and collected in sample jars for analysis. It

should be documented in the field book which soil sample preceded the field blank and which soil sample followed the field blank for the equipment used.

3.4.2 Quality Control for Soil Vapor and Air Sampling

Approximately five percent of all soil vapor (including sub-slab soil vapor) samples analyzed should be duplicate samples. Soil vapor duplicates will be collected in a manner so that the sample and duplicate are being collected simultaneously from the same sample location. One duplicate indoor air sample will be collected per site where indoor air sampling is being conducted. Duplicate outdoor air samples will be collected only at the sites where indoor air sampling is also being conducted. Duplicate samples are analyzed for the same compounds. All summa canisters must be certified to be free of contaminants in accordance with QA/QC protocol.

3.4.3 Quality Control for Groundwater Sampling

Approximately twenty percent of all groundwater samples analyzed should be QA/QC samples. These samples act as a verification of appropriate field and laboratory procedures. These samples should be recorded in the field book but should not be identified on the COC form as a QA/QC sample. All QA/QC samples should be numbered sequentially with other field samples. The following is a breakdown of types of QA/QC samples that are to be taken:

3.4.3.1 Duplicate Samples

Approximately five percent of all groundwater samples analyzed should be duplicate samples. To ensure laboratory "blind" analysis, duplicate samples will be recorded with the well I.D. number and the next sequential sample number on sample containers and the COC forms. Duplicate samples are collected from the same bailer and analyzed for the same compounds.

3.4.3.2 Trip Blanks

Each cooler packed and shipped for aqueous VOC analysis should also contain a trip blank. Trip blanks are VOA vials filled with distilled water. These pre-filled vials are to be carried with the sample bottles and samples and should remain sealed the entire time. It should be documented in the field book which aqueous samples were collected and transported with the trip blank.

3.4.3.3 Field Blanks

One field blank sample will be collected per day of sampling. Field blanks are collected after a sample is taken and the equipment used (i.e., bailer) has been decontaminated. Distilled water is then poured over the decontaminated sampling equipment and collected in sample jars for analysis. It should be documented in the field book which groundwater sample preceded the field blank and which sample followed the field blank for the equipment used.

3.5 Premobilization

Prior to initiating fieldwork, the following preparatory activities will be completed:

- Project mobilization.
- Utility clearance and permitting. The drilling subcontractor is responsible for contacting the appropriate local utility or "one-call" service to locate subsurface and aboveground utilities in the vicinity of the soil gas survey area.
- Site specific issues resolved.
- Sample analysis will be scheduled with the laboratory.
- Appropriate sample containers and preservatives for the various sample parameters will be obtained. Extra containers will be obtained to account for possible breakage.
- Field blank water will be obtained from the laboratory performing the analysis.
- Necessary field sampling and monitoring equipment will be obtained. Prior to use, the equipment will be checked to confirm that it is in good working condition, properly calibrated, and decontaminated. **The field equipment for the procedures detailed in Sections 3.6 through 3.27 is listed in Table 3-1.**
- Materials necessary for personal protection and decontamination will be obtained.
- Coordinate with subcontractors.

3.6 Direct Push Groundwater Sampling

3.6.1 Macro Core Sampling

Direct push methods will be used to collect 48 or 60-inch macro-core samples continuously at each of the groundwater sample locations. The samples will be used by the CDM engineer to determine the depth to groundwater at each location. Once saturated soil is verified, a screen point groundwater sampler will be set approximately 5 feet into the water table. The depth to water will be used to determine the depth of the soil vapor probes.

Table 3-1
Equipment List

Equipment List \ Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
¼-inch flush mount hex socket plug, Teflon coated			x																			
¼-inch OD Teflon tubing	x	x	x				x															
¼-inch outside diameter (OD) stainless steel tubing			x																			
¼-inch Swagelock™ female and male connector			x																			
½- to ¾-inch braided nylon line or Teflon-coated wire rope									x		x	x										
1.4 or 6 Liter summa canisters	x	x	x	x	x																	
1-gallon buckets with foam along the rim	x	x																				
5-gallon bucket							x	x	x	x											x	x
60 cm^3 syringe	x	x	x																			
6-ft Engineers Scale																	x					
Aluminum foil												x									x	
Anchoring cement			x																			
Auger, rotary, air hammer or other drilling method (provided by subcontractor)																	x	x				
Bailer (sampler) and rope or wire line								x	x		x											
Boat (as needed for deep water)												x										
Bricks (or equivalent)	x																					
Camera	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cement (to patch floor)		x																				
Check valve																			x			
Clear waterproof tape												x										
Composite Liquid Waste Sampler (COLIWASA) or sample thief for liquid sampling in a container															x							
Coolers/Sample shipping containers with ice packs						x	x		x	x	x	x	x	x	x			x			x	x
Core Barrel (provided by subcontractor)																	x					
Data logger and laptop																x			x			
Decontamination supplies						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Direct-push drill rig or rotary drill rig (for split-spoon/split barrel or direct push sampling)													x									
Discharge Hosing/piping								x											x			
Electrical conduit putty or modeling clay		x	x																			
Field parameters meters (Temperature, conductivity, pH, dissolved oxygen, Redox, turbidity)							x		x	x	x							x				
Flow meter with totalizer																		x	x			
Generator/electric supply source							x	x											x			
Hammer Drill with 1.25-inch bit		x																				
Hammer Drill with 3/8,1-inch bit			x																			

Table 3-1
Equipment List

Equipment List / Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
Hand auger and extension rods (for manual sampling)												x	x									
Helium, regulator and detector	x	x																				
Indelible black ink pen or marker	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x				
Inflatable Packers (provided by subcontractor)																		x				
Kimwipe or paper towels						x	x	x	x		x	x	x	x	x	x					x	x
Labels and shipping products	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x		x			x	x
Large, wide-mouth breakers for measuring field parameters							x		x	x	x							x				
Lift pipe (provided by subcontractor)																		x				
Logbook	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
low-flow air pump	x	x	x																			
low-flow groundwater pump							x															
Nitrogen																		x				
Personal protective equipment per Health and Safety Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Photoionization detector (PID)	x	x	x			x	x		x	x		x	x	x	x			x				
Plastic Zip-top bag									x	x		x	x	x							x	x
Polyethylene or plastic sheeting						x	x	x	x		x	x	x	x	x			x		x	x	x
Ponar sampler/ Eckman grab												x										
Pond sampler											x											
Pressure Gauges																		x				
Sample containers and preservatives (supplied by laboratory)						x	x		x	x	x	x	x	x	x			x				
Sampling port/valve																		x	x			
Scale																					x	x
Slide Hammer with extension rods (for manual sampling)													x									
Stainless steel push tubes (as needed)												x										
Stainless steel trowels, spoons, pan, tray, or bowls												x	x	x	x							
Stop watch										x									x			
Submersible pump								x										x	x			
Surveyor's stand (or equivalent to place canister on)				x																		
Tap and deionized water						x			x		x	x	x	x	x	x	x	x				
Tape Measure (100+ ft)	x	x	x	x	x	x	x				x	x	x	x				x	x		x	x
Locating device (GPS)	x	x	x	x	x	x	x		x		x	x	x	x			x	x		x		
Tedlar™ sample bags	x	x	x																			
Teflon thread tape			x																			
T-handle (extension rod) and hand auger													x									
three-way valve	x	x	x																			
trowel or putty knife			x																			
Tubing cutter	x	x	x				x	x														
Water level indicator						x	x	x	x							x		x	x			

Table 3-1
Equipment List

Equipment List \ Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
Water spray bottle						x	x				x	x	x	x	x							
Water storage container (if necessary)					x	x	x											x	x			
Wrenches and pliers	x	x	x	x	x		x	x	x				x									

3.6.2 Purge and Sampling

Standard purge techniques will be utilized to purge and sample groundwater. Standard purge and sampling techniques consist of using a check valve and tubing to purge the well at a low flow rate. The check valve intake is set approximately in the middle of the screen. The well is purged at the low rate until the water flows clear or the turbidity is reduced to 50 nephelometric turbidity units (NTUs) or less or to a level deemed acceptable by NYSDEC. The sample is then collected directly from tubing or bailer.

3.6.3 Groundwater Sampling Procedure

Personal protective equipment will be donned in accordance with the requirements of the Site Health and Safety Plan (HASP).

- Assemble the screen point groundwater sampler.
- Attach the Mill-slotted screen point groundwater sampler, onto the leading probe rod.
- Thread the drive cap onto the top of the probe rod and advance the sampler using either the hydraulic hammer or hydraulic probe mechanism. Replace the 30-centimeter (cm) rod with the 90-cm rod as soon as the top of the sampler is driven to within 15 cm of the ground surface.
- Advance the sampler to the interval to be sampled using the hydraulic hammer. Add additional probe rods as necessary to reach the specified sampling depth.
- Move the probe unit back from the top of the probe rods and remove the drive cap.
- Attach the pull cap to the top probe rod, retract the probe rods, push the screen into the formation, remove extension rods from the probe rods, and measure and record the water level, allowing time for the water level to reach equilibrium.
- Purge the groundwater until the water flows clear or the turbidity has been reduced to 50 NTUs or less. If the well is purged dry, the sample may be collected after the well recharges.
- Collect the samples using a check valve and flexible tubing system or a dedicated bailer.
- Label and store samples. Samples will be preserved, labeled, and placed immediately into a cooler and maintained at 4°C throughout the sampling and transportation period. Samples should be labeled, recorded on the chain-of-custody and shipped according to the proper procedures. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

3.7 Soil Vapor Sampling

Soil vapor sampling will be conducted in accordance with the NYSDOH *"Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006"* and the NYSDEC *"Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002".*

3.7.1 Soil Vapor Probe Installation

A Soil vapor probe installation at all locations will be performed according to the following procedures:

- At each location, a Geoprobe will be used to drive stainless steel rods equipped with detachable stainless steel drive points to the desired depth (approximately 8 feet bgs).
- Once the probe is in place, retract the drive rod slightly to expose a 6-inch sampling screen and sampling port. Insert Teflon-lined tubing through the rods and attach it to the soil gas probe just above the tip.
- Seal the probe at the surface using electrical conduit putty or non-shrink bentonite grout.
- The borehole will then be backfilled with sand to a minimum depth of 6 inches above the screen interval.
- Bentonite slurry will then be placed from approximately 6 inches above the screen to the ground surface and immediately hydrated. The bentonite will be allowed to set-up for a minimum of 24 hrs.
- Repeat steps 1 through 4 at a second co-located borehole to the second depth (~2 feet above the water table).

3.7.2 Tracer Testing

Tracer tests will be conducted at all soil vapor locations to verify the integrity of the soil vapor probe seal. Tracer tests will be conducted according to the following procedures:

- Set up the tracer test apparatus by first sealing the open area around the tubing with wax or bentonite.
- A bucket is then placed upside down over the borehole with the tubing coming out through a hole at the top.
- Helium will then be injected through a hole near the bottom of the bucket to enrich the atmosphere to at least 80 percent helium. The concentration of helium

inside the bucket will be monitored by a helium detector located at a second hole near the bottom of the bucket.

- Once the atmosphere is enriched to the appropriate concentration, the helium detector will then be used to check the concentration coming out of the tubing from the borehole located at the top of the bucket. If the reading is below 10 percent tracer gas, the probe seal is sufficient; proceed with sampling, as described in the following sections. If the reading is above 10 percent tracer gas, the probe seal is not sufficient; reseal the probe surface with bentonite and repeat the tracer test until the reading is below 10 percent tracer gas.

3.7.3 Soil Vapor Sampling Procedures for Offsite Analysis

Once the soil gas probe is installed and a tracer test is conducted, soil gas samples for off site analysis will be collected according to the following procedures:

- The soil vapor samples will be collected using a laboratory-certified clean summa canister with a two-hour regulator ensuring that the sample flow rate less than 200 milliliters per minute (ml/min) to minimize outdoor air infiltration during sampling. The summa canisters will have a vacuum of 28 inches mercury (in Hg) ± 2 inches prior to the collection of the soil vapor sample.

- Calculate the volume of the tubing including the screen interval as part of the volume. The tubing has an inside diameter of ¼ inch and a volume of 9.65 ml/foot.

- Attach the vacuum pump and purge at least 3 tube volumes from the tubing. Syringes will be utilized to purge the tubing if obtaining a flow rate of 200 ml/min is difficult with vacuum pump.

- A Tedlar™ bag will be filled toward the end of the purge volume to be screened using the PID meter. The PID readings will be observed and recorded on the appropriate field form.

- After purging is complete, the tubing will be connected to the summa canister.

- Record the initial pressure in the stainless steel summa canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 inches Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.

- Connect the end of the tubing directly to the summa canister intake valve.

- Collect the sample into the summa canister, which will be provided by CDM's laboratory. An additional canister and regulator will be ordered as backup. Sample flow rate will not exceed 200 ml/min.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the summa canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

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

  - sample identification.
  - date and time of sample collection
  - sampling height
  - serial numbers for summa canisters and regulators
  - sampling methods and devices
  - purge volumes
  - volume of soil vapor extracted
  - vacuum of summa canisters before and after sample collection
  - apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
  - chain of custody protocols and records used to track samples from sampling point to analysis.

It is critical to ensure that moisture does not enter the summa canister which can compromise the analytical results.

3.8 Temporary Port Sub-Slab Soil Vapor Sampling Procedures for Offsite Analysis

Sub-slab soil gas samples for off site analysis will be collected according to the following procedures:

- Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

- After the slab has been inspected and the location of any subsurface utilities determined, the ambient air surrounding the proposed sampling location will be screened with a PID.
- A hammer drill with a 1.25-inch diameter drill bit will be used to advance a boring to a depth of approximately three to six inches beneath the slab. When drilling is complete, clean around drilled area.
- Insert probe constructed with 3/8-inch outer diameter, ¼-inch inner diameter Teflon® tubing. The tubing should not extend further than 2 inches into the sub-slab material
- The annular space between the borehole and the sample tubing will be filled and sealed with electrical conduit putty (or equivalent) at the surface.
- Conduct tracer testing in accordance with the procedures detailed in Section 3.7.2 above.
- The tubing will be connected to a low-flow sample pump. A three-way valve will be used to allow purging of all the lines. Flow rates for both purging and collection must not exceed 200 milliliters per minute to minimize the ambient air infiltration during sampling.
- Approximately 1 liter of gas will be purged from the subsurface probe and captured in a Tedlar™ bag using the low-flow pump. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form.
- Record the initial pressure in the stainless steel SUMMA canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 inches Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.
- The end of the tubing will be connected directly to the summa canister's regulator intake valve via the three-way valve. Flexible silicone tubing will be used at a minimum and as a tubing adapter only. The sample shall be collected with a 6 Liter laboratory-certified summa canister with dedicated regulator set for a 24-hour sample collection.
- Collect the sample into the Summa canister, which will be provided by CDM's laboratory. An additional canister and regulator will be ordered as backup. Sample flow rate will not exceed 200 ml/min.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the SUMMA canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

- Remove the sample port and patch the floor with concrete.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

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

- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and

between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

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

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- soil vapor purge volumes,
- volume of soil vapor extracted,
- if canisters used, vacuum of canisters before and after samples collected,
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.9 Permanent Port Sub-Slab Soil Vapor Sampling Procedures for Offsite Analysis

Sub-slab soil gas samples for off site analysis will be collected from permanent sub-slab ports according to the following procedures:

- Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

- After the slab has been inspected and the location of any subsurface utilities determined, the ambient air surrounding the proposed sampling location will be screened with a PID.

- A hammer drill with a 3/8-inch diameter drill bit will be used to drill an inner pilot hole into the concrete slab to a depth of approximately two inches.

- Using the pilot hole as the center, drill an outer hole to an approximate depth of 1 3/8 inch using the one-inch diameter drill bit.

- Clean any cuttings out of the hole.

- Using the 3/8 inch drill bit, continue to drill the pilot hole through the slab and several inches into the sub-slab material.

- Assemble the stainless steel probe:

  - Determine the length of stainless steel tubing required to reach from the bottom of the outer hole, through the slab, and into the open cavity below the slab. To avoid obstruction of the probe tube, insure that it does not contact the sub-slab material.
  - Attach the measured length of ¼-inch OD stainless tubing to the female connector with the swagelock™ nut and tighten the nut.
  - Insert the ¼-inch hex socket plug into the female connector. Tighten the plug. Do not over tighten.
  - Place the completed probe into the outer hole. The probe tubing should not contact the sub-slab material and top of the female connector should be flush with the surface of the slab and centered in the outer hole.
  - Fill the space between the probe and the inside of the outer hole with anchoring cement and allow to cure.

- Wrap one layer of Teflon thread tape onto the NPT end of the male connector

- Remove the ¼-inch hex socket plug from the female connector

- Screw and tighten the male connector into the female connector.

- A length of Teflon tubing is attached to the probe assembly and connected to the sample system using for purging and sample collection.

- A three-way valve will be used to allow purging of all the lines. Flow rates for both purging and collection must not exceed 100 milliliters per minute to minimize the ambient air infiltration during sampling.

- Purge at least 3 volumes from the subsurface probe and captured in a Tedlar™ bag using a 60 cc syringe. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form.

- Record the initial pressure in the stainless steel summa canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 in Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.

- The end of the tubing will be connected directly to the SUMMA canister's regulator intake valve via the three-way valve. Flexible silicone tubing will be used at a minimum and as a tubing adapter only. The sample shall be collected with a 6 Liter laboratory-certified summa canister with dedicated regulator set for a 24-hour sample collection.

- Collect the sample into the summa canister, which will be provided by the subcontracted laboratory.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the summa canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

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

- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

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

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- soil vapor purge volumes,
- volume of soil vapor extracted,
- if canisters used, vacuum of canisters before and after samples collected,
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.10 Indoor (Ambient) Air Sampling Procedures for Offsite Analysis

All indoor air samples will be collected with a 6 Liter laboratory-certified summa canister regulated for a 24-hour sample collection. Sample collection will be similar to outdoor ambient air sample collection. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at four or six feet above the floor. Personnel should avoid lingering in the immediate area of the sampling device while samples are being collected.

The New York State Department of Health *Indoor Air Quality Questionnaire and Building Inventory* shall be completed for each structure where indoor air testing is being conducted. The following actions should be taken to document conditions during indoor air sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current uses and storage of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- a product inventory survey documenting sources of volatile chemicals present in the building during the indoor air sampling that could potentially influence the sample results should be completed;

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system supply and return registers, compass orientation

(north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;
- weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and
- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

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

- sample identification,
- date and time of sample collection,
- sampling height,
- identity of samplers,
- sampling methods and devices,
- volume of air sampled,
- vacuum of canisters before and after samples collected, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.11 Outdoor (Ambient) Air Sampling Procedures for Offsite Analysis

All outdoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection using a 6 Liter summa canister. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at four or six feet above the ground.

Personnel will avoid lingering in the immediate area of the sampling device while samples are being collected. Ambient air samples will be collected in a location of as far away as possible from any boring or dust generating activities.

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

- Outdoor plot sketches will be drawn that include the building site, area streets, ambient air sample locations, the location of potential interferences, compass orientation, and paved areas.

- Weather conditions (e.g. precipitation, temperature, wind direction and barometric pressure)

- Any pertinent observations, such as odors, reading from field instruments, and significant activities in the vicinity (e.g. operation of heavy equipment) will be recorded.

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

- sample identification,
- date and time of sample collection,
- sampling height,
- identity of samplers,
- sampling methods and devices,
- volume of air sampled,
- vacuum of canisters before and after samples collected, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.12 Decontamination

All non-dedicated, non-disposal sampling equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Unless disposable sampling equipment is used, the equipment will be decontaminated by the following procedure:

- Wash with the non-phosphate detergent
- Tap water rinse
- Deionized water rinse
- Air dry and wrap in aluminum foil, shiny side out

Additional cleaning of the drilling equipment with steam may be needed under some circumstances if elevated levels of contamination appear to be present using field monitoring equipment or visible stained soils. Decontamination fluids will be discharge to the ground surface unless visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be contained in a 55-gallon drum, staged and properly disposed.

3.13 Investigative Derived Waste

Soil cuttings and purge water will be placed and dispersed on the ground unless visible contamination or elevated PID readings are observed. If contamination is present, investigative derived waste (IDW) will be contained and analyzed to determine the appropriate disposal methods.

3.13.1 Waste Sampling

Waste classification sampling will occur before the completion of site investigation activities. Representative soil samples (5 grab samples) will be collected from waste containers with a decontaminated stainless steel trowel. The aliquots will be homogenized in a stainless steel bowl and transferred to the sample container(s) for subsequent analysis. Grab samples will be collected from each container containing aqueous wastes.

The requirements for waste characterization will be determined by the disposal facility. The containers of waste will be stored in an area designated by NYSDEC until the analytical results are received and the waste can be characterized for disposal.

3.13.2 Waste Sampling Procedure

Soil Waste

- Scan the sample with the OVM and record readings.
- Collect a sample of the soil from the container using a decontaminated stainless steel trowel in and place the sample in a stainless steel bowl. Homogenize the soil using the trowel. Several samples will be collected and homogenized in the steel bowl to represent each drum.
- Remove the cap from the container
- Fill the sample container as completely as possible by transferring the sample to the container immediately after collected the sample with a stainless steel trowel, and screening the sample with the OVM.
- Close the sample container tightly.
- Label the container and place it into in a cooler with bagged ice sufficient to cool the samples to 4°C.
- Maintain Chain-of-Custody forms for samples.
- Log the description and depth of the sample sent for analysis in the field book.
- Record field information and sample location, including measurements from fixed points in logbook.

Aqueous Waste

- Remove the cap from the drum containing the aqueous waste.
- Fill a sample container(s) as completely as possible by transferring liquid sample from the waste container to the sample container with the COLIWASA (or similar), and screening the sample with an OVM.
- Close the sample container(s) tightly.

- Place sample container(s) in cooler with bagged ice sufficient to cool the samples to 4°C.
- Maintain Chain-of-Custody forms.

3.14 Soil Boring Logs/Geoprobe

Geological logging includes keeping a detailed record of drilling (or excavating) and a geological description of materials on a prepared form. Geological logs are used for all types of drilling and exploratory excavations and include descriptions of both soil and rock. Accurate and consistent descriptions are imperative.

3.14.1 Log Form

When drilling in soils or unconsolidated deposits, the log should be kept on a standard Soil Boring Log Form. The following basic information should be entered on the heading of each log sheet:

- Project name and number
- Boring or well number
- Locations (approximate in relation to an identifiable landmark; will be surveyed)
- Elevations (approximate at the time; will be surveyed)
- Name of drilling contractor
- Drilling method and equipment
- Water level
- Start and finish (times and date)

The following technical information is recorded on the logs:

- Depth of sample below surface
- Sample interval
- Sample type and number
- Length of sample recovered
- Standard penetration test (ASTM-D1586) results if applicable
- Soil description and classification
- Graphic soil symbols
- PID readings

In addition to the items listed above, all pertinent observations about drilling rate, equipment operation, or unusual conditions should be noted. Such information might include the following:

- Size of casing used and method of installation
- Rig reactions such as chatter, rod drops, and bouncing
- Drilling rate changes
- Material changes
- Zones of caving or heaving

3.14.2 Soil Classification

The soil description should be concise and should stress major constituents and characteristics. Soil descriptions should be given in a consistent order and format. The following order is as given in ASTM D2488:

- Soil name. The basic name of the predominant constituent and a single-word modifier indicating the major subordinate constituent.
- Gradation or plasticity. For granular soil (sand or gravel) that should be described as well graded, poorly graded, uniform, or gap-graded, depending on the gradation of the minus 3-inch fraction. Cohesive soil (silts or clays) should be described as non-plastic, slightly plastic, moderately plastic, or highly plastic, depending on the results of the manual evaluation for plasticity as described in ASTM D2488.
- Particle size distribution. An estimate of the percentage and grain-size range of each of the soil's subordinate constituents with emphasis on clay-particle constituents. This description may also include a description of angularity. This parameter is critical for assessing hydrogeology of the site and should be carefully and fully documented.
- Color. The color of the soil using Munsell notation.
- Moisture content. The amount of soil moisture, described as dry, moist, or wet.
- Relative density or consistency. An estimate of density of a granular soil or consistency of a cohesive soil, usually based on standard penetration test results (see Table 3-2 and 3-3).
- Local geologic name. Any specific local name or a generic name (i.e., alluvium, loess). Also use of Unified Soil Classification System of symbols.

