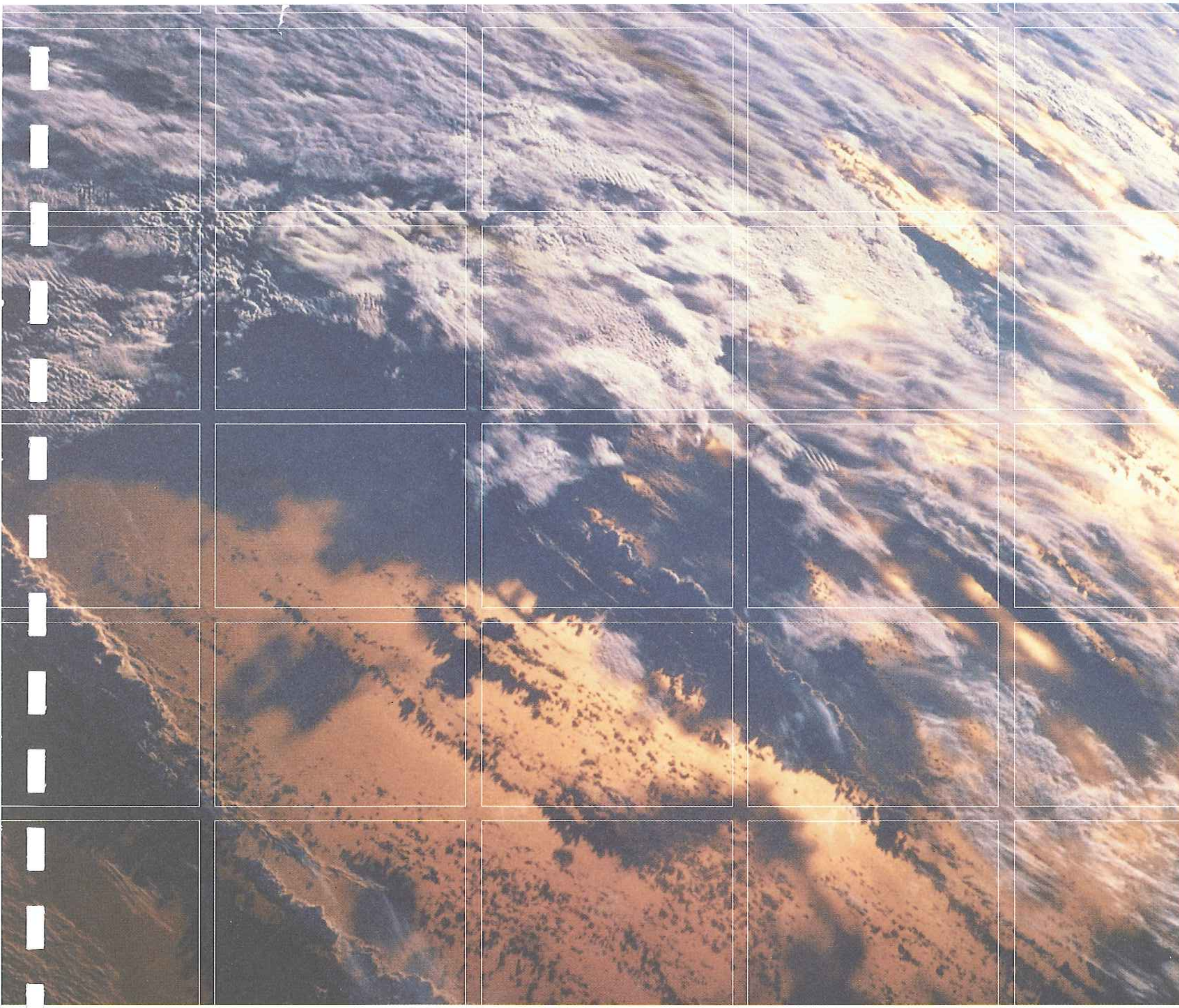


New York State Department of Environmentl Conservation

SITE CHARACTERIZATION WORK PLAN
Glen Head Groundwater Plume Site

August 2005

Environmental Resources Management
520 Broad Hollow Road
Melville, New York 11747