The soil logs should also include a complete description of any tests run in the borehole; placement and construction details of piezometers, wells, and other monitoring equipment; abandonment records; geophysical logging techniques used; and notes on readings obtained by air monitoring instruments.

- Additional data in sedimentary rocks includes:
  - Sorting
  - Cementation
  - Density or compaction
  - Rounding

The core should be logged as quickly as possible after removal from the hole. Some materials may degrade rapidly upon exposure, resulting in apparently poor rock, which was not actually present in the subsurface.

Check carefully each core end and try to determine if the fracture is natural or mechanical in origin. Mechanical fractures often can be identified by their orientation, the absence of secondary coatings or filling and slickensides, and its fit with the adjacent core piece. If doubt exists, consider it a natural fracture. If it is determined that the fracture is mechanical, ignore it and consider the two pieces of core as a single piece.

Table 3-2
Relative Density of Noncohesive Soil

Blows/Ft	Relative Density	Field Test
0-4	Very Loose	Easily penetrated w/ ½-inch steel rod pushed by hand
5-10	Loose	Easily penetrated w/ ½-inch steel rod pushed by hand
11-30	Medium	Easily penetrated w/ ½-inch steel driven with a 5- lb hammer
31-50	Dense	Penetrated one foot with a ½-inch steel road driven with 5-lb hammer
>50	Very Dense	Penetrated only a few inches with a ½-inch steel rod driven with a 5-lb hammer

Blows/Ft= Blows per foot
lb = pound

Table 3-3
Relative Consistency of Cohesive Soil

Blows/Ft	Consistency	Pocket Penetrometer (TSF)	Torvance (TSF)	Field Test
<2	Very Soft	<0.25	<0.12	Easily penetrated several inches by fist
2-4	Soft	0.25-0.8	0.12-0.25	Easily penetrated several inches by thumb
5-8	Firm	0.50-1.0	0.25-0.5	Can be penetrated several inches by thumb with moderate effort
9-15	Stiff	1.0-2.0	0.5-1.0	Readily indented by thumb but penetrated only with great effort
16-30	Very Stiff	2.0-4.0	1.0-2.0	Readily indented by thumbnail
>30	Hard	>4.0	>2.0	Indented with difficulty by thumbnail

TSF= Tons per square foot

3.15 Monitoring Well Installation

This section provides procedures for well design and well construction to aid in the development of drilling subcontracts. Drilling operation and well development guidelines are presented to aid the reader in the oversight of the installation of monitoring wells.

The principal reason that monitoring wells are constructed is to collect groundwater samples that, upon analysis, can be used to delineate a contaminant plume and track movement of specific chemical or biological constituents. A secondary consideration is the determination of the physical characteristics of the groundwater flow system to establish flow direction, transmissivity, quantity, etc. The spatial and vertical locations of monitoring wells are important. Of equal importance are the design and construction of monitoring wells that will provide easily obtainable samples and yield reliable, defensible, meaningful information. In general, monitoring well design and construction follows production well design and construction techniques. However, emphasis is placed on the effect these practices may have on the chemistry of the water samples being collected rather than on maximizing well efficiency.

From this emphasis, it follows that an understanding of the chemistry of the suspected pollutants and of the geologic setting in which the monitoring wells are constructed plays a major role in determining the drilling technique and materials used.

3.15.1 Well Siting

The following procedures should be followed:

- Review and be familiar with pertinent proposal sections, specifications, and subcontractor's contracts. Review and be familiar with any regulations governing how, where or when the well is drilled. Review and be familiar with data (supplied by the Client, or any other data available) used for program planning.

- Identify well site on a topographic map or other suitable project base map. Contact landowner at the beginning of well siting. Inquire whether the proposed drill locations will interfere with the landowner's established land use. Unless the property is owned by the client, the landowner is always contacted before entering the property, even if he is leasing back the property from the client.

- Check route to insure a drill rig can access the proposed well site. Plan routes that require the least disturbance of natural vegetation or natural countryside conditions and which would not require grading or other types of work by i.e., backhoes, etc.

- The well site should be reasonably level and absent of large boulders or other hazardous obstructions.

- Check to insure absence of buried high-pressure gas, oil or water lines. If any lines are present relocate the well site a safe distance away from them. Be sure to check with the subcontractor to insure his/her agreement.

- Check to insure absence of overhead power transmission lines. If any overhead power lines are present, relocate the well site a safe distance away from them. Be sure to check with the subcontractor to insure his/her agreement.

- Consult landowner about water source and access, and then notify the driller of these decisions.

- Explain to the driller the need for care and accurate retrieval of drill cuttings and, if necessary, placement and accounting of materials during well completion.

- If necessary, request access agreement to the well site.

3.15.2 Well Design

The following procedures should be followed:

- Examine the geophysical log and determine the exact interval(s) and depth(s) of the completion zone(s). Calculate the quantity of slotted casing or screen, blank casing, sealing materials, gravel pack and cement necessary to complete the well.

- Calculate the quantities of gravel pack, sealing materials and cement figuring the volume of the bore hole [borehole radius squared time the length of the borehole (r_B^2 x L)] minus the volume of the casing [radius of the casing squared times the length of the casing (r_C^2 x L)] which will yield the volume per linear foot.

  A cubic foot of silica sand weighs 100 pounds. Frequently silica sand is packaged in 100-pound sacks but should be purchased and delivered in bulk quantities. A five-gallon bucket is equal to 0.67 cubic feet. Dividing the determined or calculated volume between the well bore and the outside of the casing(s) into 0.67 cubic feet per bucket will yield approximately the number of feet per bucket of silica sand. Dividing the total interval of the intended gravel pack by the number of feet per bucket of gravel pack will yield approximately how many buckets of gravel will be required. This same method can be used if the silica sand arrives in 1-cubic foot sacks (100 pounds) except the final value is approximately the number of feet per sack of silica sand.

  Cement usually comes in 94 pound sacks and can be mixed in the field to obtain volumes between 0.88 cubic feet per sack to 1.50 cubic foot per sack. See Table 3-4 for the most common cement slurry mixtures.

  Clay seals are routinely placed in a well completion above the gravel or filter pack and below the cement or grout cap or plug. The clay seals are generally a bentonite clay and before swelling (in the borehole) has the form of ¼ inch to ½

inch pellets. The pellets generally come in plastic containers of 20 and 50 pounds but can also arrive in boxes or cloth sacks.

Table 3-4
Monitoring Well Grout

Water-Cement Ratio (Gallons water per sack)	Weight per Gallon of Slurry (pounds)	Volume of Mixture per sack (cubic feet)
7 1/2	14.1	1.50
7	14.4	1.43
6 1/2	14.7	1.35
6	15.0	1.28
5 1/2	15.4	1.21
5	15.8	1.14
4 1/2	16.25	1.08
4	16.50	1.00
3 1/2	17.35	0.95
3	18.1	0.88

The volume of the bentonite tablets needed for a specific seal thickness is calculated in the same manner as was done for the gravel pack and cement requirements.

Measure all materials twice during the well construction. First, when estimating the quantity of supplies needed for the completion, second, during well construction. Keep the first estimate in the daily log book record the actual (second measurement) intervals (tops and bottoms), quantity and type of materials placed in the well recorded on the appropriate forms.

3.15.3 Well Construction

The following procedures should be followed:

3.15.3.1 Final Design of Casing - Screen/Slotted Casing String(s)

If there is any doubt about the final design of the casing string, based on data from the pilot hole or the individual drill holes scheduled for completion, verify the design with the hydrogeologist in charge.

It is the rig hydrogeologist's responsibility to insure adequate supplies are maintained at each well site even though it may be the contractor's responsibility for supplying the materials.

3.15.3.2 Installing Casing (Slotted/Screen Casing String(s))

- Plastic or Polyvinylchloride (PVC) Casing - Join all 5 or 10 foot lengths of casing (blank and screen) by flush-joint threading. All pipe is to be cut with a cutting tool which leaves a smooth, square end.

- Both the hydrogeologist and the contractor keep a complete casing-slotted/screen casing string tally. Seal the bottom on the casing-slotted/screen casing string with a cap, glued and screwed permanently in place.

3.15.3.3 Installing Filter Material (Gravel Pack)

- Place the filter material downhole by gravity feed.

- The filter material shall be installed to levels pre-determined by the hydrogeologist. The exact depth for each well is determined from the final well design. However, generally the top of the filter material will be 5 feet above the top of the highest slotted/screened interval.

- Following placement of the filter material "sound" or "tag" this depth with the tremie pipe to insure it is at the prescribed level.

3.15.3.4 Installing Bentonite Pellet Seals (Blanket)

Following the installation of the filter material place a bentonite pellet blanket seal on top of the filter material to prevent contamination of the filter pack by the grout.

The actual amount of the annulus that is filled with bentonite pellets may vary from completion to completion but a minimum of 6 inches of the annulus should be filled with bentonite by gravity feed from the surface. The tremie pipe remains in the bore hold during gravity feed of the bentonite pellets. Calculate the exact volume of pellets needing placement.

3.15.3.5 Grouting

- Grout the annular space above the bentonite pellets as directed by the hydrogeologist.

- The grouted volume of annular space will vary from completion to completion, and sometimes within the same completion. Generally, if the annular space exceeds approximately 20 feet then the grouting is done in more than one stage. Take care to insure that the grout does not displace the bentonite seal or exceed (in weight) the collapse strength of the casing.

- The methods of mixing grout in the field are numerous. The first concern is that the slurry mixture is fluid enough for placement by tremie pipe and heavy enough to give the desired strength and sealing properties required. Reference the table from Halliburton Cementing Tables, 1979 or some other suitable source for the amount of water per sack, and then measure accurately into a large tub (water trough) or steel pit. Mix the correct number of bags of cement with the water at a rate which prevents, clotting or settling out of dry, unmixed cement. Usually this procedure is accomplished with a portable pump that sucks the water or cements mixtures in and then expels it under pressure through a hose that is used in a jetting fashion at the opposite end of the tank, pit or trough.

  Grout also can be mixed using a shovel or hoe. Generally, the grout is placed on the side of the tub, the bag is ruptured, and the cement is slowly added to the water. If the cement has hard spots place on a screen of approximately ¼ inch mesh attached to some type of frame that is placed across the mixing tub. The cement is then "filtered" for the larger; hard pieces or blocks.

- Pumping or Pouring Grout

  Place the mixed grout above the bentonite pellets. The time between placement of the bentonite pellets and the grout should not be less than 15 to 20 minutes. This allows the pellets to settle to the top of the gravel pack and to begin to swell, while not allowing the grout to harden.

  - The grout can either be pumped down the tremie pipe by same pump used for jetting or it can be poured by buckets through a funnel into the tremie pipe. Displacement of the bore hole fluid is almost certain because the grout slurry weighs more than the residual borehole fluid (10 or 11 pounds per gallon for the mud versus 14 to 18 pounds per gallon for the grout).

  - Except under rare circumstances, grout is never poured from the surface nor is it ever poured into standing water.

  - Grout the remainder of the hole by gravity feed from the surface as directed by the hydrogeologist. The quantity of grout placed from the surface should not exceed the collapse strength of the casing and should not be initiated prior to the curing of the grout seal above the bentonite pellets.

3.16 Monitoring Well Development

All completed wells, whether the production or monitoring type, must be developed in order to facilitate unobstructed and continuous groundwater flow into the well. Well development is the process of cleaning the fines from the face of the borehole and the formation near the well screen. During any drilling process the side of the borehole becomes smeared with drilling mud, clays or other fines. This plugging

action substantially reduces the permeability and retards the movement of water into the well screen. If these fines are not removed, especially in formations having low permeability, it then becomes difficult and time consuming to remove sufficient water from the well before obtaining a fresh groundwater sample because the water cannot flow easily into the well.

The development process is best accomplished for monitoring wells by causing the natural formation water inside the well screen to move vigorously in and out through the screen in order to agitate the clay and silt, and move these fines into the screen. The use of water other than the natural formation water is not recommended.

3.16.1 Development Methods

The following well development methods may be used including:

- Surge Block - A surge block is a round plunger with pliable edges such as belting that will not catch on the well screen. Moving the surge block forcefully up and down inside the well screen causes the water to surge in and out through the screen accomplishing the desired cleaning action. Surge blocks are commonly used with cable-tool drilling rigs, but are not easily used by other types of drilling rigs.

- Bailer - A bailer sufficiently heavy that it will sink rapidly through the water can be raised and lowered through the well screen. The resulting agitating action of the water is similar to that caused by a surge block. The bailer, however, has the added advantage of removing the fines each time it is brought to the surface and dumped. Bailers can be custom-made for small diameter wells, and can be hand-operated in shallow wells.

- Surging and pumping - Starting and stopping a pump so that the water is alternately pulled into the well through the screen and backflushed through the screen is an effective development method. Periodically pumping to the surface will remove the fines from the well and permit checking the progress to assure that development is complete.

Well development should continue until the water becomes free of sediment or contains sediment in a lesser amount than was initially present. Conductivity, pH, temperature and turbidity (as measured by a turbidity meter) of the development water must all have stabilized prior to ceasing development. Disposal of development water is site specific and should be discussed in the Sampling and Analysis Plan or Work Plan.

3.17 Low Flow Groundwater Sampling

Low-flow purge and sampling is appropriate at locations where disturbance of the media around the well screen needs to be minimized. A common concern is turbidity

in the monitoring wells and the consequent undesirable effects on metals sampling results.

The low-flow purge and sample method creates less disturbance and agitation in the well, and therefore excess turbidity is not generated during the purging and sampling process. The result is a more rapid stabilization of turbidity and other parameters (pH, temperature, specific conductivity, and dissolved oxygen), and a sample more representative of conditions in the formation is collected.

The low flow purge and sample method consists of using a submersible or bladder pump to purge the well at a very low flow rate (0.5 to 1.5 liter/minute). The pump intake is set approximately in the middle of the well screen, with a stagnant water column over the top of the pump. The well is purged at the low rate until the field parameters (temperature, pH, specific conductivity, turbidity, dissolved oxygen, and Eh) have stabilized. The sample is then collected directly from the pump discharge at a low flow rate.

- Check and record the condition of the well for any damage or evidence of tampering.
- Remove the well cap.
- Measure well headspace with a PID and record the reading in the field logbook. For wells installed on a landfill, also measure the headspace with a combustible gas indicator.
- Measure and record the depth to water with an electronic water level device and record the measurement in the field logbook. Do not measure the depth to the bottom of the well at this time (to avoid disturbing any sediment that may have accumulated). Obtain depth to bottom information from installation information in the field logbook or drilling logs. Calculate volume of the water column by depth of water column times the cross-sectional area of the well.
- Lower pump to desired sampling depth. During purging, monitor the water level and field parameters (temperature, pH, turbidity, specific conductance and dissolved oxygen) approximately every 3 to 5 minutes. Continue monitoring until the water level stabilizes and field parameters have stabilized to within 10 percent (plus or minus 5 percent) over a minimum of three readings. Turbidity and dissolved oxygen are typically the last parameters to stabilize. Note: once turbidity readings get below 10 NTUs, then the stabilization range can be amended to 20 percent (plus or minus 10 percent) over a minimum of three readings.

  Readings should be taken in a clean container (preferably a less beaker) and the monitoring instrument allowed to stabilize before collection of the next sample. The Horiba instrument takes the readings consecutively and therefore the process

to record all the measurements may take longer than five minutes. If so, measurements should be taken as often as practicable.

- Once the water level and field parameters have stabilized, collect the samples from the pump. Collect samples per Section 3.2.2.1.
- Decontaminate equipment in accordance with Section 3.12.

3.18 Monitoring Well Purging

Well purging can be performed on a volume basis or on a field parameter stabilization basis. In both cases, field parameters are recorded; however, for the former case purging is concluded after a target number of well volumes (typically 3 to 5) regardless of whether parameters have stabilized. In the latter case, purging continues until field parameters stabilize within 10 percent.

3.18. 1 Volumetric Method of Well Purging

The following steps should be followed when purging a well by the volumetric method:

- Don personal protective clothing and equipment as specified in the site-specific health and safety plan.
- Open the well cover and check the condition of the wellhead, including the condition of the surveyed reference mark, if any.
- Monitor the air space at the wellhead, using a PID or equivalent, as soon as well cover is removed according to health and safety requirements.
- Calibrate the required field parameter meters according to manufacturer's specifications.
- Determine the depth to static water level and depth to bottom of well casing. Calculate the volume of water within the well bore based on the following well volumes

Table 3-5 Well Volumes	
Well Diameter (inches)	**Gallons per foot**
2	0.16
4	0.65
6	1.5
8	2.6
10	4.1
12	5.9

Note: Record all data and calculations in the field logbook.

- Set up field parameter probes at the discharge orifice or dedicated probe port of the pump assembly or within the flow-through chamber.
- Prepare the pump and tubing, or bailer, and lower it into the casing.
- Remove the number of well volumes specified in the site-specific plans. Generally, three to five well volumes will be required. Field parameters should be measured and recorded, if required by site-specific plans. In low recharge aquifers, the well commonly will be pumped or bailed to dryness before three well volumes of water are removed. If this is the case, there is no need to continue with purging operations. Record pertinent data in the field logbook.
- Remove the pump assembly or bailer from the well, decontaminate it (if required), and clean up the site. Lock the well cover before leaving. Containerize and/or dispose of development water as required by the site-specific plan.

3.18.2 Indicator Parameter Method of Well Purging

- Don personal protective clothing and equipment as specified in the site-specific health and safety plan.
- Open the well cover and check the condition of the wellhead, including the condition of the surveyed reference mark, if any.
- Monitor the air space at the wellhead, using a PID or equivalent, as soon as well cover is removed according to health and safety requirements.
- Calibrate the required field parameter meters according to manufacturer's specifications.

- Determine the depth to static water level and depth to bottom.
- Set up field parameter probes at the discharge orifice or dedicated probe port of the pump assembly or within the flow-through chamber.
- Assemble the pump and tubing, or bailer, and lower into the casing.
- Begin pumping or bailing the well. Record indicator parameter readings for every purge volume. Maintain a record of the approximate volumes of water produced.
- Continue pumping or bailing until indicator parameter readings remain stable within ±10 percent for three consecutive recording intervals, or in accordance with site-specific plans. Purging should continue until the discharge stream is clear or turbidity becomes asymptotic-low or meets project requirements. In a low recharge aquifer, the well may pump or bail to dryness before indicator parameters stabilize. In this case, there is no need to continue purging. Record pertinent data in the field logbook.
- Remove the pump assembly or bailer from the well, decontaminate (if required), and clean up the site. Lock the well cover before leaving. Containerize and/or dispose of development water as required by the site-specific plans.

3.19 Groundwater Sampling by Bailer

Groundwater is typically sampled by bailer after purging 3 to 5 well volumes per Section 3.18.

- Don personal protective clothing as specified in the site-specific health and safety plan.
- Prepare the area for sample acquisition. If required, cover ground surface around well head with plastic sheeting.
- Open well head and immediately check for organic vapors with PID or flame ionization detector as appropriate.
- Determine static water level and calculate water volume in well.
- Purge well in accordance with Section 3.18.
- Allow water level to recover to a depth at least sufficient for complete submergence of the bailer without contacting well bottom. Ideally, water level should recharge to 75 percent of static level. Samples shall be collected within 3 hours of purging if recharge is sufficient. Wells with a low recharge rate must be collected within 24 hours of purging.

- Securely attach the bailer to the line and test the knot. The opposite end of the line should be secured to prevent loss of bailer into well.
- Lower bailer slowly into the water to prevent aeration, particularly when VOC samples are collected.
- Retrieve filled bailer and fill sample bottles in accordance with Section 3.2.2.1.
- Collect required field parameters and depth to water.
- Decontaminate non-disposable sampling equipment in accordance with Section 3.12.
- Secure well, clean up area.

3.20 Well Abandonment

Once it is deemed that the temporary or permanent monitoring well is no longer needed, the well will be abandoned by a New York State certified well driller as follows:

- The well will be sounded (its depth measured with a weighted line or appropriate method) immediately before it is destroyed to make sure that it contains no obstructions that could interfere with filling and sealing.
- Where possible, remove all material within the original borehole - including the well casing, filter pack and annular seal. If the casing, filter pack and annular seal materials cannot be removed, they may be left in place
- The casing left in place may require perforation or puncturing to allow proper placement of sealing materials. Where the casing is left in the hole, the casing may be cut at the surface.
- Fill well screen with sand per NYSDEC specifications.
- The monitoring well should be filled to the surface with cement grout, or within 20 feet of the surface with bentonite grout. After the placement of the bentonite grout (if used), the remaining portion of the well then should be sealed with a Portland Type I, II or Type I/II cement with 2 percent to 5 percent bentonite.

3.21 Surface Water Sampling

Four surface water sampling scenarios are provided below. These include 1) shallow surface water samples for VOC analysis (preserved and unpreserved), 2) shallow surface water samples for non-VOC or inorganic compound analysis (preserved and unpreserved), 3) deep surface water samples using a weighted bottle sampler and 4) deep surface water samples using a peristaltic pump.

The following steps should be taken when preparing for sampling surface water:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Select stream/river sampling locations as directed in work plan.
- Prepare sampling site by laying out clean plastic sheeting on the ground or any flat, level surfaces near the sampling area and place equipment to be used on the plastic.
- Make field measurements as required by the project plans in physical, chemical, and biological characteristics of the water (e.g., temperature, dissolved oxygen, conductivity, pH).
- The samples shall be collected from areas of least to greatest contamination (when known) and, when collecting several samples in 1 day, always collect from downstream to upstream.
- The sampler should be facing upstream when sampling.
- Document the sampling events, recording all information in the designated field logbook and take photographs if required or if possible. Document any and all deviations from this SOP and include rationale for changes.

3.21.1 Collecting Shallow Surface Water Samples

The following steps must be taken when collecting shallow surface water samples:

- Approach the sample location from downstream; do not enter the sample area. Slowly submerge VOA vials completely into an area of gently flowing water and fill. Do not disturb bottom sediments. The sampler and open end of the vials should be pointed upstream. If wading is necessary, approach the sample location from downstream; do not enter the actual sample area. When using gasoline-powered vessels, make sure the engine is turned off.
- Collect samples per Section 3.2.2.1 If preserved bottles are used, collect sample in a dedicated non-preserved bottle and transfer to the preserved bottle.

Note: When collecting samples for VOC analysis, avoid collecting from a surface water point where water is cascading and aerating. Cap the VOC vial while it is under water. After the vial is capped, check the vial to see if there are any air bubbles trapped in it. If air bubbles are present discard the sample.

3.21.2 Collecting Deep Surface Water Samples at Specified Depth Using a Weighted Bottle Sampler

The following steps must be followed when collecting surface water samples at specific depths using a weighted bottle sampler:

- Lower the weighted bottle sampler to the depth specified in the site-specific plan.
- Remove the stopper by pulling on the sampler line; allow the sampler to fill with water.
- Release the sampler line to reseat the stopper and retrieve the sampler to the surface.
- Wipe the weighted bottle sampler dry with a Kimwipe or clean paper towel.
- Remove the stopper slowly. Collect samples per Section 3.2.2.1.
- Decontaminate equipment according to the Section 3.12.

3.21.3 Collecting Deep Surface Water Sample Collection Using a Peristaltic Pump

The following steps must be followed when collecting deep surface water samples using a peristaltic pump:

- Install clean silicon or Teflon tubing on the pump head. Leave sufficient tubing on the discharge side for convenient dispensing of liquid directly into sample containers.
- Select the appropriate length of Teflon intake tubing necessary to reach the specified sampling depth. Attach the intake sampling tube to the intake pump tube.
- Lower the intake tube into the surface water at the specified sampling location to the specified depth; make sure the end of the intake tube does not touch underlying sediments.
- Start the pump and allow at least three tubing volumes of liquid to flow through and rinse the system before collecting any samples. Do not immediately dispense the purged liquid back to the surface water body. Instead, collect the purged liquid and return it to the source after sample collection is complete.
- Fill the specified number of sample containers directly from the discharge line, in accordance with Section 3.2.2.1.
- Drain the pump system, rinse it with deionized water, and wipe it dry. Replace all tubing with new tubing before sampling at another sampling location. Place

all used tubing in plastic bags to be discarded or decontaminated according to the Section 3.12.

3.22 Sediment/Sludge Sampling

The following steps should be taken when preparing for sampling sediment/sludge:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Select stream/river sampling locations in accordance with the site-specific work plan.
- Prepare sampling site by laying out clean plastic sheeting on the ground or any flat, level surfaces near the sampling area and place equipment to be used on the plastic.
- The samples shall be collected from areas of least to greatest contamination (when known) and, when collecting several samples in 1 day, always collect from downstream to upstream.
- When sampling sediment and surface water from the same surface water body, collect surface water samples prior to sediment samples.

3.22.1 Sediment/Sludge Sample Collection from Shallow Waters

- Use a decontaminated stainless steel or Teflon, long-handled scoop, corer, push tube, or dredge to collect the entire sample in one grab. If wading is necessary, approach the sample location from downstream. Do not enter the actual sample area.
- Retrieve the sampling device and slowly decant off any liquid phase.
- Collect samples in accordance with Section 3.2.2.2.

3.22.2 Subsurface Sediment/Sludge Sample Collection Using a Corer or Auger from Shallow Waters

- At the specified sampling location, force or drive the corer to the specified depth.
- Twist and withdraw the corer in a smooth motion.
- Retrieve the sampling device, remove the corer nosepiece (if possible), and extrude the sample into the specified sampling container(s). Use a clean stainless steel or Teflon spoon or spatula to completely fill the container(s), ensuring no headspace.
- Collect samples in accordance with Section 3.2.2.2.

3.22.3 Sediment/Sludge Sample Collection Using a Dredge from Deep Waters

- Attach a clean piece of 12- to 19-mm (½- to ¾-inch) braided nylon line or Teflon-coated wire rope to the top of the sampler. The line must be of sufficient length to reach sediment or sludge and have enough slack to release the mechanism. Mark the distance to the bottom on the line.
- Attach the free end of the sampling line to a fixed support to prevent loss of the sampler.
- At the specified sampling location, open the sampler jaws and slowly lower the sampler until contact with the bottom (sediments/sludge) is felt.
- Release tension on the line; allow sufficient slack for the mechanism (latch) to release. Slowly raise the sampler.
- Once the sampler is above the water surface, place the sampler in a stainless steel or Teflon lined tray or pan. Open the sampler.
- Collect samples in accordance with Section 3.2.2.2.

3.22.4 Restrictions/Limitations

Core sampling devices may not be usable if cobbles exist in the sediment/sludge. Bumping of core sampling devices and Ponar dredge samplers may result in the loss of some of the sample.

For VOC analysis or for analysis of any other compound(s) that may be degraded by aeration grab sampling is necessary to minimize sample disturbance and, hence, analyte loss. The representativeness of this sample, however, is difficult to determine because the collected sample represents a single point, is not homogenized, and has been disturbed.

3.23 Subsurface Soil Sampling

Subsurface soil samples may be collected using a hand auger at depths of up to 10 feet (typical). In such cases, CDM typically performs the boring and collects the samples for analysis. For deeper depths, a drilling subcontractor is typically used to perform a boring and collect subsurface soil samples by split spoon or Shelby tube via rotary drilling methods, or by direct push methods. In such cases, the driller provides the soil samples to CDM, and CDM then collects the laboratory samples.

The following steps should be taken when preparing for subsurface soil sampling:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.

- Locate sampling location(s) in accordance with project documents (e.g., work plan) and document pertinent information in the appropriate field logbook. When possible, reference locations back to existing site features such as buildings, roads, intersections, etc.
- Processes for verifying depth of sampling must be specified in the site-specific plans.
- Clear away vegetation and debris from the ground surface at the boring location.
- Prepare an area next to the sample collection location for laying out cuttings by placing plastic sheeting on the ground to cover the immediate area surrounding the borehole.

The following general steps must be followed when collecting all subsurface soil samples:

- VOC samples or samples that may be degraded by aeration shall be collected first and with the least disturbance possible.
- Sampling information shall be recorded in the field logbook and on any associated forms.
- Describe lithology, including color, grains size, moisture, odor and other observations.

3.23.1 Manual (Hand) Augering

The following steps must be followed when collecting hand-augered samples:

- Auger to the depth required for sampling. Place cuttings on plastic sheeting or as specified in the site-specific plans. If possible, lay out the cuttings in stratigraphic order.
- Throughout the augering, make detailed notes concerning the geologic features of the soil or sediments in the field logbook.
- Cease augering when the top of the specified sampling depth has been reached. If required, remove the auger from the hole and decontaminate the auger or use a separate decontaminated auger, then obtain the sample.
- Scan sample with organic vapor meter as appropriate.
- Collect samples in accordance with Section 3.2.2.2. Collect VOCs quickly to minimize loss of volatiles.

- When all sampling is complete, dispose of cuttings, plastic sheeting, etc., as specified in the site specific plans.
- Decontaminate all equipment in accordance with Section 3.12

3.23.2 Split-Spoon/Split Barrel Sampling

Note: the first 15 bullets describe activities to be performed by a licensed drilling contractor, not CDM personnel.

The following steps must be followed when collecting split-spoon samples:

- Remove any pavement and subbase material from an area of twice the bit diameter, if necessary.
- The drilling rig will be decontaminated at a separate location prior to drilling.
- Attach the hollow-stem auger with the cutting head, plug, and center rod(s) to the drill rig.
- Begin drilling and proceed to the first designated sample depth, adding auger(s) as necessary.
- Upon reaching the designated sample depth, slightly raise the auger(s) to disengage the cutting head, and rotate the auger without advancement to clean cuttings from the bottom of the hole.
- Remove the plug and center rods.
- If required by the site-specific sampling plan, install decontaminated liners in the splitspoon/split barrel sampler.
- Install a decontaminated split-spoon on the center rod(s) and insert it into the hollow-stem auger. Connect the hammer assembly and lightly tap the rods to seat the drive shoe at the top of undisturbed soil or sediment.
- Mark the center rod in 15-centimeter (6-inch) increments from the top of the auger(s).
- Drive the split-spoon using the hammer. Use a full 76-cm (30-inch) drop as specified by the American Society for Testing and Materials (ASTM) Method D-1586. Record the number of blows required to drive the spoon or tube through each 15-cm (6-inch) increment.
- Cease driving when the full length of the spoon has been driven or upon refusal. Refusal occurs when little or no progress is made for 50 blows of the hammer.

ASTM D1586-99 § 7.2.1 and 7.2.2 defines "refusal" as >50 blows per 6-inch advance or a total of 100 blows.

- Pull the split-spoon free by using upswings of the hammer to loosen the sampler. Pull out the center rod and split-spoon.
- Unscrew the split-spoon assembly from the center rod and place it on the plastic sheeting.
- Remove the drive shoe and head assembly. If necessary, tap the split-spoon assembly with a hammer to loosen threaded couplings.
- With the drive shoe and head assembly off, open (split) the split-spoon, being careful not to disturb the sample.
- Scan sample with organic vapor detector as appropriate.
- Collect samples in accordance with Section 3.2.2.2. Collect VOCs quickly to minimize loss of volatiles.
- When all sampling is complete, dispose of cuttings, plastic sheeting, etc., as specified in the site specific plans.
- Decontaminate all equipment in accordance with Section 3.12.

3.23.3 Direct Push Drilling

Note: The first six bullets describe activities to be performed by a licensed drilling contractor, not CDM personnel.

- Decontaminate equipment.
- Install acetate sleeve in direct push sampler (no acetate sleeve required for split spoon).
- Drive samples from the surface to the desired depth, using either 4-foot or 5-foot long direct push samplers, or 2-foot split spoons.
- Use discrete interval sampling (sampler end is plugged while driving to top of desired sample interval to exclude soil from non-desired depths) when appropriate (for example, deeper than 8 feet or below the water table).
- At top of sampling interval, release plug (if used) and drive sampler across desired sample interval.
- Retrieve sample and provide to CDM.

- Cut open acetate sleeve with two parallel slices, scan with organic vapor meter as appropriate.
- Collect samples in accordance with Section 3.2.2.2.
- At the conclusion of the boring, grout the borehole and decontaminate equipment in accordance with Section 3.12.

3.23.4 Restrictions/Limitations

- Basket or spring retainers may be needed for split-spoon sampling in loose, sandy soils.

3.24 Surface Soil Sampling

The following steps must be followed when preparing for sample collection:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Locate sampling location(s) in accordance with project documents (e.g., work plan) and document pertinent information in the appropriate field logbook. When possible, reference locations back to existing site features such as buildings, roads, intersections, etc.
- Processes for verifying depth of sampling must be specified in the site-specific plans.
- Carefully remove vegetation, stones etc. from the ground surface to expose soil.
- Pace clean plastic sheeting on a flat, level surface near the sampling area, if possible, and place equipment to be used on the plastic; place the insulated cooler(s) on separate plastic sheeting.
- A clean, decontaminated trowel, scoop, or spoon will be used for each sample collected. Other equipment may be used (e.g., shovels) if constructed of stainless steel.
- Surface soil samples are normally collected from the least contaminated to the most contaminated areas, if known.
- Document the sampling events, recording the information in the designated field logbook. Document any and all deviations from SOPs in the field logbook and include rationale for changes.
- Collect samples in accordance with Section 3.2.2.2.
- Decontaminate sampling equipment in accordance with Section 3.12.

3.25 Water Level/NAPL Measurement

Water levels can be measured by several instruments. The three most common are covered here - electric water level meter (measures depth to water only), interface probe (measures depth to water and depth to non-aqueous phase liquid) and pressure transducer (typically used to measure depth to water for long term monitoring or aquifer testing).

3.25.1 Procedures for Use of Water Level Meter

- Standing upwind of the well, open the well head and monitor with organic vapor meter as dictated by the site-specific health and safety plan.
- Check that water level meter is functioning correctly (test button, or immerse probe in tap water to test).
- Lower probe slowly into well until contact with water surface is indicated (tone and/or light).
- Slowly raise and re-lower probe until a precise, repeatable depth to water can be measured.
- Record the depth to water from the measuring point of known elevation, usually marked at the top of the casing. If no mark is present, measure from the highest point of the casing or as otherwise instructed in the site-specific work plan.
- Remove and decontaminate probe, secure well.

3.25.2 Procedures for Use of Interface Probe

The interface meter is used to measure the depth to water and the depth to non-aqueous phase liquid (light and/or dense).

- Standing upwind of the well, open the well head and monitor with organic vapor meter as dictated by the site-specific health and safety plan.
- Check that the interface level meter is functioning correctly (test button, or immerse probe in tap water and NAPL to test).
- Lower probe slowly into well until contact with water or NAPL surface is indicated. Water is typically indicated by a steady tone; NAPL is typically indicated by a beeping tone - check manufacturer's specifications.
- Slowly raise and re-lower probe until a precise, repeatable depth to water/NAPL can be measured.
- Record the depth to water/NAPL from the measuring point of known elevation, usually marked at the top of the casing. If no mark is present, measure from the

highest point of the casing or as otherwise instructed in the site-specific work plan.

- Measurement of interface depth between LNAPL and water: For LNAPL, the non-aqueous phase is floating on top of the water column, and the probe must be lowered through the NAPL before encountering water. In this case, shake the probe after water is encountered to help dislodge any NAPL droplets stuck to the probe. Then raise the probe slowly until it re-enters the NAPL. Perform this procedure until a repeatable result is obtained. The interface depth should be recorded in the up direction, never the down direction. When the probe is moving down, past the LNAPL, it may still be coated with product and can therefore yield misleading results. Therefore, it must be shaken in the water and raised to the interface for an accurate result. Record depth from measuring point, per item 5 above.

- Measurement of interface depth between DNAPL and water: For DNAPL, the non-aqueous phase is at the bottom of the well, below the water column. Lower the probe until NAPL is encountered. Then raise the probe, shake it in the water to dislodge any NAPL droplets, and lower it again. Perform this procedure until a repeatable result is obtained. The interface depth should be recorded in the down direction, never in the up direction. When the probe is moving up from the DNAPL it may still be coated with product and can therefore yield misleading results. Therefore, it must be shaken in the water and lowered to the interface for an accurate result. Record depth from measuring point, per item 5 above.

- Remove and decontaminate probe, secure well.

3.26 Tap Water Sampling

Tap water sampling may be performed in residential, commercial or industrial areas for several reasons. The most common tap water samples are used to obtain groundwater samples from private wells.

- Obtain permission to access the property and collect samples.

- Obtain the name(s) of the resident(s) or water supply owner/operator, the exact mailing address, and telephone numbers. This information is required to obtain access to the property to be sampled and to submit a letter of introduction to the owner/representative.

- Determine the location of the tap to be sampled based on its proximity to the water source. It is preferable that the tap water sampling be conducted at a tap located prior to any holding or pressure tanks, filters, water softeners, or other treatment devices that may be present.

- If possible, obtain well construction details, holding tank volumes etc. to evaluate standing volume of water in the system.

- If the sample must be collected at a point in the water line beyond a pressurization or holding tank, a sufficient volume of water should be purged to provide a complete exchange of fresh water into the tank and at the location where the sample is collected. If the sample is collected from a tap or spigot located just before a storage tank, spigots located inside the building or structure should be turned on to prevent any backflow from the storage tank to the sample tap or spigot. It is generally advisable to open as many taps as possible during the purge, to ensure a rapid and complete exchange of water in the tanks.

- Samples collected to determine if system related variables (e.g., transmission pipes, water coolers/heaters, holding/pressurization tanks, etc.) are contributing to the quality of potable water should be collected after a specific time interval (e.g., weekend, holiday, etc.). Sample collection should consist of an initial flush, a sample after several minutes, and another sample after the system has been purged.

- Devices such as hoses, filters, or aerators attached to the tap may harbor a bacterial population and therefore should be removed prior to sampling.

- Sample containers should not be rinsed before use when sampling for bacterial content, and precautions should be taken to avoid splashing drops of water from the ground or sink into either the bottle or cap.

- Samples of the raw water supply and the treated water after chlorination should be collected when sampling at a water treatment plant.

- In the logbook, record the location and describe the general condition of the tap selected for sampling. The rationale used in selecting the tap sampling location, including any discussions with the property owner, should also be recorded. Provide a sketch of the water supply/distribution system noting the location of any filters or holding tanks and the water supply source (i.e., an onsite groundwater well or surface water intake or a water service line from a public water main). If an onsite water supply is present, observe and record the surrounding site features that may provide potential sources of contamination to the water supply.

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan. Gloves should be changed between sampling locations to avoid possible cross-contamination of the tap water samples.

- Prior to sample collection, the supply system should be purged by turning the cold-water tap on. The following general guidelines should be followed to

determine when the system is adequately purged (refer to the site-specific sampling plans for any other requirements):

- Onsite Water Supply. A minimum of three standing volumes of water (i.e., the static volume of water in the well and holding tank, if present) should be purged. Obtain water temperature, conductivity, and pH measurements after each volume of water is purged. If the standing volume of water in the supply system is unknown, the tap should be allowed to run for a minimum of 15 minutes and temperature, conductivity, and pH measurements, or other parameters as specified by the project plan, should be collected at approximately 3- to 5-minute intervals. (In general, well construction details and holding tank volumes should be obtained prior to conducting the sampling event to estimate the standing volume of the water supply system.) The system is considered adequately purged when the temperature, conductivity, and pH stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 15 minutes, then purging should be discontinued and tap water samples may be collected.

- Large Distribution Systems. Because it is impractical to purge the entire volume of standing water in a large distribution network, a tap should be run for a minimum of 5 minutes, which should be adequate to purge the water service line. Obtain temperature, conductivity, and pH measurements at approximately 1-minute intervals. The system is considered adequately purged when the temperature, conductivity, and pH readings, or other parameters as specified by the project plan, stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 5 minutes, then purging should be discontinued and tap water samples may be collected. During purging, a 5-gallon bucket and stopwatch may be used to estimate the flow rate if required by the site-specific plans. Dispose the purged water according to the site-specific plans. Record the temperature/conductivity/pH readings, or other parameters as specified by the project plan, the volume of water purged, the flow rate if measured, and the method of disposal in the field logbook.

- After purging the supply system, collect the samples directly from the tap (i.e., if a hose was used for purging, the hose should be disconnected prior to sampling). Any fittings on the end of the faucet that might introduce air into the sample (i.e., a fine mesh screen that is commonly screwed onto the faucet) should be removed prior to sample collection also.

- Obtain a smooth-flowing water stream at moderate pressure with no splashing. Collect samples in accordance with Section 3.2.2.1. chain-of-custody forms.

3.26.1 Restrictions/Limitations

To protect the sample from contamination on the exterior of a tap, a tap should not be chosen for sampling if any of the following conditions exist:

- A leaky tap allowing water to flow out from around the stem of the valve handle and down the outside of the faucet.
- A tap located too close to the bottom of the sink or the ground surface.
- A tap that allows water to run up on the outside of the lip.
- A tap that does not deliver a steady stream of water. A temporary fluctuation in line pressure may cause sheets of microbial growth, lodged in some pipe sections or faucet connections, to break loose.

Careful sampling for VOC analysis, or for any other compound(s) that may be degraded by aeration, is necessary to minimize sample disturbance and, hence, analyte loss.

3.27 Sample Handling, Packaging, and Shipping

The shipping containers (coolers or shuttles) will be provided by the laboratory providing the analysis. These containers, once filled, will be secured with fiber tape, wrapped entirely around the container and will either be delivered directly to the Con Edison laboratory in Astoria Queens by the field crew or picked up by a laboratory provided courier. Consequently, the strict packaging, labeling and shipping of hazardous wastes and substances requirements set forth by the U.S. Department of Transportation (DOT) under CFR 49 will not be necessary. However, the following sample packaging procedures will be followed to guard against sample breakage and to maintain chain-of-custody.

- Check to ensure that the sample is properly filled; tighten cap securely.
- Enclose and seal sample containers in a clear plastic bag.
- Place freezer packages or ice in large ziplock plastic bags and place the bags in a sample cooler so that ice is not in direct contact with sample bottles. Sufficient ice will be added to cool the samples to 4°C.
- Pack noncombustible, absorbent vermiculite around bottles and ice to avoid sample breakage during transport.
- Complete Chain-of-Custody Records and other shipping/sample documentation including air bill numbers for each shipment of samples using a ballpoint pen. Seal documentation in a waterproof plastic bag and tape the bag inside the shipping container under the container lid. Include a return address for the cooler.
- Close the container and seal it with fiber tape and custody seals in such a manner that the custody seals would be broken if the cooler were opened.

3.28 Rock Coring

The rock core will be collected as follows:

- Decontaminate all equipment in accordance with Section 3.12 of the generic QAPP.
- Advance borehole to the desired depth using auger, rotary, air hammer or other drilling method, as appropriate.
- Install a steel casing in the borehole and grout it in place. Casing must be set into competent bedrock. Let the grout set for a minimum of 12 hours.
- Collect core (using specified core barrel) in accordance with ASTM D2113-06, as appropriate for site conditions.
- Record penetration rate.
- Record any fluid loss and depth of loss.
- Place core in new, sturdy, wooden, core boxes.
- Clearly label boxes with borehole number and depth.
- Drilling/coring induced breaks should be marked with 3 parallel lines across the break.
- Photograph full core box, with hole's number and depths clearly visible in the photo.
- Record core data including rock type, fractures and other pertinent information.
- Determine Rock Quality Designation (RQD) for each core run:

$$\text{RQD} = \frac{\text{the total length of core pieces greater than four inches long}}{\text{total core run}}$$

  - Measure core lengths along the center line of the core.
  - Do not count core pieces that are not "hard and sound" as part of the RQD; however, record such lengths separately.
  - Core breaks known to be induced by drilling or core handling should be fitted together and counted as one piece when determining RQD.

3.29 Packer Testing

Packer testing is performed to obtain groundwater samples from discrete intervals within a larger open borehole in bedrock. A dual straddle packer system or single packer system can be used, as appropriate. The single packer is often used when collecting a groundwater sample from near the bottom of the borehole. Inflatable packers, with a submersible pump between the packers (or below the single packer) are typically used. Geophysical logging can be used prior to packer testing to design the packer interval. If packer testing occurs concurrent with drilling, then a single packer is typically used at progressively deeper depths.

Packer testing will be conducted as follows:

- Decontaminate all down hole equipment in accordance with Section 3.12 of the generic QAPP.
- Assemble packer(s) lift pipe and pump. If a straddle packer system will be used, assemble packers at desired spacing.
- Lower packer assembly to desired depth.
- Measure static water level using a water level indicator.
- Inflate packers with nitrogen, with sufficient pressure to seal against borehole wall.
- Calculate volume of water in packer zone and lift pipe using Table 3-5.
- Begin purging with submersible pump; record totalizer readings and flow rates. Dispose/contain water as appropriate for the site.
- Monitor water quality parameters if appropriate.
- Collect water sample based upon volume of water pumped and/or water quality parameters.
- Deflate packers.
- Move system to next test zone or remove from borehole, as appropriate.

3.30 Aquifer Performance Test

Aquifer performance tests are typically performed to characterize the hydraulic properties of wells and aquifers. Properties evaluated include specific capacity, hydraulic conductivity, transmissivity and storativity.

3.30.1 Continuous Background Monitoring

- Baseline groundwater level measurement data will be used to evaluate the effects of outside influences (i.e., influences other than the proposed pump test withdrawal) on groundwater levels. These influences will then be considered when analyzing the pump test data.

- Groundwater level data will be recorded with electronic data loggers at selected well, at 30-minute intervals.

- The loggers will be synchronized to record water levels at the same time.

- A synoptic round of water levels will be made at the wells prior to installing the transducers. After the transducers have been installed and recording has been started, a second round of synoptic water levels will be collected on the day of transducer installation to confirm proper data recording.

- A third round of manual groundwater level measurements will be collected from continuous monitoring points and any other existing wells just prior to beginning pump testing to:

  1) confirm proper data recording by transducers and

  2) obtain a broader baseline groundwater level data set.

- Groundwater level data will also be downloaded from data loggers at this time, saved to electronic media, and reviewed to confirm that groundwater levels have stabilized.

- Precipitation and barometric pressure data will be obtained for the APT period from the local weather station (within approximately 5 miles of the project).

3.30.2 Step Drawdown Test

The step drawdown test (or step test) is required to determine the specific capacity and short term yield of the recovery well and select the pumping rate for the long-term pump test.

- During the test, continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically. An example of a logarithmic schedule is provided below.

Table 3-6
Step Drawdown Test Logarithmic Schedule

Log Cycle	*Elapsed Time*	*Sample Interval*	*Points/Cycle*
1	0-20 seconds	0.2 second	101
2	20-60 seconds	1 second	40
3	1-10 minutes	10 seconds	54
4	10-100 minutes	2 minutes	45
5	100-480 minutes	10 minutes	38

- The drawdown-time data shall be plotted semi-logarithmically.
- The drawdown (y-axis) shall be plotted on a linear scale and time (x-axis) shall be plotted on a logarithmic scale. The drawdown curves shall be extrapolated to the specified time of the proposed long-term test. The rate that results in the maximum drawdown without dropping the water level below the design pumping level within the time period of the long-term test shall be considered the flow rate to be used for the long-term test.
- The specific capacity versus pumping rate should also be plotted to determine if excessive well losses occur at the selected rate.
- A variable rate submersible pump capable of operating across the above flow range will be used to complete testing. A vertical check valve will be placed on the discharge line immediately above the pump. A one-inch diameter polyvinylchloride line will be placed in the well, with the open, bottom end extending to within one foot of the pump. This one-inch line will be used as the stilling pipe for the water level transducer.

After the pumping equipment is installed, the following testing steps will be followed:

- *Step 1* - Connect a flow meter, valve, and sample port to the pump discharge line. Extend the pump discharge line from the pumping well to the existing groundwater treatment system influent sump using flexible, chemical-resistant pipe/hose (e.g., garden hose, polyethylene pipe).
- *Step 2* - Measure and record the static groundwater level reading in the pumping well.
- *Step 3* – Start log cycle for select transducers, and initiate pumping. Set to initial flow rate (Step 1) using the valve (or variable-speed controller). Record the stabilized flow rate and start time for pumping. Confirm proper operation of the pumping well transducer. Confirm that significant leaks are not present along

the above-ground hose/pipe line extending between the pumping well and the influent sump.

- *Step 4* - Monitor the groundwater level in the pumping well using the transducer, and collect manual groundwater level measurements at monitoring points at ± 20 minute intervals.

- *Step 5* - After approximately two hours, calculate the specific capacity of the well (flow/drawdown [gpm/ft]), estimate the maximum well yield based upon the calculated capacity and pump depth, and increase the pumping rate to approximately 50 percent (%) of the calculated maximum yield (Step 2). If 50% of the yield has already been exceeded, adjust the rate to approximately 75% of the yield. Record the flow rate and adjustment time. Confirm proper operation of the pumping well transducer.

- *Step 6* – Monitor the groundwater level in the pumping well using the transducer, and collect manual groundwater level measurements at monitoring points at ± 20 minute intervals.

- *Step 7* – Repeat Steps 5 and 6 for up to two additional steps at approximately 75% and 95% of the maximum well yield (Steps 3 and 4). Be careful not to drop the water level below the top of the pump.

- *Step 8* - Shut off the pump at the end of the last step test (after 4 tests and 8 hours, maximum), and download the groundwater level data from all transducers. Also collect manual groundwater level measurements at approximately 20 minutes and 40 minutes after terminating pump operation. Leave the transducers in place.

3.30.3 Long-Term Constant Rate Test

The long-term constant rate test (72-hour pump test) will be performed at the pumping well on the day after completion of the step test, assuming groundwater levels have recovered to 90% of baseline values. The 72-hour pump test will not commence until this condition is met or a minimum of 72 hours have elapsed since the termination of the step testing. The step test results will be reviewed in advance and used to select the pumping rate for this test, which will equate to approximately 50 to 75% of the calculated short-term, maximum well yield.

- During this test, continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically. An example of a logarithmic logging schedule is provided below.

Table 3-7
Long Term Constant Rate Test Logarithmic Schedule

Log Cycle	*Elapsed Time*	*Sample Interval*	*Points/Cycle*
1	0-20 seconds	0.2 second	101
2	20-60 seconds	1 second	40
3	1-10 minutes	10 seconds	54
4	10-100 minutes	2 minutes	45
5	100-480 minutes	10 minutes	38

The following testing steps will be followed:

- *Step 1* – Manually measure groundwater levels in recovery well and all observation points prior to initiating pumping.
- *Step 2* – Start log cycle for transducers, and initiated pumping at the pre-determined rate by adjusting the valve (or variable-speed controller). Record flow rate and start time. Also check proper data recording at the pumping well transducer.
- *Step 3* - Collect manual groundwater level measurements at 20 minute intervals until drawdown begins to stabilize. Also check pump flow rate and adjust valve as necessary to maintain a constant pumping rate until stabilization (difference between consecutive measurements less than 10%).
- *Step 4* - Perform manual groundwater level measurements and flow rate checks/adjustments at one-hour intervals after the system has approached stabilization. Download and review pressure transducer data at 6-hour intervals to confirm proper data recording and observe data trends.
- *Step 5* - Stop pumping after 72 hours have elapsed, and record time. Leave the transducers in place. Download and review pressure transducer data at 6-hour intervals to confirm proper data recording and observe data trends.

3.30.4 Recovery water level measurement

- Initiate a new log cycle for the transducers immediately upon termination of the constant-rate pumping test.
- Continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically.

- Leave the transducers in place to record continuous groundwater level data until:

  1) the groundwater level at the pumping well has recovered to 90% of its baseline value or

  2) 72 hours (minimum) have elapsed since termination of pump testing.

3.30.5 Discharge Water Management

The water pumped from the well shall be discharged and managed following the plan specific to the project.

3.31 Pre-Packed Direct Push Well Installation

A subcontracted driller will perform the well installation. CDM will oversee the fieldwork.

- Wells will be constructed of a pre-packed 2.5 inch OD (1 inch ID) slotted PVC well screen (pre-packed with sand and stainless steel mesh) and 1-inch ID, schedule 40 PVC riser casings. The pre-packed well screens are manufactured prior to mobilization.
- Thread the drive cap onto the top of the 3.25 inch OD probe rod and advance the drive rod using either the hydraulic hammer or hydraulic probe mechanism.
- Advance the drive rod to the target depth using the hydraulic hammer. Add additional probe rods as necessary to reach the specified sampling depth.
- Lower the well assembly into the probe rod string with threaded PVC riser pipe to the bottom of the probe rod string.
- Install a sand filter around the well screen to directly above the screen. Grain size of the sand will be appropriate for the slot size of the screen (normally 0.01-inch). Retract the probe rods to a point above the screen.
- Install 2-foot grout penetration seal using "00" gravel or bankrun sand.
- Insert a tremie pipe and backfill the remainder of the hole with bentonite-cement grout until it flows at the surface.
- Square cut the well pipe below grade.
- Install protective flushmount casing around new well.

3.32 Membrane Interface Probe (MIP)

In order to provide a screening-level characterization of VOC contamination in subsurface soil in both the vadose and saturated zones, CDM will utilize a MIP to

obtain qualitative, depth-continuous, relative instrument response data for VOCs and electrical conductivity data in the subsurface soil. The MIP data will be used to establish an instrument response gradient in subsurface soils to identify "hot spots" for sampling during the soil boring investigation.

- The MIP utilizes a truck-mounted photo-ionization detector (PID), flame-ionization detector (FID), and an electron-capture devise (ECD).

- The 1.5-inch diameter MIP will be pushed into the subsurface at a penetration rate of approximately 1-foot per minute. The tip of the probe contains a thermister, which provides a heat source to volatilize VOCs. The gasses that are produced pass into the probe through a permeable membrane and enter a sampling loop. The gasses then are transported to the surface and pass through the PID, FID, and ECD. The MIP will produce a response to all compounds that:

  1) Volatilize sufficiently to diffuse through the MIP probe membrane,

  2) are carried to the detector in the carrier gas, and

  3) produce a response on one or more of the detectors (PID, FID, and ECD).

The total response for each detector is related to the total contaminant concentration and the relative response of the detector to the compounds in the carrier gas stream. Therefore, the MIP is considered to produce qualitative data.

A number of "performance checks" have been incorporated into the MIP screening program to provide a basis for evaluating MIP performance during subsurface soil screening activities. The following performance checks will be used during the MIP screening activities:

- Ex situ response check - This performance check will be used to test the response of the probe to a known concentration of a target contaminant in a test cell. This check will be performed in accordance with Geoprobe® Systems Technical Bulletin MK3010 (Geoprobe® 2003)

- Reproducibility check - This performance check includes performance of a replicate push within 5 to 10 feet of a selected push. The MIP profiles for the replicate locations will be compared to assess the reproducibility of the data. As a guideline, MIP responses that are within one order of magnitude will be considered to be reasonable evidence of reproducibility.

- Ex situ response checks will be run at the following times:

  - at the start of each day

- if more than 3 hours elapses between the last response check and the next logging run
- if the MIP probe, membrane, trunk line, dryer, probe rod, or any major components of the MIP system are repaired or replaced.

- Replicate MIP profiles will be run on approximately 1 in 20 samples.

Performance check results will be reviewed for each sample lot to evaluate MIP performance. If MIP performance issues are identified, the MIP subcontractor will take corrective actions to remedy the issues.

3.32.1 MIP Procedure

Prior to initiating any field activities, the field team will review and discuss, in detail, the HASP and any appropriate background documentation. All monitoring and protective equipment will be thoroughly checked at this time. All underground and overhead utilities and structures which may interfere with the progress of the work will be located prior to the commencement of subsurface drilling activities.

- The MIP soil screening will be conducted using a Geoprobe® rig or equivalent direct push rig (as discussed above) and will follow the general drilling procedures outlined in Section 3.23.3.

- At each location the direct push rig will continuously collect data on the lithology and the VOC contamination.
- The MIP technology will provide a continuous depth qualitative readout of VOC concentrations. This probe will be used until the final depth is reached.
- The MIP subcontractor will provide CDM with an electronic data file of each push containing qualitative VOC readings and electrical conductivity readings.
- The screening point boreholes will be tremie-grouted with a cement-bentonite mixture after all sampling has been completed and the boring locations will be restored to pre-existing conditions.

3.33 Fish Sampling

Fish samples will be collected from an adequate number of locations in order to characterize and address project objectives, or as directed by the NYSDEC.

- Samples will be collected using site-specific common fisheries techniques (e.g., seine net, electroshocking, etc.).

- During each investigation, species representative of the site or individual location (i.e., dominant taxa, high percentage of total biomass, etc.) will be targeted for analysis.
- The age and/or trophic level of species and other pertinent sampling design information will be decided after consultation with the NYSDEC.
- Upon capture, sampling crews will taxonomically identify fish retained for analysis and record the weight and total length of representative individuals.
- In order to satisfy analytical requirements, it may be necessary in specific cases (e.g., minnow species) to composite samples consisting of an individual species. When required, the total number of individuals and total weight of the composite will be noted.
- After processing, individual samples will be wrapped in aluminum foil, placed in re-sealable plastic bags and placed on wet or dry ice.
- Samples will be shipped via overnight delivery (see Section 3.27) to the subcontracted analytical laboratory for the analyses specified in the site specific Work Plan.

3.34 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate (benthos) samples will be collected from an adequate number of locations in order to characterize and address project objectives, or as directed by the NYSDEC.

- Samples will be collected using site-specific sampling techniques (e.g., kick net, surber sampler, etc.).
- During each investigation, species representative of the site or individual location (i.e., dominant taxa, high percentage of total biomass, etc.) will be targeted for analysis. Pertinent sampling design information (e.g., sample size, etc.) will be decided after consultation with the NYSDEC.
- As samples are collected they will be placed into a clean sample vessel (e.g., stainless steal bucket, high density polyethylene bucket, etc.) for sorting.
- Representative species retained for analysis will be taxonomically identified to Order.
- Due to analytical requirements, all samples will consist of a given number of individuals composited together until the proper sample mass is achieved.

- After processing, individual samples will be placed into the appropriate sample container, placed in re-sealable plastic bags and placed on wet ice or dry ice.
- Samples will be shipped via overnight delivery (see Section 3.27) to the subcontracted analytical laboratory for the analyses specified in the site specific Work Plan.

Section 4
Instrument Procedures

4.1 Photoionization Detector

4.1.1 Introduction

This Standard Operating Procedure (SOP) is specific to the HNu PI 101 and the Thermal Environmental Organic Vapor Monitor (OVM) PID. These portable instruments are designed to measure the concentration of trace gases in ambient atmospheres at industrial and hazardous waste sites and are intrinsically safe. The analyzers employ PIDs.

The PID sensor consist of a sealed ultraviolet light source that emits photons which are energetic enough to ionize many trace species (particularly organics) but do not ionize the major compounds of air such as O_2, N_2, CO, CO_2, or H_2O. An ionization chamber adjacent to the ultraviolet lamp source contains a pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions, formed by absorption of UV light, to the collector electrode where the currents (proportional to concentration) are measured. One major difference between a flame ionization detector (FID) and a PID is that the latter responds to inorganic compounds as well as non methane type organic compounds.

To assess whether the instrument will respond to a particular species, the ionization potential (IP) should be checked. If the IP is less than the lamp energy, or, in some cases, up to 0.2-0.3 electron volts (ev) higher than the lamp energy, instrument response should occur. For example, hydrogen sulfide (IP = 10.5 ev) may be detected with a 10.2 ev lamp, but butane (IP 10.6 ev) will not be detected.

4.1.2 Calibration

Qualified personnel trained in calibration techniques for all field items perform calibration of all CDM field equipment. When a field instrument that requires calibration is obtained from the equipment room, the unit will display a calibration tag denoting the date when the instrument was last calibrated and/or maintained. All field instruments are calibrated each time they leave the equipment facility for a site. A maintenance file is kept for each calibrated field item.

PID and FID detector type instruments come with field calibration kits. A field calibration kit would be used if the instrument is to be kept out at the site for extended periods of time, or if the instrument endures prolonged environmental extremes. In either case, a calibration check standard could be introduced in the instrument to verify its accuracy. If an instrument will not calibrate or shows improper field operation, it should be sent back to the office, and another instrument reissued.

Field personnel should not try to maintain the instruments in the field. If long sampling program is required, be prepared to take more equipment for backup in

case of instrument failure. Records and procedures of all calibration techniques are on file at the CDM equipment management facility in Ten Cambridge Center, Cambridge, Massachusetts.

With the instrument fully calibrated, it is now ready for use. Any results obtained should be reported as parts per millions (ppm) as isobutylene. If you need to convert these numbers based on a benzene standard, HNu offers a conversion table which is available from CDM. Important instrument specifications for each PID detector are listed as follows.

HNu PI 101 Performance	OVM Model 580A
Range - 0.1 to 2000	0 - 2000
Detection limit 0.1 PPM	0.1 PPM

HNu PI 101 Power Requirements	OVM Model 580A
Continuous use, battery >10 hours	8 hours
Recharge time, max >14 hours, 3 hours +	8 hours
NiCd Battery	Gel Cell Battery

Unit can be operated on battery charger.
Both units provide protection circuitry for the battery. This prevents deep discharging of the battery and considerably extends the battery life.

4.1.3 HNu PI 101

4.1.3.1 Procedure

- Before attaching the probe, check the function switch on the control panel to make sure it is in the off position. The 12-pin interface connector for the probe is located just below the span adjustment on the face of the instrument. Carefully match the slotted groove on the probe to the raise slot on the 12-pin connector on the control panel. Once in line, twist the outer ring on the 12-pin connector until it locks into position (a distinct snap noise will be felt when in place).

- Turn the function switch to the battery check position. The needle on the meter should read within or above the green battery arc on the scaleplate. The battery, if needle falls below the green arc, should be recharged before any measurements are taken. If the read LED on the instrument panel should come on, the battery needs charging and the unit cannot be operated without a charger.

- If the battery is functioning properly, turn the function switch to the STANDBY position. If the needle on the instrument does not read 0, then turn the knob on the instrument panel until the needle deflects to the zero point on the meter.

- Once the zero is confirmed, turn the function switch to the 0-20 position. At this point, the needle will read approximately 0.5 ppm. This reading is normal

background for ambient air. For CDM health and safety reasons, the HNU PI 101 should be operated on this range to insure maximum sensitivity in the work area. The unit, however, has 2 other ranges (0-200), (0-2000) should monitoring be required for other purposes such as headspace analysis etc. where readings could exceed the 0-20 ppm range.

4.1.3.2 Limitations

- AC power lines (high-tension lines), or power transformers can interfere with the instruments performance. This situation can be confirmed by noting a deflection of the meter while in the STANDBY position.

- Environmental factors such as humidity, rain and extreme cold can limit the instrument performance. To verify the "water sensitivity" condition, gently blow in the hole at the end of the probe. If the needle deflects positively (on the 0-20 position) by 2 ppm or more, water sensitivity problem exists and the unit should be brought into the warehouse for service. HNU PI 101 should be kept out of the rain as much as possible or covered. This will insure longer operating times with less false positive readings.

- Quenching the detector can limit the instrument performance. This occurs when a compound such as methane at a very high concentration is introduced to the detector. The concentration is so high that the unit does not respond at all or gives a negative reading.

4.1.4 OVM 580A

4.1.4.1 Procedures

- With the unit being fully calibrated before receiving it, you are ready for operation. Located on the right hand side of the unit is a panel. Slide this panel off of the unit. Inside there is a switch that supplies power to the LCD portion of the instrument. Turn this switch on and replace the panel. On the top of the OVM, there is an instrument panel. Locate the on/off switch and turn the unit on. This switch activates the lamp as well as the pump. Turn this switch off when the instrument is not in use, but leave the internal switch on.

- The unit is now in the operation mode with all readings shown on the LCD display. Options for the OVM 580A include automatic recording and alarm settings. Should any options be required, they can be set up before the instrument leaves the CDM equipment warehouse.

  Warning signals associated with the OVM include a Low Battery signal. A flashing B will appear in the left-hand corner of the bottom line of the display when the 580A is in the RUN mode. If a gas concentration >2000 ppm is detected by the OVM, the top line of the display will show OVERRANGE. Once this occurs, the instrument will "lock out" until the unit is brought to a clean area. A

clean area is described as an area where the concentration of organic vapors is below 20 ppm.

4.2 pH Meter

4.2.1 Introduction

pH is the negative logarithm of the effective hydrogen ion concentration (or activity) in gram equivalents per liter used. This expresses both acidity, and alkalinity on a scale whose valves run from 0 to 14. Number 7 represents neutrality, and numbers greater than 7 indicate increasing alkalinity while numbers less than 7 indicate increasing acidity. pH is one of the most commonly analyzed parameters. Water supply treatments such as neutralization, softening, disinfection and corrosion control are all pH dependent. CDM has a variety of pH monitoring instruments in the equipment warehouse.

4.2.2 Orion SA 250 pH Procedures

With the instrument fully calibrated, it is now ready for use. Follow the check out procedures:

- Slide power switch to on position. Attach BNC shorting plug to BNC connector on top of meter.
- If LO BAT indicator on LCD remains on, the battery must be replaced.
- Slide mode switch to mV. Display should read 0 $\pm$ .3.
- Slide mode switch to TEMP. Display should read 25.0. If 25.0 is not displayed, scroll using, and X10 keys, until 25.0 is displayed and press enter.
- Slide mode switch to pH .01. Press iso. Display should read the letters ISO, then a value of 7.000. If 7.000 is not displayed, scroll until 7.00 is displayed and press enter.
- Press slope. Display should read the letters SLP, then a value of 100.0. If 100.0 is not displayed, scroll until 100.0 is displayed and press enter.
- Press sample. Observe the letters pH, then a steady reading of 7.00, $\pm$0.02 should be obtained. If not, press CAL and scroll until 200 is displayed and press enter. Press sample and observe a reading of 7.00.
- Remove the shorting plug. After completing these steps, the meter is ready to use with an electrode.
- Attach electrodes with BNC connectors to sensor input by sliding the connector onto the input, pushing down and turning clockwise to lock into position.

Connect reference electrodes with pin tip connectors by pushing connector straight into reference input.

- Put the temperature probe in the sample and let it stabilize.
- Once temperature is stable, set the unit to read pH (by 0.1 or 0.01) and take a reading in the aqueous sample. (Remembering first to remove the cap on the end of the pH probe.)

4.2.3 Model Tripar Analyzer Procedures

With the instrument fully calibrated, it is now ready for use:

- Connect the pH probe's BNC input connector to the front of the Tripar.
- Put the pH/mV switch on the pH position.
- Turn the parameter display selection switch to TEMP.
- Plug in the gray temperature plug jack in the input temperature sensor connector.
- Put end of temperature probe in the sample.
- Allow the temperature to stabilize.
- Turn the temperature compensation knob to the temperature shown.
- Turn the parameter display selection switch to pH.
- Put pH probe in the aqueous sample (remembering first to remove the cap on the end of the probe). Let it stabilize and record the reading.

4.3 Conductivity Meter

4.3.1 Introduction

Conductivity is a numerical expression of the ability of an aqueous solution to carry an electrical current. This ability depends on the presence of ions in the solution, and their total concentration. Factors such as mobility valence, relative concentration, and temperature also combine to create this occurrence. Solutions of most inorganic acids, bases and salts are relatively good conductors. Organic compounds in aqueous solutions are not good conductors. For example, freshly distilled water has conductivity reading of 0.5 to 2 mhos/cm and increases with time. This increase is caused by absorption of atmospheric carbon dioxide, and to a lesser extent ammonia. While industrial type wastes have conductivity readings of $\pm$10,000 mhos/cm.

4.3.2 Model SCT Procedures

The model 33 SCT has 3 conductivity scales of 0-500, 0-5000, and 0-50,000 mhos/cm. Salinity is scaled 0-40 parts per thousand in a temperature range of -2 to +45^{B}C. Temperature is scaled -2^{B} to +5^{B}C.

With the instrument calibration verified, the unit is now ready for use. The model 33 S-C-T meter face is scaled and calibrated to give an accurate reading of the conductivity of a water sample by measuring the amount of current flow between two fixed electrodes in the probe. The unit also measures salinity in a special range conductivity circuit, which includes a user-adjusted temperature compensator. A precision thermistor in the probe measures temperature by changing its resistance in relation to the temperature of the water.

The start-up procedure is as follows:

- Plug the probe plug receptacle in the side of the meter.
- With the mode select in the OFF position, check to see that the meter needle is centered at the zero mark on the conductivity scale and adjust if necessary.
- Turn the mode control switch to Red Line position.
- Adjust the Red Line control knob so the meter needle lines up with the red line on the meter face. If this cannot be accomplished, replace the batteries. If battery replacement is necessary, use only alkaline "D" cells, as regular carbon zinc batteries will cause errors.
- Place the probe into the solution to be measured.
- Set the mode control to TEMPERATURE. Read the temperature on the bottom scale of the meter in Degrees C. Allow time for the probe temperature to come to equilibrium before taking a reading.
- With the probe in the solution to be tested, adjust the conductivity scale until the meter reading is on scale. (Multiply the reading by the correction on the calibration sticker on the instrument).
- When using the X10 and X100 scales, depress the CELL TEST button. If the reading on the dial moves +2%, the electrode is fouled and needs to be cleaned. Repeat the measurement on another instrument.
- Store the probe in distilled water when not in use.

4.4 Photovac Portable Gas Chromatograph

4.4.1 Introduction

The Photovac portable gas chromatograph (GC) can provide for accurate and specific identification of volatile organic compounds in a field control laboratory.

4.4.2 Equipment Preparation

- The Photovac portable GC should be set up in a sheltered area and, if possible, within a climate controlled area to minimize temperature changes. Do not place the GC near any equipment that causes vibration. A flat table, large enough to accommodate the GC, the printer, a laboratory size oven, and electrical power packs for the GC should be utilized during operation.

- Fill the GC with carrier gas being sure not to pressurize the GC with more than 1500 pounds per square inch (psi) of carrier gas. Check to ensure the pressure of the air feed to the GC column is 40 psi. The carrier gas should contain no more than 2.0 parts per million by volume (ppmV) of total hydrocarbons and not less than 0.1 ppmv of total hydrocarbons. The lower the hydrocarbon concentration the lower the baseline of the GC. A lower baseline minimizes interference of compound identification.

- Install new Teflon septa in the injection port being utilized. The septa should be replaced at the start of each day and after every twenty injections.

4.4.3 Calibration Procedures and Frequency

The Photovac portable GC will be calibrated at the beginning of each day prior to sample analysis.

Gas Standards

Gas standards used to calibrate the GC will be obtained from certified compressed gas cylinders of known concentration. CDM stocks two compressed gas standard cylinders containing the following gases and concentrations:

Cylinder 1

Benzene - 10 ppmv
Toluene - 10 ppmv
Ethyl Benzene - 10 ppmv
M-xylene - 10 ppmv
O-xylene - 10 ppmv
P-xylene - 10 ppmv

Cylinder 2

trans 1,2 Dichloroethylene - 1.05 ppmv
1,1,1 Trichloroethane - 19.3 ppmv
Trichloroethylene - 1.13 ppmv

These gas cylinders were purchased from Scott Specialty Gas Corporation and are certified by Scott to be traceable to NBS standards.

The calibration procedure using these cylinders is as follows:

- A two stage pressure regulator (CGA 350) is attached to the standard gas cylinder to be used.
- A 250 ml glass sampling bulb, determined clean by injecting a volume of air obtained from the bulb onto the GC (described later), is labeled and attached to the effluent port of the second stage of the gas regulator. The Teflon stopcocks of the sampling bulb are opened.
- The sample cylinder valve is opened and the first stage of the regulator is pressurized.
- Slowly the diaphragm valve controlling the gas flow entering the second stage is opened until the pressure reads 2 psig.
- The valve allowing the gas to exit the second stage of the regulator is opened until the gas can be heard escaping from the regulator and passing through the glass sample bulb. Purge the bulb for approximately ten seconds. Close the Teflon stopcock located at the discharge end of the sampling bulb, then, the stopcock closest to the regulator. In this way the calibration gas is collected at the same pressure as the delivery pressure of the second stage of the regulator.
- Using a gas tight 1 ml syringe, extract approximately 500 microliters (µl) of the calibration gas from the glass bulb and purge the volume of gas into the atmosphere. Repeat this step.
- Place the syringe needle in the glass bulb. Pull the syringe plunger back approximately 500 µl of calibration gas enters the syringe barrel. Without removing the syringe from the glass bulb depress the plunger. Pump the syringe in this manner several times.
- Extract the syringe from the glass bulb with approximately 500 µl of calibration gas present. Carefully depress the plunger until 300 µl of calibration gas is present in the syringe barrel. Immediately inject this gas volume into the Photovac GC.
- A response factor for each analyte is obtained as the ratio of the known gas concentration injected and the area under the peak produced by that injection. This integration is performed automatically by the internal Photovac data processor and stored in the library.

- The procedure to obtain a calibration gas sample is repeated and the gas volume is injected into the GC. The GC will identify the compounds in the sample stream that have retention times within +/- 20% of the retention times of the compounds in the library. The area of these identified peaks will be compared to the response factor of the compounds stored in the library and integrate a corresponding concentration.

- If the calibration check concentration does not equal +/- 15% of the library concentration, a new calibration check is performed. If this check fails, a new library is created.

4.4.4 Sample Analyses

The following procedure will be followed when performing analysis of samples.

- The Photovac portable GC is set as described above. The GC function and application file is loaded into memory. This includes all previously established calibration data and retention time information.

- 300 µl of sample are obtained from the sample source and injected into the GC. Samples will be injected as soon as possible after it is collected.

- Immediately after injection the GC is started.

- Each chromatograph run will run for a minimum of 5 minutes. At this time the run will be stopped and the results obtained.

- Following completion of the run, the Photovac GC will produce a hard copy printout of the results. This printout will include the sample identification, time of analysis, and appropriate operating parameters.

This procedure will be followed for all sample runs.

4.4.5 Method Blanks and Duplicates

Prior to any calibration or sample injections, the integrity and level of contamination of each syringe used for injections will be verified.

- Plungers will be removed from the barrel of the syringe and placed into a laboratory oven for 5 minutes. The temperature of the oven should not be above 150 degrees Fahrenheit (F) or below 120 degrees F.

- The syringes will be removed from the oven, cooled, and reassembled.

- Pump the syringe plunger several times, purging the syringe with ambient air.

- Collect approximately 500 µl of ambient air in the syringe and carefully depress the plunger to 300 µl. Immediately inject the gas volume into the GC.

- Detection of the target compounds above the detection limit (50 ppbv for most compounds) will require another decontamination procedure before additional analyses.
- Blanks will be performed after every sample and calibration injection. Blanks will not be performed between duplicate sample injections.
- Duplicate samples will be performed at a minimum of 1 every 10 sample injections.

Section 5
Laboratory Procedures

The term "data quality" refers to the level of uncertainty associated with a particular data set. The data quality associated with environmental measurement data is a function of the sampling plan rationale and procedures used to collect the samples as well as the analytical methods and instrumentation used in making the measurements. Each component has its own potential sources of error and biases that can affect the overall measurement process.

Sources of error that can be traced to the sampling component of environmental data collection are: poor sampling plan design, inconsistent use of standard operating procedures, sample handling and transportation. The most common sources of error that can be traced to the analytical component of the total measurement system are calibration and contamination problems. It is recognized that by far the largest component of the total uncertainty associated with environmental data collection originates from the sampling process. All sampling programs initiated in support of this project will stress forward planning and be well conceived and reviewed prior to the collection of any samples as a way to minimize this major source of potential error.

Uncertainty cannot be eliminated from environmental measurement data. The amount of uncertainty that can be tolerated depends on the objective of the sampling program and the intended use of the data collected. The purpose of the project's quality assurance program is to assure that the data quality of all data collected be of known and ascertainable value.

5.1 Data Quality Criteria

Data quality can be assessed in terms of its precision, accuracy, representativeness, completeness, and comparability. Analytical method detection limits will also be discussed in this section.

5.1.1 Precision

Precision is a measure of the reproducibility of analyses under a given set of conditions. The overall precision of a sampling event is a mixture of sampling and analytical factors. The precision of data collected in support of this project will be assessed on two different levels:

- By calculating the relative percent difference (RPD) of laboratory matrix spike duplicates and/or laboratory replicate samples (a measure of analytical precision).
- By calculating the RPD of field duplicates samples submitted to laboratory "blind" (a measure of the precision of the entire measurement system, including sampling).

Relative percent difference will be calculated according to the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100\%$$

where: A = Sample Result
B = Replicate Sample Result

5.1.2 Accuracy

Accuracy is a measurement of the amount of bias that exists in a measurement system. This can be thought of as the degree that the reported value agrees with the supposed "true value". The accuracy of data collected in support of this project will be assessed in the following ways:

- By calculating the percent recovery (%R) of laboratory matrix spikes and/or laboratory control standards
- By documenting the level of contamination that exists (if any) in laboratory method blanks
- By documenting the level of contamination that exists (if any) in field and/or trip blanks submitted to the laboratory "blind" for analysis
- Percent recovery will be calculated according to the following equation:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Concentration

5.1.3 Representativeness

Unlike the previous two criteria which can be expressed in quantitative terms, representativeness is a qualitative parameter. However, in terms of overall data quality, representativeness may be the most important parameter of all.

The representativeness criterion is concerned with the degree to which a sample reflects (represents) a characteristic of a population, parameter variations at a specific location or an environmental condition. Sample representativeness will be addressed in support of this project through a detailed sampling plan design and rationale and through the proper use of the appropriate sampling standard operating procedures, depending on sample matrix and the parameters to be analyzed.

Composite samples will be collected in situations conducive to compositing techniques (particularly samples collected along the vertical extent of a borehole). The use of composite samples tends to maximize the representativeness of a sampling round because more information is provided about a much broader area than a single grab sample. This is especially true in situations where the objective of sampling is to determine where gross contamination exits on site and the location of any "hot spots". In these cases, broad coverage of the area to be sampled is more important than obtaining the lowest possible detection limits.

5.1.4 Completeness

Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Usability will be determined by evaluation of the precision, accuracy, representativeness, and comparability parameters. Those data that are validated as correct, or are qualified as estimated or non-detect are considered usable. Rejected data are not considered usable. A completeness goal of 90% is projected. If this goal is not met, the effect of not meeting this goal will be discussed by the CDM project manager and the NYSDEC site manager. Completeness is calculated using the following equation:

$$Percent\ Completeness = \frac{DO}{DP} \times 100$$

Where:

DO = Data obtained and usable
DP = Data planned to be obtained

There also may be incomplete data while still meeting the 90 percent goal if a critical sample location cannot be sampled.

5.1.5 Comparability

The comparability criterion is a quality characteristic which is an expression of the confidence with which one data set can be compared with another. Comparability issues are of importance at two different levels of a sampling program. The primary comparability issues are concerned with whether the field sampling techniques, analytical procedures, and concentration units of one data set can be compared with another.

The comparability criterion also applies to the environmental conditions/ considerations present at the time of the sampling. Temporal and/or seasonal variations may make data collected from the same location at different times of the year incomparable, or comparable in a relative sense only, for example.

Comparability is judged by comparing results to other similar data sets. Consistency in the acquisition, handling, and analysis of samples is necessary for comparing

results. Data developed under this investigation will be collected and analyzed using Soil Vapor Intrusion Guidance for soil vapor collection and NYSDEC Department of Remediation Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002 to ensure comparability of results with other analyses performed in a similar manner.

5.1.6 Method Detection Limits

Whenever environmental measurement data is to be used in comparison with predetermined "action levels" or other regulatory requirements, the reported method detection limits of the analytical data is of prime importance. Analytical methods specified in support of this project should have a reported detection limit at least 50% below the required action level to assure that measurements made in the vicinity of the action level are of high quality. In circumstances concerning extremely low action levels or regulatory requirements where analytical techniques will have to be pushed to their limits, every effort will be made to select the most appropriate analytical procedures. It is recognized that analytical detection limits are sample specific and are affected by sample volumes as well as the need for sample concentration or dilution. These circumstances will be accounted for in the review and interpretation of the analytical results.

5.2 Quality Control

Two separate levels of quality control exist for all samples collected in support of this project, internal laboratory quality control and program generated quality control.

5.2.1 Internal Laboratory Quality Control

Internal laboratory quality control is a function of the individual laboratory's QA/QC Plan. A laboratory's QA/QC plan contains specific criteria governing the manner in which analyses are conducted and provide information on the laboratory's performance and control of the sources of error that exist within the lab. Included in the plan are requirements for the type and frequency of quality control check samples that are to be analyzed on a routine basis.

All laboratory analysis conducted in support of this project must include the following quality control check samples:

- Surrogate spikes (where appropriate)
- Matrix spike/matrix spike duplicate or laboratory duplicates and laboratory control samples (where appropriate)
- Method blanks

The laboratory may adhere to the analysis frequency specified in their QA/QC plan for these check samples provided that the specified frequency is equal-to or greater-than the frequency specified in Table 5-1 or as modified/specified by the QAPP.

5.2.2 Program Generated Quality Control

Program generated quality control consists of quality control check samples that are submitted to the laboratory for analysis "blind" along with actual environmental samples. These samples provide quality control information for the entire sampling event, from the actual sampling and handling through laboratory analysis. As such, they can provide the best overall estimate of the total uncertainty associated with the sampling round.

TABLE 5-1

LABORATORY SAMPLE FREQUENCY

QC Check Sample	Frequency of Analysis
Method Blanks	One per analytical batch or one per every twenty samples
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One per analytical batch or one per every twenty samples
Surrogate Spikes	One per every trace organic analysis

The combination of laboratory duplicates and laboratory control samples may be substituted for MS/MSD analysis for parameters where they are more appropriate.

Program generated quality control samples collected in support of this project are:

- Duplicate samples
- Field blanks
- Trip blanks

Each report should have a cover page that references the CDM task number.

The cover page also provides an opportunity to describe in a narrative format any unusual problems or interferences encountered during analysis. In addition, all results should be reported on a dry weight basis for soils and at dilution-corrected concentrations for all samples.

5.2.3 QC Deliverables Package

The following quality control data is required to be reported. For "priority pollutant" type analysis, the following quality control data is required per sample batch:

- Method Blanks associated with each analytical procedure.

- Surrogate Spike Recoveries for volatile organics, PCBs, semi-volatiles and polynuclear aromatic hydrocarbons.
- MS/MSDs for all priority pollutant parameters. One MS/MSD should be run for every 20 samples.

For non-priority pollutant parameters, the following quality control data is required per sample batch:

- Method Blanks
- Laboratory Duplicates -- One duplicate analysis should be performed at a frequency of one per twenty samples.

No specific acceptance criteria for blanks and spike recoveries will be set forth here, however, all laboratories are expected to conform to standard EPA quality control specifications. CDM expects laboratories to reanalyze samples if quality control samples fail to meet EPA specifications.

The quality control data may be presented as a quality control section within the report or it may be integrated among the results.

5.3 Data Quality Requirements

Taking into consideration a project's overall objective and intended use of the data, it should be considered that analyses be conducted in accordance with SW-846, Test Methods for Evaluating Solid Waste, Third Edition procedures. In cases where additional procedures are required, other EPA approved laboratory methods will be used.

5.4 Data Deliverable

Analytical data deliverable will be provided in accordance with NYSDEC requirements (EPA Region 2 EDD, dated December 2003).

5.5 Analytical Data Validation

If a Work Assignment requires the validation of data; i.e., data validation is performed to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

Laboratories results shall be supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of the data. The laboratory will review data prior to its release from the laboratory. Objectives for review are in accordance with the QA/QC objectives stated in each site-specific Work Plan. The laboratory is required to evaluate their ability to meet these objectives. Outlying data will be flagged in accordance with laboratory standard operating procedures, and corrective action will be taken to rectify the problem.

A NYSDEC-approved qualified independent third party data validator will review the data package to determine completeness and compliance in accordance with Standby Contract D004437. A narrative describing how the data did or did not meet the validation criteria is part of the data validation procedure. The validation assessment will describe the overall quality of the data and the data validation report will provide a written statement upon completion of the validation indicating whether or not the data are valid and usable, and include a percent completeness value of usable data.

5.6 Data Usability Summary Report

A Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. If a Work Assignment requires a DUSR, the DUSR will be developed by a NYSDEC approved qualified environmental scientist in accordance with Standby Contract D004437.

ATTACHMENT 1

NYSDOH Indoor Air Quality Questionnaire and Building Inventory

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

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

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

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

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

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

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

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

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

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

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

Other characteristics:

Number of floors_____ Building age_____

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

4. AIRFLOW

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

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

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

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

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

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

_____

_____

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

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

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

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

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

_____

_____

_____

_____

7. OCCUPANCY

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

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

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

If yes, what types of solvents are used? _____

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

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

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

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

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

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

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

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

11. FLOOR PLANS

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

Basement:

First Floor:

12. OUTDOOR PLOT

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

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

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

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

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

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

Appendix B

Health and Safety Plan

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractors*	**CDM** (Camp Dresser & McKee) **PROJECT DOCUMENT #:**

PROJECT NAME	Former Metco Facility	**PROJECT#**	0897-63375	**REGION**	PSG NER
SITE ADDRESS	325 Duffy Ave.	**CLIENT ORGANIZATION**		NYSDEC	
	Hicksville, NY	**CLIENT CONTACT**		Vivian James	
		CLIENT CONTACT PHONE #		(518) 402-9621	

( ) **AMENDMENT TO EXISTING APPROVED H&SP?**

( ) **H&SP AMENDMENT NUMBER?** _____ ( ) **DATE OF PREVIOUS H&SP APPROVAL** _____

OBJECTIVES OF FIELD WORK:
(e.g. collect surface soil samples):

1. supervise geophysical survey
2. collect surface soils samples
3. install and sample soil vapor monitoring probes
4. install and sample groundwater monitoring wells

SITE TYPE: *Check as many as applicable*

Active	(xx)	Landfill	(xx)	Unknown	( )
Inactive	( )	Uncontrolled	( )	Military	( )
Secure	( )	Industrial	(xx)	Other (specify)	
Unsecure	(xx)	Recovery	( )		
Enclosed space	( )	Well Field	( )		

All requirements described in the **CDM Health and Safety Manual** are incorporated in this health and safety plan by reference.

PERSONNEL AND RESPONSIBILITIES **NAMES OF WORK CREW MEMBERS**	**COMPANY or DIVISION**	**SUPERVISORY TRAINED?**	**PROJECT OR SITE RESPONSIBILITIES**	**Tasks On Site?**
Frank Robinson	CDM/EMP	Y	Work Assignment Manager	1-2-3-4-5-6
Christopher Marlowe	CDM/EMP	Y	Site Health & Safety Coordinator	1-2-3-4-5-6
			2nd Health & Safety Coordinator	1-2-3-4-5-6
Melissa Koberle	CDM/EMP	Y	Site Engineer	1-2-3-4-5-6
			Site Engineer	1-2-3-4-5-6
Dennis Grove	CDM/EMP	Y	Site Technician	1-2-3-4-5-6
Aztech Technologies - drillers	Aztech		Subcontractor	1-2-3-4-5-6

BACKGROUND REVIEW: ( ) Complete (XX) Incomplete

SITE MAP: *Show Exclusion, Contamination Reduction, and Support Zones. Indicate Evacuation and Reassembly Points*

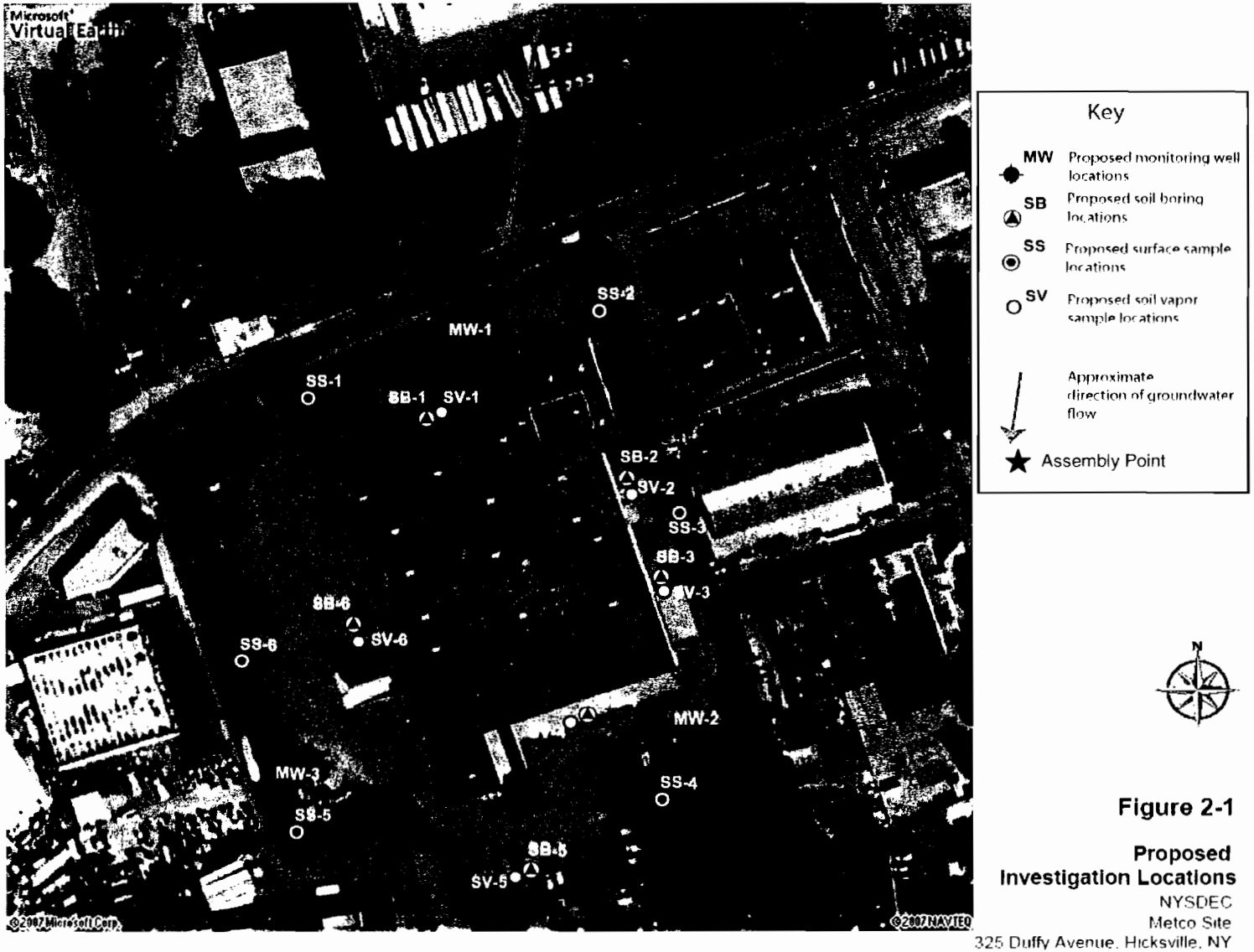


Figure 2-1

Proposed Investigation Locations
NYSDEC
Metco Site
325 Duffy Avenue, Hicksville, NY

The exclusion zone will include all points within 10 feet of the investigation activities or a sampling location. The contamination reduction zone will consist of a ten foot radius outside of the exclusion zone and will be cordoned off with cones and caution tape. The support zone will be a 10 foot radius outside of the CRZ. All zones are mobile, established in consideration of the prevailing wind direction and will be established and moved as work crew advances to new locations.

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM** (Camp Dresser & McKee)
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

HISTORY: *Summarize conditions that relate to hazard. Include citizen complaints, spills, previous investigations or agency actions, known injuries, etc.*

Little information is available on the history of this site. Constructed circa 1959 the facility has been used as a commercial and industrial establishment by dozens of former tenants. A public records file search will be conducted to determine the locations of potential areas of concern.Waste manifests provided by NYSDEC suggest that the previous ocupants generated wastes of various types between 1980 and 1985 including class D001 (non-listed ignitables) , D002 (Oil sludges), D008 (lead) , D010 (selenium), D011 (silver), F001 Halogenated solvents) and F005 (spent halogenated solvents). It is not clear how or where the former occupnats disposed of these wastes. This investigation is being conducted to determine if residual contamination may have been left on site and whether it has impacted soils, soil vapor or/or groundwater. No previous investigative work is reported to have been performed on this site.

WASTE TYPES: ( ) Liquid ( ) Solid ( ) Sludge ( ) Gas ( ) Unknown (XX) Other, specify: contaminated groundwater

WASTE CHARACTERISTICS: *Check as many as applicable.*

( ) Corrosive ( ) Flammable ( ) Radioactive
( ) Toxic (XX) Volatile ( ) Reactive
( ) Inert Gas ( ) Unknown
( ) Other: _____

WORK ZONES:

The exclusion zone will include all points within 10 feet of the investigation activities or a sampling location. The contamination reduction zone will consist of a ten foot radius outside of the exclusion zone. The support zone will be a 10 foot radius outside of the CRZ. All zones are mobile, established in consideration of the prevailing wind direction and will be established and moved as work crew advances to new locations.

HAZARDS OF CONCERN: *Check as many as applicable.*

(X) Heat Stress CDM Guideline (X) Noise CDM Guideline
(X) Cold Stress CDM Guideline (X) Inorganic Chemicals
( ) Explosive/Flammable (X) Organic Chemicals
( ) Oxygen Deficient (X) Motorized Traffic
( ) Radiological (X) Heavy Machinery
( ) Biological (X) Slips & Falls CDM Guideline
( ) Other: _____
( ) Other: _____

FACILITY'S PAST AND PRESENT DISPOSAL METHODS AND PRACTICES:

No information is available on the past disposal practices at this facility. NYSDEChas indicated that wastes formerly generated by various facility occupants between 1980 and 1985 included waste types D001 (Ignitable), D002 (Oil Sludges), D008 (Lead), D010 (Selenium), D011 (Silver) and F001 and F005 (halogenated and spent solvents). It is presumed that these wastes could have beed disposed in floor drains, dry wells or other on-site structures.

This plan incorporates CDM's procedure for: *(Click on the relevant topics to download the hazard guideline. Delete irrelevant topics.)*

Housekeeping	Traffic and Work Zone Safety	Tools and Power Equipment	Working Safely Around Geoprobes
Manual Material Handling	Excavations	Working Around Heavy Equipment	Hazardous Waste Site Controls
Electrical Safety	Ladders	Working Near or Over Water	Working Safely Around Drill Rigs
Lock Out/Tag Out	Scaffolds	Flammable and Combustible Liquids	
Compressed Gases	Mechanized Personnel Lifts	Hazardous Waste Site Decontamination	

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM** (Camp Dresser & McKee)
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

DESCRIPTION AND FEATURES: *Include principal operations and unusual features (containers, buildings, dikes, power lines, hillslopes, rivers, etc.)*

This 6.8 acre site was building circa 1959 and been used as a commercial and industrial establishment for dozens of former tenants throughout its history. Historical waste manifest/forms indicate that the site occupants did generate various types of industrial wastes between 1980 and 1985 (including wastes characterized as D001, D002, D008, D010, D011, F001 and F005). Dry wells are suspected to be present on the site. Storm water and roof drain discharges are channeled to an on-site recharge basin in the southeast corner of the site. Scope of work is designed as a preliminary site assessment to determine whether residual contamination from former activities has impactes soils, soil vapor and/or groundwater

SURROUNDING POPULATION: (X) Residential (X) Industrial (X) Commercial ( ) Rural (X) Urban OTHER:

HAZARDOUS MATERIAL SUMMARY: ***Highlight or bold waste types and estimate amounts by category.***

CHEMICALS: *Amount/Units:*	**SOLIDS:** *Amount/Units:*	**SLUDGES:** *Amount/Units:*	**SOLVENTS:** *Amount/Units:*	**OILS:** *Amount/Units:*	**OTHER:** *Amount/Units:*
Acids	Flyash	Paints	Ketones	Oily Wastes	Laboratory
Pickling Liquors	Mill or Mine Tailings	Pigments	Aromatics	Gasoline	Pharmaceutical
Caustics	Asbestos	Metals Sludges	Hydrocarbons	Diesel Oil	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	Alcohols	Lubricants	Radiological
Dyes or Inks	Non-Ferrous Smelter	Distillation Bottoms	Halogenated (chloro, bromo)	Polynuclear Aromatics	Municipal
Cyanides	Metals	Aluminum	Esters	PCBs	Construction
Phenols	Dioxins		Ethers	Heating Oil	Munitions
Halogens					
Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION	PEL/TLV *ppm or mg/m3 (specify)*	IDLH *ppm or mg/m3 (specify)*	Warning Concentration *(in ppm)*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL
Oil Sludge	NE/U	5 mg/m3	2,500 mg/m3	Mist	Nasal irritation	Mist
Gasoline (possible)	NE/U	300 ppm	NE	10 ppm	Vomiting, diarrhea, insomnia, dizziness, headache	NA
Diesel Fuel (possible)	NE/U	100 mg/m3	NE	10 ppm	Vomiting, diarrhea, insomnia, dizziness, headache	NA
Lead	NE/U	50 µg/m3	100 mg/m3	Dust	Fatigue, pallor, colic, insomnia	Dust
Selenium	NE/U	200 µg/m3	1 mg/m3	Dust	Headache, chill, fever, garlic breath, disturbed vision	Dust
Silver (dust)	NE/U	100 µg/m3	10 mg/m3	Dust	Blue-gray eyes & skin, gastrointestinal irritation	Dust
Silver (metal & soluble)	NE/U	10 µg/m3	NA	NA	Blue-gray eyes & skin, gastrointestinal irritation	Dust
Possible VOCs						
Benzene	NE/U	0.5 ppm	500 ppm	61 ppm	Eye & nose irritation, headache, giddiness, nausea, fatigue	9.25
Vinyl chloride	NE/U	1 ppm	Carc.	NA	Weakness, stomach pain, cancer	10.00
Trichloroethylene	NE/U	50 ppm	1,000 ppm	82 ppm	Vertigo, visual disturbance, headache, drowsiness	9.45
Trichlorobenzene	NE/U	C-5 ppm	NE	NA	Nose & eye irritation	NA
1,1,1-Trichloroethane	NE/U	350 ppm	700 ppm	400 ppm	Headache, CNS depression, loss of balance, eye irritation	11.00
1,1,2-Trichloroethane (skin)	NE/U	10 ppm	100 ppm	NA	Irritated nose, central nervous system depression	11.00
Toluene (skin)	NE/U	50 ppm	500 ppm	1.7 ppm	Fatigue, confusion, euphoria, dizziness, headache, tears	8.82
Tetrachloroethylene	NE/U	25 ppm	150 ppm	47 ppm	Irritated eyes, nose, throat, flushed face & neck, dizziness	9.32
Ethyl benzene	NE/U	100 ppm	800 ppm	200 ppm	Eye & nose irritation, headache, narcosis	8.76
1,1-Dichloroethane	NE/U	100 ppm	3,000 ppm	120 ppm	Skin irritation, drowsiness	11.10
1,1 Dichloroethylene	NE/U	1 ppm	>500 ppm	1.1 ppm	No acute effects	<11.0
1,2 Dichloroethylene	NE/U	200 ppm	1,000 ppm	1.1 ppm	Irritated eyes, CNS depression	10.00
Dichlorobenzene (skin)	NE/U	10 ppm	150 ppm	0.7 ppm	Nose, eye irritation, skin blister, headaches, nausea, jaundice	9.10
Xylene	NE/U	100 ppm	900 ppm	5 ppm	Eye, nose & throat irritation, drowsiness, nausea, incoordination	8.44

NA = Not Available **NE = None Established** **U = Unknown**

Verify your access to an MSDS for each chemical you will use at the site.

S = Soil SW = Surface Water T = Tailings W = Waste TK = Tanks SD = Sediment
A = Air GW = Ground Water SL = Sludge D = Drums L = Lagoons OFF = Off-Site

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractors*	**CDM** (Camp Dresser & McKee) **PROJECT DOCUMENT #:**	
SPECIFIC TASK DESCRIPTIONS	**Disturbing the Waste?**	**TASK - SPECIFIC HAZARDS**	**HAZARD & SCHEDULE**
1 1. supervise geophysical survey	**Intrusive** Non-intrusive	Physical hazards - heat/cold stress, slip-trip-fall, vehicular traffic	Low Hazard
2 2. collect surface soil samples	Intrusive **Non-intrusive**	Physical hazards - heat/cold stress, slip-trip-fall, vehicular traffic Chemical hazards - contact with contaminated soils	Low Hazard
3 3.install and sample soil vapor probes	**Intrusive** Non-intrusive	Physical hazards - heat/cold stress, slip-trip-fall, vehicular traffic, geoprobe/drill rig, heavy equipment, electrical hazards, manual material handling Chemical hazards - contact with contaminated soil, groundwater, and/or vapors	Low Hazard
4 4. Install and sample groundwater monitoring wells	**Intrusive** Non-intrusive	Physical hazards - heat/cold stress, slip-trip-fall, vehicular traffic, geoprobe/drill rig, heavy equipment, electrical hazards, manual material handling Chemical hazards - contact with contaminated soil, groundwater, and/or vapors	Low Hazard
5	Intrusive Non-intrusive		
6	Intrusive Non-intrusive		
SPECIALIZED TRAINING REQUIRED:		**SPECIAL MEDICAL SURVEILLANCE REQUIREMENTS:**	
OVERALL HAZARD EVALUATION: ( ) High ( ) Medium (XX) Low ( ) Unkn *(Where tasks have different hazards, evaluate each.)*			
JUSTIFICATION: While little is known about the site, there is no evidence that hazards would be greater than Low.			
FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (XX) Low ( ) Unknown			

HEALTH AND SAFETY PLAN FORM | *This document is for the exclusive use of CDM and its subcontractors* | **CDM** (Camp Dresser & McKee)

CDM Health and Safety Program | **PROJECT DOCUMENT #:**

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(x) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(x) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(x) Steel-Toe
( ) Rubber **(X) Leather**
( ) Overboots: Latex (optional)

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
(XX) Other: **work clothes**

Gloves: ( ) Not needed
(XX) Undergloves: latex
(X) Gloves: Nitrile Task 4 & 5
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device
(X) Heating Protection
(X) Sun Screen

BLOCK B

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary (XX) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) Cartridge:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

( ) Overboots: Latex

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

( ) Hearing Protection
( ) Sun Screen

BLOCK C

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Hearing Protection
( ) Sun Screen

BLOCK D

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Hearing Protection
( ) Sun Screen

This health and safety plan form constitutes hazard analysis per 29 CFR 1910.132

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM** (Camp Dresser & McKee)
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

MONITORING EQUIPMENT: *Specify by task. Indicate type as necessary. Attach additional sheets if needed.*

INSTRUMENT	TASK	ACTION GUIDELINES		COMMENTS
Combustible Gas Indicator	1-2-3-4-5-6-7-8	0-10% LEL 10-25% LEL >25% LEL 21.0% O2 <21.0% O2 <19.5% O2	*No explosion hazard* *Potential explosion hazard; notify SHSC* *Explosion hazard; interrupt task/evacuate* *Oxygen normal* *Oxygen deficient; notify SHSC* *Interrupt task/evacuate*	( ) Not Needed Needed for all drilling activities which includes hydropunch technology and soil vapor sampling.
Radiation Survey Meter	1-2-3-4-5-6-7-8	3 x Background: >2mR/hr:	*Notify HSM* *Establish REZ*	(X) Not Needed
Photoionization Detector 11.8 eV Lamp Type MiniRAE 200	1-2-3-4-5-6-7-8	*Specify:*		( ) Not Needed PID#1 - Monitor breathing zone continuoulsy. Compare action levels to time-averaged breathing zone measurements. PID#2 - Continuous sampling and logging downgradient of exclusion zone (see NYSDOH CAMP attached)
Flame Ionization Detector Type	1-2-3-4-5-6-7-8	*Specify:*		(X) Not Needed
Single Gas Type Vinyl Chloride Type Benzene	1-2-3-4-5-6-7-8	*Specify:*	0-1 ppm: Level D 1-20 ppm: Level D. Check for vinyl chloride > 20 ppm Leave area. Call HSM	( ) Not Needed Team will draw vinyl chloride or benzene detector when PID readings rise.
Respirable Dust Monitor Type DR-4000 Type DR-4000	1-2-3-4-5-6-7-8	*Specify:*	If team observes visible concentrations of airborne dust or dry, windy conditions that dust, team will leave area.	( ) Not Needed Continuous sampling and logging upgradient and downgradient of exclusion zone (see NYSDOH CAMP attached)
Other *Specify:* Type Type	1-2-3-4-5-6-7-8	*Specify:*	If team notices unusual odors or irritation of the eye or throat, they will leave the area.	( ) Not Needed
Other *Specify:* Type Type	1-2-3-4-5-6-7-8	*Specify:*		( ) Not Needed

HEALTH AND SAFETY PLAN FORM CDM Health and Safety Program	*This document is for the exclusive use of CDM and its subcontractors*	**CDM** (Camp Dresser & McKee) **PROJECT DOCUMENT #:**

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES AS PAGE TWO

Personnel Decontamination *Summarize below or attach diagram;*	**Sampling Equipment Decontamination** *Summarize below or attach diagram;*	**Heavy Equipment Decontamination** *Summarize below or attach diagram;*
Team members will remove their protective clothing in the following order: 1. Equipment drop. 2. Glove removal 3. Hand and face wash. ( ) Not Needed	Sampling equipment will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. 4. Distilled water rinse. ( ) Not Needed	Drill rigs and/or geoprobes used for hydropunch and soil vapor sampling will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. Heavily contaminated equipment will be steam cleaned ( ) Not Needed
Containment and Disposal Method Disposable protective equipment will be disposed of in CDM dumpster, unless heavily contaminated. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	**Containment and Disposal Method** Sampling equipment cleaning water solutions will be allowed to drain to the groundwater. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	**Containment and Disposal Method** Decontamination fluids will be released to the ground, unless heavily contaminated. If heavily contaminated, contractor will contain the waste in drums, and left on site for proper disposal.

HAZARDOUS MATERIALS TO BE BROUGHT ONSITE

Preservatives		*Decontamination*		*Calibration*	
(X) Hydrochloric Acid	( ) Zinc Acetate	( ) Alconox ™	( ) Hexane	(X) 100 ppm isobutylene	(X) Hydrogen Sulfide
( ) Nitric Acid	( ) Ascorbic Acid	(X) Liquinox ™	( ) Isopropanol	(X) Methane	(X) Carbon Monoxide
( ) Sulfuric Acid	( ) Acetic Acid	( ) Acetone	( ) Nitric Acid	( ) Pentane	( ) pH Standards
( ) Sodium Hydroxide	( ) Other:	( ) Methanol	( ) Other:	( ) Hyrogen	( ) Conductivity Std
		( ) Mineral Spirits		( ) Propane	( ) Other:

HEALTH AND SAFETY PLAN FORM *This document is for the exclusive* **CDM** (Camp Dresser & McKee)

CDM Health and Safety Program *use of CDM and its subcontractors* **PROJECT DOCUMENT #:**

EMERGENCY CONTACTS

Water Supply	
Site Telephone	NA
EPA Release Report #:	800 / 424 - 8802
CDM 24-Hour Emergency #:	NSG 732 / 539 - 8128
Facility Management	NA
Other (specify)	
CHEMTREC Emergency #:	800 / 424 - 9300

SAFETY NARRATIVE: *Summarize below*

If CDM work team observes hazards for which they have not prepared, they will withdraw from the area and call the CDM Project Manager.

SHSC will designate evacuation routes. Teams will cease work if they see lightning or thunder storms in the area.

CDM may rely on instruments operated by contractor personnel only upon HSM approval. If contractor directs a higher level of protection than this plan does, CDM personnel will wear that level. CDM personnel may choose to wear more potection than directed by this plan.

Contractor will be expected to inspect its equipment and certify its suitability for the project to the CDM site health and safety coordinator.

HEALTH AND SAFETY PLAN APPROVALS (H&S Mgr must sign each plan)

Prepared by	David Keil	Date	
HSC Signature		Date	
HSM Signature		Date	

EMERGENCY CONTACTS	**NAME**	**PHONE**
Health and Safety Manager	Chris Marlowe	732 / 590 - 4632
Project Manager	Frank Robinson	631.553.5785
Site Safety Coordinator	Melissa Koberle	212-785-9160
Client Contact	Vivian James	(518) 402-9621
Other *(specify)*	Melissa Koberle	212-785-9160
Environmental Agency		
State Spill Number	New York	(800) 457 - 7362
Fire Department		911
Police Department		911
State Police		911
Health Department	NYS DOH	866.881.2809
Poison Control Center	Nationwide	800 / 222 - 1222
Occupational Physician	Jerry Berke	800.350.4511

MEDICAL EMERGENCY 516 876-5200 **PHONE**

Hospital Name:	North Shore University Hospital
Hospital Address	972 Brush Hollw Road, Westbury, NY
Name of Contact at Hospital:	
Name of 24-Hour Ambulance:	911
Route to Hospital:	

Proceed southwest on Duffy Ave. Take Wantagh Parkway North and merge onto the Northern Parkway. Exit Northern Parkway at Exit 34. Make a right onto Cedar Road and a right onto Brush Hollow Road. Hospital is 2.01 miles from the site. **Map to hospital is provided at the back of this HASP.**

Distance to Hospital 1.99 miles

HEALTH AND SAFETY PLAN SIGNATURE FORM

CDM Health and Safety Plan

All site personnel must sign this form indicating receipt of the H&SP. Keep this original on site. It becomes part of the permanent project files. Send a copy to the Health and Safety Manager (HSM).

SITE NAME/NUMBER: Former Metco Facility, 325 Duffy Ave, Hicksville, NY

DIVISION/LOCATION: _____

CERTIFICATION:

I understand, and agree to comply with, the provisions of the above referenced H&SP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the site Health and Safety Coordinator (SHSC). I agree to inform the SHSC about any drugs (legal and illegal) that I take within three days of site work.

PRINTED NAME	SIGNATURE	DATE

Google Maps

Start **325 Duffy Ave**
Hicksville, NY 11801
End **972 Brush Hollow Rd**
Westbury, NY 11590
Travel **2.0 mi – about 4 mins**

Notes North Shore University Hospital
972 Brush Hollw Road, Westbury
NY

325 Duffy Ave
Hicksville, NY 11801
Drive: 2.0 mi – about 4 mins

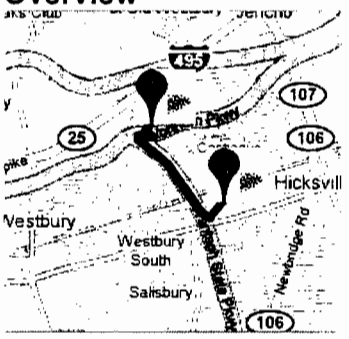
1.	Head **southwest** on **Duffy Ave** toward **Charlotte Ave**	0.2 mi 1 min
➔ 2.	Turn **right** onto the **Wantagh State Pkwy N** ramp	0.1 mi
3.	Merge onto **Wantagh Pkwy N/Wantagh State Pkwy**	1.1 mi 1 min
4.	Take the exit onto **Northern Pkwy E** toward **Hauppauge**	0.2 mi 1 min
5.	Take exit **34** toward **Westbury/Brush Hollow Rd**	190 ft
6.	Merge onto **Cedar Rd**	0.1 mi
➔ 7.	Turn **right** at **Brush Hollow Rd**	0.2 mi

972 Brush Hollow Rd
Westbury, NY 11590

These directions are for planning purposes only. You may find that construction projects. traffic, or other events may cause road conditions to differ from the map results.

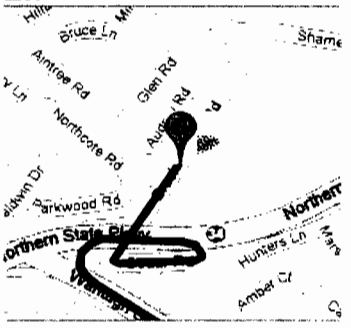
Map data ©2008 NAVTEQ™

Overview



Start

End



Map data ©2008 NAVTEQ™

NEW YORK STATE DEPARTMENT OF HEALTH

COMMUNITY AIR MONITORING PLAN

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

Appendix C

2.11 forms

Schedule 2.11(a)

Summary of Work Assignment Price

Work Assignment Number D004437-21

1) Direct Salary Costs (Schedules 2.10(a) and 2.11(b))	$24,360
2) Indirect Costs (Schedule 2.10(g))	$40,900
3) Direct Non-Salary Costs (Schedules 2.10(b)(c)(d) and 2.11(c)(d))	$6,616

4) Subcontract Costs

Cost-Plus-Fixed-Fee Subcontracts (Schedule 2.10(e) and 2.11(e))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	Ken Schider Consulting	W/MBE Reporting	$600
ii)			
iii)			

A) Total Cost-Plus-Fixed-Fee Subcontracts $600

Unit Price Subcontracts (Schedule 2.10 (f) and 2.11 (f))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	EDR	City Directories	$696
ii)	Aztech Technologies, Inc.	WBE Well Driller	$31,068
iv)	ChemTech	MBE Laboratory	$15,555
v)	Nancy Potak	WBE Data Validator	$1,806
vi)	EnviroProbe Service, Inc.	Geophysical Survey	$5,100
vii)	SeaCoast Environmental	IDW Removal	$4,284

B) Total Unit Price Subcontracts $58,508

5) Subcontract Management Fee	$2,421.44	
6) Total Subcontract Costs (lines 4A + 4B + 5)		$61,530
7) Fixed Fee (Schedule 2.10(h))		$4,568
8) Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)		$137,973

Engineer/Contract # D004437-21
Project Name Metco Site
Work Assignment No. D004437-21

Date Prepared: 2/19/2008

Schedule 2.11(b)
Direct Labor Hours Budgeted

Labor Classification	***IX***		***VIII***		***VII***		***VI***		***V***		***IV***		***III***		***II***		***I***		***Admin Support***		***Total No. of Direct Labor Hours and Costs Budgeted***	
*Av. Salary Rate ($) Year 2008	$65.24		$59.42		$52.09		$45.95		$38.75		$32.86		$28.62		$25.52		$21.12		$21.12		0	
Description	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Task 1 Work Plan Development	2	$130.48	16	$950.72	0	$0.00	8	$367.60	0	$0.00	80	$2,628.80	0	$0.00	0	$0.00	0	$0	8	$168.96	114	$4,246.56
Task 2 Site Characterization	2	$130.48	24	$1,426.08	0	$0.00	8	$367.60	0	$0.00	200	$6,572.00	150	$4,293.00	20	$510.40	0	$0	0	$0.00	404	$13,299.56
Task 3 Field Documentation and Reporting	2	$130.48	24	$1,426.08	0	$0.00	0	$0.00	0	$0.00	120	$3,943.20	40	$1,144.80	0	$0.00	0	$0	8	$168.96	194	$6,813.52
Total Hours	6		64		0		16		0		400		190		20		0		16		712	
Total Direct Labor Cost ($) **Year 2008**		$391.44		$3,802.88		$0.00		$735.20		$0.00		$13,144.00		$5,437.80		$510.40		$0.00		$337.92		$24,359.64

* For multiple years use one average salary rate row for each year and each years subtotal Labor Cost.

Engineer/Contract # D004437-21
Project Name Metco Site
Work Assignment No. D004437-21

Date Prepared: _____

Schedule 2.11(b-1)
Direct Administrative Labor Hours Budgeted

Labor Classification		***IX***	***VIII***	***VII***	***VI***	***V***	***IV***	***III***	***II***	***I***	***Admin. Support***	***Total No. of Direct Labor Hrs.***
Task 1	Work Plan Development	2	0	0	1	0	0	0	0	0	8	11
Task 2	Site Characterization	2	0	0	0	0	0	0	0	0	0	2
Task 3	Field Documentation and Reporting	2	0	0	0	0	0	0	0	0	8	10
TOTAL HOURS		6	0	0	1	0	0	0	0	0	16	23

Contract/Project administrative hours would include (subject to contract allowability) but not necessarily be limited to the following activities:

1) Work Plan Budget Development
   > Conflict of Interest Check
   > Budget schedules & supporting documentation
2) Review work assignment (WA) progress
   > Conduct progress reviews
   > Prepare monthly project report
   > Update WA progress schedule
   > Prepare M/WBE Utilization Report
3) Contractor Application for Payment (CAP)
   > Oversee and prepare monthly CAP
4) Program Management
   > Prepare monthly cost control report
   > Cost control reviews
   <> Staffing Plans
   >Manage subcontracts
   > NSPE list update
   > Equipment inventory
5) Miscellaneous
   > Conduct Health and Safety Reviews
   > Word processing and graphic artists
   > Report editing

Contract/Project Administration hours would **not** inclu
1) QA/QC reviews
2) Techincal oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Schedule 2.11 (c)

Direct Non-Salary Costs
Work Assignment Number **D004437-21**

	Item		Max. Reimbursement * Rate (Specify Unit)	Est. No. of Units	Total Estimated Cost
A)	Other				
	1)	Shipping Task 1	LS	1	$25.00
	2)	Outside Printing Task 1	LS	1	$250.00
	3)	Shipping Task 3	LS	1	$50.00
	4)	Outside Printing Task 3	LS	1	$400.00
				Sub-Total Other	$725.00
B)	Miscellaneous Task 1 - Workplan Development/Record Search				
	1)	Meals (per day)	$64.00	0	$0.00
	2)	Lodging (per day)	$159.00	0	$0.00
	3)	Mileage (per mile)	$0.505	20	$10.10
	4)	PPE (level D) (per day)	$15.00	0	$0.00
	5)	Tolls	$0.00	0	$0.00
	6)	LVE	$1.00	8	$8.00
				Sub-Total Miscellaneous Task 1	$18.10
B)	Miscellaneous Task 2 - Site Characterization				
	1)	Meals (per day)	$20.00	34	$680.00
	2)	Lodging (per day)	$159.00	0	$0.00
	3)	Mileage (per mile)	$0.505	800	$404.00
	4)	PPE (level D) (per day)	$15.00	34	$510.00
	5)	Tolls	$0.00	0	$0.00
	6)	LVE	$1.00	354	$354.00
				Sub-Total Miscellaneous Task 2	$1,948.00
				Total Direct Non-Salary Costs	**$2,691.10**

Work Assignment No. D004437-21

Schedule 2.11(d) 3

Maximum Reimbursement Rate for Vendor Rented Equipment

Item	Max Reimbursement Rate ($)*	Est. Usage (unit of time)	Est. Rental Cost ($) (Col. 2 x 3)
Task 2			
PID #1 (weekly) (for downgradient community air monitoring station)	$110.00	3	$330.00
Lamp 11.7 eV Interchangeable (weekly) (for downgradient community air monitoring station equipped with PID #1)	$41.25	3	$123.75
PID #2 (weekly) (for breathing zone and headspace readings)	$110.00	3	$330.00
Lamp 11.7 eV Interchangeable (weekly) (for breathing zone and headspace readings collected with PID #2)	$41.25	3	$123.75
CGI (weekly) (includes associated auxiliary equipment for upgradient community air monitoring station)	$247.50	2	$495.00
Dust Monitor #2 MIE DR-4000 (monthly) (includes associated auxiliary equipment for downgradient community air monitoring station)	$900.20	1	$900.20
JOBCOM Radio VHF JMS-141-D (for alarms on DR-4000s) (weekly)	$900.20	1	$900.20
Bailers, weighted teflon (3') (3 each)	$19.25	3	$57.75
Submersible pump (day)	$15.40	3	$46.20
Oil-Water Interface probe (day)	$52.26	1	$52.26
Water level meter (week)	$24.75	1	$24.75
Horiba U-22 Water Quality meter (day)	$27.50	3	$82.50
3/8"IDx1/2"OD poly tubing (feet)	$55.00	1	$55.00
Generator (day)	$0.25	240	$60.00
Helium tank rental (from Walmart)	$24.75	1	$24.75
Helium Meter (day)	$60.00	1	$60.00
Low Flow Pump (<0.2 L/min) (day)	$49.50	2	$99.00
GeoXT hand held GPS (day)	$24.75	2	$49.50
	$110.00	1	$110.00
		SUBTOTAL:	**$3,924.61**

* Reimbursement will be made at the Maximum Reimbursement rate or the actual rental rate, whichever is less.

Schedule 2.11 (e)

Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D004437-21

Name of Subcontractor	Services to be Performed	Subcontract Price
Ken Schider Consulting	M/WBE Reporting	$599.97

A) Direct Salary Costs

Professional Responsibility Level	Labor Classification	Ave. Reimbursement Rate ($/Hr.)	Max. Reimbursement Rate ($/Hr.)	Est. No. of Hours	Total Est Direct Salary Cost (Ave. Reimb. Rate x Est. # of Hrs.)
IV	Eng/Scientist 4	$32.60	$36.78	8	$260.80

Total Direct Salary Costs **$260.80**

Footnotes:

1) The labor rate averages and maximums shall be adjusted by a rate equal to the increase in the CPI index CUURA101SAO-"All Urban Consumers-New York-Northern N.J.-Long Island" for the previous year. This index is published by the U.S. Department of Labor's Bureau of Labor Statistics. The adjustment will be calculated every January and will be effective for subsequent work assignment billing and budgeting purposes.
2) Schedule 2.11(e) may be re-negotiated after four (4) years at the request of either party. Any revision as a result of re-negotiation will be subject to the approval of the Office of the State Comptroller.
3) The maximum annual escalation is limited to 5%.
4) Reimbursement will be limited to the lesser of either the individual's actual hourly rate or the maximum rate for each labor
5) Reimbursement will be limited to the maximum reimbursement rate for the professional responsibility level of the actual work
6) Only those labor classifications indicated with an asterisk will be entitled to overtime.
7) Reimbursement for technical time of principals, owners, and officers will be limited to the maximum reimbursement rate of that category, the actual hourly labor rate paid, or the State M-6 rate, whichever is lower.
8) Maximum reimbursement rates may be exceeded for work assignment activities that are under the jurisdiction of the Schedule of Prevailing Wage Rates set by the New York State Department of Labor.

B) Indirect Costs

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of 115 % or the actual rate calculated in accordance with 48 CFR Federal Acquisition Regulation, whichever is lower.

Amount budgeted for indirect costs is: **$299.92**

C) Maximum Reimbursement Rates for Direct Non-Salary Costs

Item		Max Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
1)	Travel	See Schedule 2.10 (d) for rates		
2)	Supplies			

Total Direct Non-Salary Costs **$0**

D) Fixed Fee

The fixed fee is: 7% **$39.25**
See Schedule 2.10 (h) for how the fixed fee should be claimed.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-21

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
EDR	Environmental Database, Aerial Photos, Topo Maps, etc	$696	$0

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
Radius Search with GeoCheck plus Title Search		1	$696
Subtotal-Subcontract Price			**$696**
Subcontract Management Fee*			**$0**
TOTAL			**$695.50**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number **D004437-21**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
EnviroProbe Service, Inc.	Utility Locate	$5,100.00	$0

Item	Max. Reimbursement Rate (Specify Uni	Est. No. of Units	Total Est. Cost
Geophysical Survey (Clear Drilling Locations)			
Geophysical survey	$1,600 day	3	$4,800.00
Mobiliztion fee	$300 ea	1	$300.00
Subtotal-Subcontract Price			**$5,100.00**
Subcontract Management Fee*			**$0.00**
TOTAL			**$5,100.00**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number **D004437-21**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Nancy Potak	WBE Data Validator	$1,806.00	$90.30

Item	Max. Reimbursement Rate (Specify Unit)		Est. No. of Units	Total Est. Cost
DATA VALIDATION Task 2A				
Groundwater				
VOCs 8260B	11.55	/Sample	11	$127.05
SVOCs 8270C	21.00	/Sample	11	$231.00
Metals 7000 (Hg)	17.85	/Sample	11	$196.35
Soil				
VOCs 8260B	11.55	/Sample	15	$173.25
SVOCs 8270C	21.00	/Sample	15	$315.00
Metals 7000 (Hg)	26.25	/Sample	15	$393.75
Air				
TO-15 VOCs	11.55	/Sample	16	$184.80
TO-15 Dilution	11.55	/Sample	16	$184.80
Subtotal-Subcontract Price				**$1,806.00**
Subcontract Management Fee*				**$90.30**
TOTAL				**$1,896.30**

* A subcontract management fee of 5% has been included for M/WBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts

Work Assignment Number **D004437-21**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Aztech Technologies, Inc.	WBE Driller	$31,068.12	$1,553.41

Item		Unit Cost		Est. No. of Units	Total Est. Cost
	Mobilization/ Demobilization Drill Rig	$3,280.00	ls	1	$3,280.00
	Per Diem	$245.00	day	6	$1,470.00
	Personal Protective Equipment	$1.10	each	12	$13.20
Drilling	4.25 inch ID Hollow Stem Augering (0-50 feet)	$14.14	per LF	150	$2,121.00
	4.25 inch ID Hollow Stem Augering (50-100 feet)	$16.67	per LF	75	$1,249.88
	Schedule 40 PVC well screen, 2.0 inch ID, #20 slot	$5.00	per LF	30	$150.00
	Schedule 40 PVC riser, 2.0 inch ID	$4.00	per LF	195	$780.00
	Well screen sand pack for 2.0 inch monitoring - well set in 4.25 inch hollow stem augers	$5.00	per LF	36	$180.00
	Seal for 2.0 inch monitoring well set in 4.25 inch hollow stem augers	$9.00	per LF	6	$54.00
	Riser Backfill	$7.00	per LF	183	$1,281.00
	Flush-Mount, 6.0 inch ID Protector with locking cover, drain hole and concrete apron	$125.00	each	3	$375.00
	Supply Clean DOT-approved 55 gallon drums with wood pallets and tarps	$70.00	each	30	$2,100.00
	Moving 55 gallon drums to borehole; filling, transporting and staging of drilling fluid/development water drums	$55.55	each	5	$277.75
	Moving 55 gallon drums to borehole; filling, transporting and staging of drill cutting drums	$55.55	each	25	$1,388.75
	Pump and surge method (w/surge block)	$158.57	per hour	3	$475.71
	Construction of one (1) decontaimination steam-cleaning pad using a swimming pool	$151.50	per hour	1	$151.50
	Steam cleaning of drill rig, tools and all other equipment between borings	$136.35	per hour	3	$409.05
	Rig and crew Standby	$151.50	per hour	3	$454.50
	Steam Cleaner	$95.95	per Day	11	$1,055.45
	Generator	$45.00	per Day	11	$495.00
Geoprobe	Mobilization/ Demobilization Geoprobe unit	$1,153.60	ls	1	$1,153.60
	Per Diem	$252.35	day	5	$1,261.75
	Truck Drill Rig & Crew	$1,416.25	day	5	$7,081.25
	Macro Core Soil Samples with Acetate Liners	$6.18	each	88	$543.84
	Shallow Soil Vapor Implants	$85.49	pt	6	$512.94
	Deep Soil Vapor Implants	$113.30	pt	6	$679.80
	Sand and Bentonite Grouting of 3" hole to ground surface	$1.55	ft	438	$676.71
	Additional Teflon Tubing beyond 16' (for 60' soil vapor points)	$2.06	ft	264	$543.84
	Decontamination	$140.00	hr	3	$420.00
	55-Gallon DOT Drum	$72.10	each	6	$432.60
Subtotal-Subcontract Price					**$31,068.12**
	(Cost increase for Geoprobe services for 2008 is 3%)				
Subcontract Management Fee*					**$1,553.41**
TOTAL					**$32,621.52**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-21

Name of Subcontractor ChemTech
Services to be Performed MBE Laboratory
Subcontract Price $15,554.70
Management Fee $777.74

Item	Max. Reimbursement Rate	Specify Unit	Est. No. of Units	Total Est. Cost
Task 2 - Site Characterization				
SAMPLING EQUIPMENT				
Tedlar Bags	$15.75	Sample	16	$252.00
Summa Canister and regulator	$36.75	Canister	18	$661.50
LABORATORY ANALYSIS				
Groundwater				
VOCs 8260B	$89.25	Sample	11	$981.75
SVOCs 8270C	$199.50	Sample	11	$2,194.50
Metals 7000 (Hg)	$110.25	Sample	11	$1,212.75
Soil				
VOCs 8260B	$89.25	Sample	15	$1,338.75
SVOCs 8270C	$199.50	Sample	15	$2,992.50
Metals 7000 (Hg)	$110.25	Sample	15	$1,653.75
Air				
TO-15 Air	$187.95	Sample	16	$3,007.20
RCRA/Full TCLP (solid)	$252.00	Sample	3	$756.00
RCRA/Full TCLP (aqueous)	$252.00	Sample	2	$504.00
			Subtotal-Subcontract Price	**$15,554.70**
			Subcontract Management Fee*	**$777.74**
			TOTAL	**$16,332.44**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-21

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Innovative Recycling Technologies	IDW Removal	$4,284.00	$0.00

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
IDW Removal (Non-Hazardous)	$119 drum	36	$4,284.00
		TOTAL	**$4,284.00**

It is assumed that NYSDEC will assist with locating a suitable staging location for the drums generated during field activitite: allow the drums to remain at that location until results from waste characterization sampling have been received and appropriate disposal methods have been made.

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Schedule 2.11 (g) - Summary

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437-21
Project Name Metco Site
Work Assignment No. D004437-21
Summary of Tasks
Percentage Completed

Date Prepared _____
Billing Period _____
Payment No. _____ **Invoice No.** _____

Expenditure Category	*A* *Costs Claimed This Period*	*B* *Paid to Date*	*C* *Total Disallowed to Date*	*D* *Total Costs Incurred to Date (A+B+C)*	*E* *Estimated Costs to Completion*	*F* *Estimated Total Work Assignment Price (A+B+E)*	*G* *Approved Budget*	*H* *Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0	$0	$0	$24,360	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0	$0	$0	$40,900	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0	$0	$0	$65,259	$0
4. Travel	$0	$0	$0	$0	$0	$0	$1,094	$0
5. Other Non-Salary Costs	$0	$0	$0	$0	$0	$0	$5,522	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0	$0	$0	$6,616	$0
7. Subcontractors	$0	$0	$0	$0	$0	$0	$59,108	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0	$0	$0	$2,421	$0
8. Total Work Assignment Cost	$0	$0	$0	$0	$0	$0	$133,405	$0
9. Fixed Fee	$0	$0	$0	$0	$0	$0	$4,568	$0
10. Total Work Assignment Price	$0	$0	$0	$0	$0	$0	$137,973	$0

Project Manager (Engineer) David Keil

Date _____

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437-21
Project Name Metco Site
Work Assigument No. D004437-21
Task #/Name Task 1 - Records Search Report & Work Plan Development
Complete 0%

Date Prepared _____
Billing Period _____
Invoice No. _____

Expenditure Category	*A* *Costs Claimed This Period*	*B* *Paid to Date*	*C* *Total Disallowed to Date*	*D* *Total Costs Incurred to Date (A+B+C)*	*E* *Estimated Costs to Completion*	*F* *Estimated Total Work Assignment Price (A+B+E)*	*G* *Approved Budget*	*H* *Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$4,247	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0			$7,130	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$11,377	$0
4. Travel	$0	$0	$0	$0			$10	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$283	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$293	$0
7. Subcontractors	$0	$0	$0	$0			$696	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$12,365	$0
9. Fixed Fee	$0	$0	$0	$0			$796	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$13,161	$0

Project Manager (Engineer) David Keil

Date _____

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437-21
Project Name Metco Site
Work Assignment No. D004437-21
Task #/Name Task 2- Site Characterization
Complete 0%

Date Prepared
Billing Period
Invoice No.

Expenditure Category	*A* *Costs Claimed This Period*	*B* *Paid to Date*	*C* *Total Disallowed to Date*	*D* *Total Costs Incurred to Date (A+B+C)*	*E* *Estimated Costs to Completion*	*F* *Estimated Total Work Assignment Price (A+B+E)*	*G* *Approved Budget*	*H* *Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$13,300	
2. Indirect Costs 167.9%	$0	$0	$0	$0			$22,330	
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$35,630	
4. Travel	$0	$0	$0	$0			$1,084	
5. Other Non-Salary Costs	$0	$0	$0	$0			$4,789	
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$5,873	
7. Subcontractors	$0	$0	$0	$0			$57,813	
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$2,421	
8. Total Work Assignment Cost	$0	$0	$0	$0			$101,736	
9. Fixed Fee	$0	$0	$0	$0			$2,494	
10. Total Work Assignment Price	$0	$0	$0	$0			$104,230	

Project Manager (Engineer) David Keil

Date

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437-21
Project Name Metco Site
Work Assignment No. D004437-21
Task #/Name Task 3 - Field Documentation and Reporting
Complete 0%

Date Prepared
Billing Period
Invoice No.

Expenditure Category	*A* *Costs Claimed This Period*	*B* *Paid to Date*	*C* *Total Disallowed to Date*	*D* *Total Costs Incurred to Date (A+B+C)*	*E* *Estimated Costs to Completion*	*F* *Estimated Total Work Assignment Price (A+B+E)*	*G* *Approved Budget*	*H* *Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$6,814	$0
2. Indirect Costs 167.9%	$0	$0	$0	$0			$11,440	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$18,253	$0
4. Travel	$0	$0	$0	$0			$0	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$450	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$450	$0
7. Subcontractors	$0	$0	$0	$0			$600	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$19,303	$0
9. Fixed Fee	$0	$0	$0	$0			$1,278	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$20,581	$0

Project Manager (Engineer) David Keil

Date

Schedule 2.11 (g) - Supplemental

Cost Control Report for Subcontracts

Engineer Camp Dresser & McKee
Contract No. D004437-21
Project Name Metco Site
Work Assignment No. D004437-21

Date Prepared _____
Billing Period _____
Invoice No. _____

Subcontract Name	*A* *Subcontract Costs Claimed this Application Inc. Resubmittals*	*B* *Subcontract Costs Approved for Payment on Previous Applications*	*C* *Total Subcontract Costs to Date (A plus B)*	*D* *Subcontract Approved Budget*	*E* *Management Fee Budget*	*F* *Management Fee Paid*	*G* *Total Costs to Date (C plus F)*
1. EDR	$0	$0	$0	$696	$0	$0	$0
2. Geophysical Surveyor	$0	$0	$0	$5,100	$0	$0	$0
3. Nancy Potak	$0	$0	$0	$1,806	$90	$0	$0
4. Aztech Technologies, Inc.	$0	$0	$0	$31,068	$1,553	$0	$0
5. Ken Schider	$0	$0	$0	$600	$0	$0	$0
6. ChemTech	$0	$0	$0	$15,555	$778	$0	$0
7. IDW Handler	$0	$0	$0	$4,284	$0	$0	$0
8.							
TOTALS	$0	$0	$0	$59,108	$2,421	$0	$0

Project Manager (Engineer) David Keil **Date** _____

NOTES:

1) Costs listed in Columns A, B, C & D do not include any management fee costs.
2) Management fee is applicable to only W/MBE and properly procured, satisfactorily completed, unit price subcontracts over $10,000.
3) Line 11, Cloumn G should equal Line 7 (Subcontractors), Column D of Summary Cost Control Report.

Schedule 2.11(h)
Monthly Cost Control Report
Summary of Labor Hours

Number of Direct Labor Hours Expended to Date/Estimated Number of Direct Labor Hours to Completion

Engineer/Contract # D004437-21
Project Name Metco Site
Work Assignment No. D004437-21

Date Prepared _____
Billing Period _____
Invoice No. _____

NSPE Labor Classification	*IX Exp/Est*	*VIII Exp/Est*	*VII Exp/Est*	*VI Exp/Est*	*V Exp/Est*	*IV Exp/Est*	*III Exp/Est*	*II Exp/Est*	*I Exp/Est*	*Admin.*	*Total No. of Direct Labor Hrs. Exp/Est*
Task 1	0 / 2	0 / 16	0 / 0	0 / 8	0 / 0	0 / 80	0 / 0	0 / 0	0 / 0	0 / 8	0 / 114
Task 2	0 / 2	0 / 24	0 / 0	0 / 8	0 / 0	0 / 200	0 / 150	0 / 20	0 / 0	0 / 0	0 / 404
Task 3	0 / 2	0 / 24	0 / 0	0 / 0	0 / 0	0 / 120	0 / 40	0 / 0	0 / 0	0 / 8	0 / 194
Total Hours	0 / 6	0 / 64	0 / 0	0 / 16	0 / 0	0 / 400	0 / 190	0 / 20	0 / 0	0 / 16	0 / 712

* Expended/Estimated

	CDM Budget	NYSDEC Budget	Delta	
Task 1 Total	$13,161.49		-$13,161.49	12961
Task 2 Total	$104,230.45		-$104,230.45	104230
Task 3 Total	$20,581.13		-$20,581.13	20581.1
Project Total	**$137,973.07**	**$73,000.00**	-$64,973.07	137773
2.11a Total	$137,973.07			137773
MBE goal (15%)	$20,695.96			20665.9
MBE Actual	$16,154.67	11.71%		16154.7
WBE goal (5%)	$6,898.65			6888.63
WBE Actual	$32,874.12	23.83%		32874.1
M/WBE Goal (20%	$27,594.61			27554.5
M/WBE Actual	$49,028.79	[redacted]		49028.8

Appendix D

Subcontractor Price Comparisons

Metco Site Geophysical Surveyor Subcontractor Quote Comparison					
Geophysical Survey	**Amount**	**Units**	**Environprobe**	**Naeva Geophysics**	**Hager-Richter**
Unit and operator	3	days	$3,600.00	$2,842.80	$3,620.00
Mobilization	1	each	$500.00	$0.00	$0.00
Totals			**$4,100.00**	**$8,528.40**	**$10,860.00**

Metco Site IDW Disposal Subcontractor Quote Comparison					
Investigation Derived Waste Disposal	**Amount**	**Units**	**Innovative Recycling Technologies, Inc.**	**Seacoast Environmental Services, Inc.**	**CleanHarbors**
Non-hazardous (SOIL or LIQUID) IDW drum removal, transportation, and disposal	60	drum	$119.00	$60.00	NA
Hazardous (SOIL) IDW drum removal, transportation, and disposal - less than 10x treatment standard	0	drum	$174.00	NA	NA
Hazardous (SOIL) IDW drum removal, transportation, and disposal - greater than 10x treatment standard and less than 2,000 ppm total organics	0	drum	$238.00	NA	NA
Hazardous (SOIL) IDW drum removal, transportation, and disposal - greater than 2,000 ppm total organics	0	drum	$795.00	NA	NA
Hazardous (SOIL) IDW drum removal, transportation, and disposal - with Hg not in free phase	0	drum	$238.00	NA	NA
Hazardous (LIQUID) TCE or PCE drum removal, transportation, and disposal	0	drum	$195.00	NA	NA
Hazardous (LIQUID or SOIL) IDW drum removal, transportation, and disposal	0	drum	NA	$160.00	NA
SOIL IDW drum removal, transportation, and disposal (CCS)	0	drum	NA	NA	$175.00
SOIL IDW drum removal, transportation, and disposal (CHG)	0	drum	NA	NA	$584.00
SOIL IDW drum removal, transportation, and disposal (CCRK)	0	drum	NA	NA	$408.00
SOIL IDW drum removal, transportation, and disposal (CHGI)	0	drum	NA	NA	$4,410.00
SOIL IDW drum removal, transportation, and disposal (CNO)	50	drum	NA	NA	$110.00
SOIL IDW drum removal, transportation, and disposal (CNOS)	0	drum	NA	NA	$120.00
LIQUID IDW drum removal, transportation, and disposal (A22K)	0	drum	NA	NA	$236.00
LIQUID IDW drum removal, transportation, and disposal (A24)	10	drum	NA	NA	$150.00
LIQUID IDW drum removal, transportation, and disposal (B40)	0	drum	NA	NA	$286.00
LIQUID IDW drum removal, transportation, and disposal (CCSS)	0	drum	NA	NA	$175.00

LIQUID IDW drum removal, transportation, and disposal (CHG)	0	drum	[redacted]	NA	$584.00
LIQUID IDW drum removal, transportation, and disposal (CHGI)	0	drum	[redacted]	NA	$4,410.00
Stop-off Fee	1	ea	[redacted]	NA	$1,100.00
Stop-off Fee	60	drum	[redacted]	$60.00	NA
Totals			[redacted]	**$7,200.00**	**$8,100.00**

Metco Site
Driller Subcontractor Quote Comparison

Company Name & Contact Information			Aztech Technologies, Inc Matthew Darcangelo, P.E. 5 McCrea Hill Road Ballston Spa, NY 12020 518-885-5383 f 518-885-5385 MDARCANGELO@AZTK.COM				Delta Well Chris Okon 97 Union Ave. P.O. Boc 1309 Ronkonkoma, NY 11779-0760 631-981-2255 CHRIS@DELTAWELL.COM				Geologic NY, Inc. Steve Laramee 37 Copeland Ave. P.O. Box 350 Homer, NY 13077 607-749-5000 STEVE@GEOLOGIC.NET			
Firm Type (MBE, DBE, WBE, SBE)			WBE				WBE				WBE			
Description	Quantity	Units	Unit Cost		Overall Cost		Unit Cost		Overall Cost		Unit Cost		Overall Cost	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D
Mob/Demob														
Mobilization/ Demobilization	1	each	$3,280.00	$3,280.00	$3,280.00	$3,280.00	$900.00	$900.00	$900.00	$900.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00
Per Diem	6	per Day	$245.00	$245.00	$1,470.00	$1,470.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Personal Protective Equipment														
Personal Protective Equipment	12	each	$22.00	$0.00	$264.00	$0.00	$350.00	$50.00	$4,200.00	$600.00	$25.00	$0.00	$300.00	$0.00
Hollow Stem Augering (without sampling)														
0-50 feet in depth														
1)4.25 inch ID Hollow Stem Augers	300	per LF	$16.80	$14.00	$5,040.00	$4,200.00	$25.00	$20.00	$7,500.00	$6,000.00	$22.00	$16.00	$6,600.00	$4,800.00
50-100 feet in depth														
2)4.25 inch ID Hollow Stem Augers	150	per LF	$19.80	$16.50	$2,970.00	$2,475.00	$25.00	$20.00	$3,750.00	$3,000.00	$30.00	$22.00	$4,500.00	$3,300.00
Well Screen (Flush-Joint, Threaded), Slotted PVC														
PVC Well Screen, 2.0 inch ID, #20 slot, schedule 40	60	per LF	$5.00	$5.00	$300.00	$300.00	$7.00	$5.00	$420.00	$300.00	$30.00	$21.00	$1,800.00	$1,260.00
Well Riser (Flush Joint Threaded)														
PVC														
PVC well riser, 2.0 inch ID, schedule 40	390	per LF	$4.00	$4.00	$1,560.00	$1,560.00	$6.00	$4.00	$2,340.00	$1,560.00	$30.00	$21.00	$11,700.00	$8,190.00
Well Screen Backfill Material														
Well screen sand pack for 2.0 inch monitoring - well set in 4.25 inch hollow stem augers	72	per LF	$5.00	$5.00	$360.00	$360.00	$10.00	$8.00	$720.00	$576.00	$0.00	$0.00	$0.00	$0.00

Metco Site
Driller Subcontractor Quote Comparison

Company Name & Contact Information			Aztech Technologies, Inc Matthew Darcangelo, P.E. 5 McCrea Hill Road Ballston Spa, NY 12020 518-885-5383 f 518-885-5385 MDARCANGELO@AZTK.COM				Delta Well Chris Okon 97 Union Ave. P.O. Boc 1309 Ronkonkoma, NY 11779-0760 631-981-2255 CHRIS@DELTAWELL.COM				Geologic NY, Inc. Steve Laramee 37 Copeland Ave. P.O. Box 350 Homer, NY 13077 607-749-5000 STEVE@GEOLOGIC.NET			
Firm Type (MBE, DBE, WBE, SBE)			WBE				WBE				WBE			
Description	Quantity	Units	Unit Cost		Overall Cost		Unit Cost		Overall Cost		Unit Cost		Overall Cost	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D
Mob/Demob	1	LS	$1,120.00	$1,120.00	$1,120.00	$1,120.00	$900.00	$900.00	$900.00	$900.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00
Per Diem Rate	5	per day	$245.00	$245.00	$1,225.00	$1,225.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Truck Drill Rig & Crew	5	per day	$0.00	$0.00	$0.00	$0.00	$2,285.00	$1,305.00	$11,425.00	$6,525.00	$1,400.00	$1,400.00	$7,000.00	$7,000.00
ATV/track Rig & Crew	5	per day	$1,375.00	$1,375.00	$6,875.00	$6,875.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Percent Reduction on Rig & Crew for 1/2 day rate	0	%	$0.00	$0.00	30.00%	40.00%	NA	NA			NA	NA		
Overtime Rate 1 person	0	per hour	$215.00	$195.00	$0.00	$0.00	$353.00	$292.00	$0.00	$0.00	$350.00	$300.00	$0.00	$0.00
Soil Sampling & Temporary Monitoring Wells														
5x2.5" macro core soil samples with acetate liners	0	ft	$6.00	$6.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3" Macro Core Soil Samples with Acetate Liners	88	each	$6.00	$6.00	$528.00	$528.00	$13.50	$13.50	$1,188.00	$1,188.00	$18.00	$18.00	$1,584.00	$1,584.00
1" Sch40 PVC Riser	0	per foot	$3.00	$3.00	$0.00	$0.00	$4.50	$4.50	$0.00	$0.00	$11.00	$11.00	$0.00	$0.00
1" Sch40 PVC 010 Slot Screen including sand to 6" above screen	0	per foot	$5.75	$5.75	$0.00	$0.00	$7.50	$7.50	$0.00	$0.00	$15.00	$15.00	$0.00	$0.00
1" PVC Cap	0	each	$1.00	$1.00	$0.00	$0.00	$5.50	$5.50	$0.00	$0.00	$5.00	$5.00	$0.00	$0.00
Sand and Bentonite Grouting of 3" hole to ground surface	438	per foot	$1.50	$1.50	$657.00	$657.00	$6.50	$6.50	$2,847.00	$2,847.00	$0.00	$0.00	$0.00	$0.00
Discrete GW sampler with 1" reusable screen	0	per day	$150.00	$150.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Soil Vapor Point Installation														
Shallow Soil Vapor Point Installation (0-8')*	6	each	$83.00	$83.00	$498.00	$498.00	$220.00	$220.00	$1,320.00	$1,320.00	$200.00	$200.00	$1,200.00	$1,200.00
Deep Soil Vapor Point Installation (8'-16')*	6	each	$110.00	$110.00	$660.00	$660.00	$270.00	$270.00	$1,620.00	$1,620.00	$275.00	$275.00	$1,650.00	$1,650.00
Intstallation of vapor point in macro-core sample location	0	each	$110.00	$110.00	$0.00	$0.00	$270.00	$270.00	$0.00	$0.00	$275.00	$275.00	$0.00	$0.00

Metco Site
Driller Subcontractor Quote Comparison

Company Name & Contact Information			Aztech Technologies, Inc Matthew Darcangelo, P.E. 5 McCrea Hill Road Ballston Spa, NY 12020 518-885-5383 f 518-885-5385 MDARCANGELO@AZTK.COM				Delta Well Chris Okon 97 Union Ave. P.O. Boc 1309 Ronkonkoma, NY 11779-0760 631-981-2255 CHRIS@DELTAWELL.COM				Geologic NY, Inc. Steve Laramee 37 Copeland Ave. P.O. Box 350 Homer, NY 13077 607-749-5000 STEVE@GEOLOGIC.NET			
Firm Type (MBE, DBE, WBE, SBE)			WBE				WBE				WBE			
Description	**Quantity**	**Units**	**Unit Cost**		**Overall Cost**		**Unit Cost**		**Overall Cost**		**Unit Cost**		**Overall Cost**	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D
Grouting Open Boreholes														
Open borehole for 2 inch marcrocore, high solids, bentonite grout	438	ft	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.00	$10.00	$4,380.00	$4,380.00
Other														
Additional Teflon Tubing beyond 16' (for 60' soil vapor points	264	ft	$2.00	$2.00	$528.00	$528.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Decontamination	3	per hour	$150.00	$135.00	$450.00	$405.00	$225.00	$180.00	$675.00	$540.00	$225.00	$175.00	$675.00	$525.00
Standby Time	0	per hour	$150.00	$135.00	$0.00	$0.00	$250.00	$200.00	$0.00	$0.00	$225.00	$175.00	$0.00	$0.00
55-Gallon DOT Drum	6	each	$70.00	$70.00	$420.00	$420.00	$65.00	$50.00	$390.00	$300.00	$55.00	$55.00	$330.00	$330.00
Geoprobe Subtotal					$12,961.30	$12,916.40			$20,365.00	$15,240.00			$18,319.00	$16,669.00
(includes % increase for 2008 and assumes 95% of Level D and 5% of Level C costs)			3%			**$13,306**	3%			**$15,961**	0%			**$16,752**

Metco Site
Driller Subcontractor Quote Comparison

Company Name & Contact Information			Aztech Technologies, Inc Matthew Darcangelo, P.E. 5 McCrea Hill Road Ballston Spa, NY 12020 518-885-5383 f 518-885-5385 MDARCANGELO@AZTK.COM				Delta Well Chris Okon 97 Union Ave. P.O. Boc 1309 Ronkonkoma, NY 11779-0760 631-981-2255 CHRIS@DELTAWELL.COM				Geologic NY, Inc. Steve Laramee 37 Copeland Ave. P.O. Box 350 Homer, NY 13077 607-749-5000 STEVE@GEOLOGIC.NET			
Firm Type (MBE/DBE/WBE/SBE)			WBE				WBE				WBE			
Description	**Quantity**	**Units**	**Unit Cost**		**Overall Cost**		**Unit Cost**		**Overall Cost**		**Unit Cost**		**Overall Cost**	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D
Well Development														
Pump and surge method (w/surge block)	6	per hour	$188.40	$157.00	$1,130.40	$942.00	$225.00	$180.00	$1,350.00	$1,080.00	$225.00	$175.00	$1,350.00	$1,050.00
Decontamination														
Construction of one (1) decontaimination steam-cleaning pad using a swimming pool	1	per hour	$180.00	$150.00	$180.00	$150.00	$1095.00 (liner	$875.00 (liner	$1,095.00	$875.00	$400.00	$300.00	$400.00	$300.00
Steam cleaning of drill rig, tools and all other equipment between borings	6	per hour	$162.00	$135.00	$972.00	$810.00	$225.00	$180.00	$1,350.00	$1,080.00	$225.00	$175.00	$1,350.00	$1,050.00
Stand-by Time														
Rig and crew	6	per hour	$180.00	$150.00	$1,080.00	$900.00	$250.00	$200.00	$1,500.00	$1,200.00	$225.00	$175.00	$1,350.00	$1,050.00
Equipment Rentals														
Steam Cleaner	11	per Day	$114.00	$95.00	$1,254.00	$1,045.00	$32.00	$25.00	$352.00	$275.00	N/C	N/C	$0.00	$0.00
Generator (2,000 watt gas & diesel generator)	11	per Day	$45.00	$45.00	$495.00	$495.00	$157.00	$125.00	$1,727.00	$1,375.00	$800.00	$600.00	$8,800.00	$6,600.00
Grouting Open Boreholes														
Open borehole for 4.25 inch hollow sten auger, high solids, bentonite grout	0	per LF	$8.00	$8.00	$0.00	$0.00	$10.00	$8.00	$0.00	$0.00	$20.00	$15.00	$0.00	$0.00
Open borehole for 6.25 inch hollow sten auger cement/bentonite grout	0	per LF	$17.00	$17.00	$0.00	$0.00	$13.00	$10.00	$0.00	$0.00	$25.00	$20.00	$0.00	$0.00
Drilling Sub Total					$31,935.40	$28,907.00			$42,372.00	$30,593.00			$56,750.00	$42,900.00
Total (includes 95 of Level D and 5% of Level C costs)						$29,058.42				$31,181.95				$43,592.50
						$29,058.42				**$32,117.41**				**$44,900.28**

Description	Quantity	Units	Unit Cost		Overall Cost		Unit Cost		Overall Cost		Unit Cost		Overall Cost	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D

Metco Site
Driller Subcontractor Quote Comparison

Company Name & Contact Information			Aztech Technologies, Inc Matthew Darcangelo, P.E. 5 McCrea Hill Road Ballston Spa, NY 12020 518-885-5383 f 518-885-5385 MDARCANGELO@AZTK.COM				Delta Well Chris Okon 97 Union Ave. P.O. Boc 1309 Ronkonkoma, NY 11779-0760 631-981-2255 CHRIS@DELTAWELL.COM				Geologic NY, Inc. Steve Laramee 37 Copeland Ave. P.O. Box 350 Homer, NY 13077 607-749-5000 STEVE@GEOLOGIC.NET			
Firm Type (MBE, DBE, WBE, SBE)			WBE				WBE				WBE			
Description	Quantity	Units	Unit Cost		Overall Cost		Unit Cost		Overall Cost		Unit Cost		Overall Cost	
			Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D	Level C	Level D
Mob/Demob	1	LS	$1,120.00	$1,120.00	$1,120.00	$1,120.00	$900.00	$900.00	$900.00	$900.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00
Per Diem Rate	5	per day	$245.00	$245.00	$1,225.00	$1,225.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Truck Drill Rig & Crew	5	per day	$0.00	$0.00	$0.00	$0.00	$2,285.00	$1,305.00	$11,425.00	$6,525.00	$1,400.00	$1,400.00	$7,000.00	$7,000.00
ATV/track Rig & Crew	5	per day	$1,375.00	$1,375.00	$6,875.00	$6,875.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Percent Reduction on Rig & Crew for 1/2 day rate	0	%	$0.00	$0.00	30.00%	40.00%	NA	NA			NA	NA		
Overtime Rate 1 person	0	per hour	$215.00	$195.00	$0.00	$0.00	$353.00	$292.00	$0.00	$0.00	$350.00	$300.00	$0.00	$0.00
Soil Sampling & Temporary Monitoring Wells														
5x2.5" macro core soil samples with acetate liners	0	ft	$6.00	$6.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3" Macro Core Soil Samples with Acetate Liners	88	each	$6.00	$6.00	$528.00	$528.00	$13.50	$13.50	$1,188.00	$1,188.00	$18.00	$18.00	$1,584.00	$1,584.00
1" Sch40 PVC Riser	0	per foot	$3.00	$3.00	$0.00	$0.00	$4.50	$4.50	$0.00	$0.00	$11.00	$11.00	$0.00	$0.00
1" Sch40 PVC 010 Slot Screen including sand to 6" above screen	0	per foot	$5.75	$5.75	$0.00	$0.00	$7.50	$7.50	$0.00	$0.00	$15.00	$15.00	$0.00	$0.00
1" PVC Cap	0	each	$1.00	$1.00	$0.00	$0.00	$5.50	$5.50	$0.00	$0.00	$5.00	$5.00	$0.00	$0.00
Sand and Bentonite Grouting of 3" hole to ground surface	438	per foot	$1.50	$1.50	$657.00	$657.00	$6.50	$6.50	$2,847.00	$2,847.00	$0.00	$0.00	$0.00	$0.00
Discrete GW sampler with 1" reusable screen	0	per day	$150.00	$150.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Soil Vapor Point Installation														
Shallow Soil Vapor Point Installation (0-8')*	6	each	$83.00	$83.00	$498.00	$498.00	$220.00	$220.00	$1,320.00	$1,320.00	$200.00	$200.00	$1,200.00	$1,200.00
Deep Soil Vapor Point Installation (8'-16')*	6	each	$110.00	$110.00	$660.00	$660.00	$270.00	$270.00	$1,620.00	$1,620.00	$275.00	$275.00	$1,650.00	$1,650.00
Intstallation of vapor point in macro-core sample location	0	each	$110.00	$110.00	$0.00	$0.00	$270.00	$270.00	$0.00	$0.00	$275.00	$275.00	$0.00	$0.00

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Keil — 3·12·08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

Aztech Technologies, Inc.

Subcontractor Name — 3/2/07

CDM

15 British American Boulevard
Latham, New York 12110
tel: 518 782-4500
fax: 518 786-3810

March 10, 2008

Mr. Emanuel Hedat, President
ChemTech
284 Sheffield Street
Mountainside, NJ 07092

Subject: NYSDEC Standby Contract No. D004437-21
Metco Site (Site No. 130179)
Conflict of Interest

Dear Mr. Hedat:

Camp Dresser & McKee (CDM) intends to issue a Task Order to ChemTech which will authorize your firm to provide services in support of our investigation for the above referenced project. Information provided in the Attachment has been furnished by the New York State Department of Environmental Conservation (NYSDEC). The entities referenced and/or listed are those believed or acknowledged to be Potentially Responsible Parties (PRP's).
Please review your firm's contractual status and/or relationship with each of the PRP's referenced and/or listed. Then complete and sign the enclosed **Conflict of Interest Certification** statement and return it to me as soon as possible. This Conflict of Interest Statement is a required element of the Prime Agreement with NYSDEC. Compensation for the contracted services will not be released without this statement.

If you have any questions or need additional information, please call me in CDM's Edison, New Jersey office at 732.590.4701.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee

Enclosures

CDM

Subcontractor Conflict of Interest Certification

The undersigned, representing ChemTech hereby certifies for the Project at **325 Duffy Avenue, Hicksville, Nassau County, NY Site No. 130179**

1) That I have been informed by the Camp Dresser & McKee who the known potentially responsible parties are for the subject site, and

2) That to the best of my knowledge, ChemTech and the employees of the firm to be assigned to this project have no conflict of interest with the work proposed at this site, and

3) That presently ChemTech has no contracts with, nor imminent prospects of contracts with, potentially responsible parties associated with the above-named site, and

4) That ChemTech has no responsibilities to potentially responsible parties associated with the above-named site

Certified By:

Signature of Authorized Subcontractor Officer

Michael Brown

Print Name of Officer

Chemtech Consulting Group

Subcontracting Firm

3/11/08

Date

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Kil — 3-13-08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

ChemTech

Subcontractor Name

3/2/07

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Kulp — 3-12-08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

EDR

Subcontractor Name — 3/2/07

CDM

15 British American Boulevard
Latham, New York 12110
tel: 518 782-4500
fax: 518 786-3810

March 10, 2008

Mr. Daniel Jonasz
ENVIROPROBE SERVICE, INC.
221 Haddon Avenue
Westmont, New Jersey 08108

Subject: NYSDEC Standby Contract No. D004437-21
Metco Site (Site No. 130179)
Conflict of Interest

Dear Mr. Jonasz:

Camp Dresser & McKee (CDM) intends to issue a Task Order to Enviroprobe Service Incorporated which will authorize your firm to provide services in support of our investigation for the above referenced project. Information provided in the Attachment has been furnished by the New York State Department of Environmental Conservation (NYSDEC). The entities referenced and/or listed are those believed or acknowledged to be Potentially Responsible Parties (PRP's).
Please review your firm's contractual status and/or relationship with each of the PRP's referenced and/or listed. Then complete and sign the enclosed **Conflict of Interest Certification** statement and return it to me as soon as possible. This Conflict of Interest Statement is a required element of the Prime Agreement with NYSDEC. Compensation for the contracted services will not be released without this statement.

If you have any questions or need additional information, please call me in CDM's Edison, New Jersey office at 732.590.4701.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee

Enclosures

CDM

Subcontractor Conflict of Interest Certification

The undersigned, representing **Enviroprobe Service Incorporated** hereby certifies for the **Project at 325 Duffy Avenue, Hicksville, Nassau County, NY Site No. 130179**

1) That I have been informed by the Camp Dresser & McKee who the known potentially responsible parties are for the subject site, and

2) That to the best of my knowledge, Enviroprobe Service Incorporated and the employees of the firm to be assigned to this project have no conflict of interest with the work proposed at this site, and

3) That presently Enviroprobe Service Incorporated has no contracts with, nor imminent prospects of contracts with, potentially responsible parties associated with the above-named site, and

4) That Enviroprobe Service Incorporated has no responsibilities to potentially responsible parties associated with the above-named site.

Certified By:

Timothy D. Gallagher
Signature of Authorized Subcontractor Officer

Timothy S. Gallagher
Print Name of Officer

Enviroprobe Service, Inc.
Subcontracting Firm

3/11/08
Date

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Kelly — 4.4.08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

Enviroprobe Service, Inc.

Subcontractor Name — 3/2/07

15 British American Boulevard
Latham, New York 12110
tel: 518 782-4500
fax: 518 786-3810

March 10, 2008

Mr. John Ewen
Innovative Recycling Technologies, Inc.
690 North Queens Avenue
Lindenhurst, NY 11757

Subject: NYSDEC Standby Contract No. D004437-21
Metco Site (Site No. 130179)
Conflict of Interest

Dear Mr. Ewen:

Camp Dresser & McKee (CDM) intends to issue a Task Order to Innovative Recycling Technologies, Inc. which will authorize your firm to provide services in support of our investigation for the above referenced project. Information provided in the Attachment has been furnished by the New York State Department of Environmental Conservation (NYSDEC). The entities referenced and/or listed are those believed or acknowledged to be Potentially Responsible Parties (PRP's).
Please review your firm's contractual status and/or relationship with each of the PRP's referenced and/or listed. Then complete and sign the enclosed **Conflict of Interest Certification** statement and return it to me as soon as possible. This Conflict of Interest Statement is a required element of the Prime Agreement with NYSDEC. Compensation for the contracted services will not be released without this statement.

If you have any questions or need additional information, please call me in CDM's Edison, New Jersey office at 732.590.4701.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee

Enclosures

CDM

Subcontractor Conflict of Interest Certification

The undersigned, representing Innovative Recycling Technologies, Inc. hereby certifies for the **Project at 325 Duffy Avenue, Hicksville, Nassau County, NY Site No. 130179**

1) That I have been informed by the Camp Dresser & McKee who the known potentially responsible parties are for the subject site, and

2) That to the best of my knowledge, Innovative Recycling Technologies, Inc. and the employees of the firm to be assigned to this project have no conflict of interest with the work proposed at this site, and

3) That presently Innovative Recycling Technologies, Inc. has no contracts with, nor imminent prospects of contracts with, potentially responsible parties associated with the above-named site, and

4) That Innovative Recycling Technologies, Inc. has no responsibilities to potentially responsible parties associated with the above-named site.

Certified By:

Signature of Authorized Subcontractor Officer

John T. Ewen

Print Name of Officer

Innovative Recycling Technologies, Inc

Subcontracting Firm

3-10-08

Date

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Kil — 3·12·08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

Innovative Recycling Technologies, Inc.

Subcontractor Name — 3/2/07

15 British American Boulevard
Latham, New York 12110
tel: 518 782-4500
fax: 518 786-3810

March 10, 2008

Mr. Ken Shider
Ken Shider Consulting
8 Dauphin Drive
Albany, NY 12205-4905

Subject: NYSDEC Standby Contract No. D004437-21
Metco Site (Site No. 130179)
Conflict of Interest

Dear Mr. Shider:

Camp Dresser & McKee (CDM) intends to issue a Task Order to Ken Shider Consulting which will authorize your firm to provide services in support of our investigation for the above referenced project. Information provided in the Attachment has been furnished by the New York State Department of Environmental Conservation (NYSDEC). The entities referenced and/or listed are those believed or acknowledged to be Potentially Responsible Parties (PRP's).
Please review your firm's contractual status and/or relationship with each of the PRP's referenced and/or listed. Then complete and sign the enclosed **Conflict of Interest Certification** statement and return it to me as soon as possible. This Conflict of Interest Statement is a required element of the Prime Agreement with NYSDEC. Compensation for the contracted services will not be released without this statement.

If you have any questions or need additional information, please call me in CDM's Edison, New Jersey office at 732.590.4701.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee

Enclosures

CDM

Subcontractor Conflict of Interest Certification

The undersigned, representing Ken Shider Consulting hereby certifies for the **Project at 325 Duffy Avenue, Hicksville, Nassau County, NY Site No. 130179**

1) That I have been informed by the Camp Dresser & McKee who the known potentially responsible parties are for the subject site, and

2) That to the best of my knowledge, Ken Shider Consulting and the employees of the firm to be assigned to this project have no conflict of interest with the work proposed at this site, and

3) That presently Ken Shider Consulting has no contracts with, nor imminent prospects of contracts with, potentially responsible parties associated with the above-named site, and

4) That Ken Shider Consulting has no responsibilities to potentially responsible parties associated with the above-named site.

Certified By:

Kenneth Shider

Signature of Authorized Subcontractor Officer

Kenneth Shider

Print Name of Officer

Ken Shider Consulting

Subcontracting Firm

3/11/08

Date

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

David J. Kelly — 3-12-08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

Ken Shidar Consulting

Subcontractor Name — 3/2/07

15 British American Boulevard
Latham, New York 12110
tel: 518 782-4500
fax: 518 786-3810

March 10, 2008

Ms. Nancy Potak
Data Validation
1796 Craftsburg Road
Greensboro, VT 05841

Subject: NYSDEC Standby Contract No. D004437-21
Metco Site (Site No. 130179)
Conflict of Interest

Dear Ms. Potak:

Camp Dresser & McKee (CDM) intends to issue a Task Order to Nancy Potak (data validator) which will authorize your firm to provide services in support of our investigation for the above referenced project. Information provided in the Attachment has been furnished by the New York State Department of Environmental Conservation (NYSDEC). The entities referenced and/or listed are those believed or acknowledged to be Potentially Responsible Parties (PRP's).
Please review your firm's contractual status and/or relationship with each of the PRP's referenced and/or listed. Then complete and sign the enclosed **Conflict of Interest Certification** statement and return it to me as soon as possible. This Conflict of Interest Statement is a required element of the Prime Agreement with NYSDEC. Compensation for the contracted services will not be released without this statement.

If you have any questions or need additional information, please call me in CDM's Edison, New Jersey office at 732.590.4701.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee

Enclosures

CDM

Subcontractor Conflict of Interest Certification

The undersigned, representing Nancy Potak (data validator) hereby certifies for the
Project at 325 Duffy Avenue, Hicksville, Nassau County, NY Site No. 130179

1) That I have been informed by the Camp Dresser & McKee who the known potentially responsible parties are for the subject site, and

2) That to the best of my knowledge, Nancy Potak (data validator) and the employees of the firm to be assigned to this project have no conflict of interest with the work proposed at this site, and

3) That presently Nancy Potak (data validator) has no contracts with, nor imminent prospects of contracts with, potentially responsible parties associated with the above-named site, and

4) That Nancy Potak (data validator) has no responsibilities to potentially responsible parties associated with the above-named site.

Certified By:

_____
Signature of Authorized Subcontractor Officer

Nancy J. Potak
Print Name of Officer

_____
Subcontracting Firm

3/11/05
Date

New York State
Department of Environmental Conservation
Division of Environmental Remediation

Subcontract Certification

On behalf of the Contractor named below, I hereby certify that the subcontract named below was procured in accordance with the terms of the prime contract and all applicable requirements of the State of New York. I also hereby certify that the executed subcontract includes all appropriate language and all required documents were completed appropriately and were acceptable. Specifically, I hereby certify the following:

1. The Contractor has determined that the subcontractor is qualified. A statement of qualifications for the subcontractor is maintained. It does include a statement of compliance with all licenses, certifications and permits, if applicable. (Note: For laboratories, this can be determined at: http://www.wadsworth.org/labservices.htm).

2. The Contractor has determined the costs are reasonable. A procurement record supporting the determination is maintained.

3. The Contractor performed a Conflict of Interest (COI) check, if applicable, and documented it in writing. (Refer to Appendix B, clause III (e) for applicability. (Note that for standby subcontractors, the COI certification must be submitted to the project manager upon activation.)

4. For subcontracts in excess (or anticipated to be) of $10,000 the subcontractor submitted an acceptable New York State Uniform Contracting Questionnaire. For subconsultants in excess (or anticipated to be) of $10,000 the subconsultant submitted an acceptable New York State Vendor Responsibility Questionnaire. (Information related to vendor responsibility can be found at http://www.osc.state.ny.us/agencies/gbull/g221.htm.)

5. The subcontract includes pass down requirements from Appendix B of the prime contract related to Minority and Women Business Enterprises/WBE and Conflict of Interest (COI).

6. The Subcontract includes the termination clause required in the prime contract.

7. The subcontract does not include "pay if paid" type clauses which are unenforceable in New York State.

8. Insurance carriers associated with the subcontract are licensed to do business in New York State. The State of New York and the Department of Environmental Conservation are named as additional insurers on the policies. Insurance limits meet prime contract requirements. (Note that licensed insurance can be determined at: http://www.ins.state.ny.us and Best's Rating can be determined at http://www.ambest.com). Pollution liability insurance (for example, drilling subcontractors) and professional liability insurance (for example, subcontracts for professional services and laboratories) is included as appropriate.

9. Documentation supporting this certification is maintained and will be provided within 10 days of any request.

Emily J. Keef — 3-13-08

Signature of Contractor's Authorized Representative — Date

Camp Dresser & McKee — D004437-21

Contractor Name — Contract No. WA No.

Nancy Potak (Data Validation Services)

Subcontractor Name

3/2/07