Delivering sustainable solutions in a more competitive world

ERM

Table of Contents

LIST OF FIGURES

LIST OF APPENDICES

Section 1

1.1 PURPOSE AND OBJECTIVES

1.1.1 Purpose and Objectives

The purpose of this Work Assignment is to conduct a Site Characterization (SC) of the Glen Head Groundwater Plume. A Preliminary Site Assessment (PSA) has been previously conducted and a summary report was published in September 2000. The PSA revealed a widespread tetrachloroethene (PCE) plume underlying numerous potential sources. The SC is designed to determine the nature and extent of groundwater PCE contamination, and identify and investigate facilities with past operations and/or disposal practices within the expanded plume area.

1.1.2 Site Setting

The Glen Head Groundwater Plume encompasses an area that includes several former and active dry cleaning and industrial facilities located in Glen Head (Township of Oyster Bay) in Nassau County, New York. There is mixed land usage in the portion of Glen Head overlying the plume including both commercial and residential properties. The commercial properties in the study area are primarily located along Glen Head Road and Glen Cove Avenue. See Figure 1-1 for Study Area Location.

The study area is approximately 40 acres, approximately bounded by Glen Cove Avenue to the west, Todd Drive South to the north, the Glen Head School on School St. to the east, and Walnut Avenue to the south. The approximate coordinates of the central portion of the Study Area are 40.833648 (latitude) and 73.627223 (longitude). See Figure 1-2 for Study Area Plan.

Two additional inactive hazardous waste disposal sites are located in the Study Area: Trans Technology (Site No.1-30-101), a Class 2, State Superfund site is located in the northern section of the Study Area; and the Former Fresh & Clean Cleaners (Site No. 1-30-111) and Voluntary Cleanup Agreement (V00606) also a Class 2 site is located on the upgradient side of currently defined plume. The former Fresh & Clean Cleaners has entered the Voluntary Cleanup Program as result of the PSA findings.

1.1.3 *Site History*

The Glen Head Groundwater Plume lies beneath the area immediately south of Trans Technology where groundwater contamination, resulting from past industrial activities, has been detected. Previous investigations at the Trans Technology indicated that on-site groundwater had concentrations of up to 16,000 micrograms per liter (ug/l) of PCE. A PSA was carried out up gradient of the Trans Technology site for the NYSDEC by Lawler, Matusky & Skelly Engineers LLP (LMS) in September - October 1999 in an attempt to determine the source(s) of PCE in Glen Head and local groundwater flow conditions. Groundwater samples were collected from four monitoring wells and four hydro punch locations. Elevated concentrations of VOCs, particularly PCE, were detected in all of the initial PSA groundwater samples. After a review of the initial (1999) PSA data, in May 2000 a second phase of investigatory work, including the installation of additional monitoring well, was conducted to better characterize the site and the potential sources of groundwater contamination. Elevated levels of PCE and VOCs were again detected in the groundwater. More recently, in November of 2004, NYSDEC staff collected an additional round of groundwater samples from all remaining and serviceable wells at the site. The groundwater analytical results confirm the presence of PCE in the plume, a maximum concentration of 18,000 ug/l was detected in MW-1.

Since PCE continues to be detected in the Glen Head Groundwater Plume, it is suspected that multiple releases of PCE have occurred within the 40 acre Study Area. Possible sources of PCE contamination, identified during the PSA (i.e., five active/former dry cleaning facilities located in the site area) include:

- Glen Head Cleaners [GH Cleaners], located on the northwest corner of the intersection of Glen Head Road and Dumond Place (an active dry cleaning facility);
- The former Charrell Cleaners [C Cleaners], located at 36 Glen Head Road, about 250 ft west of GH Cleaners;
- A former dry cleaners [unnamed] located on the northeast corner of the intersection of Glen Head Road and Dumond Place, about 50 ft east of GH Cleaners;
- Station Valet Cleaners [SV Cleaners], historically no active dry cleaning activities (drop off only) located along Station Place, about 50 ft south of Glen Head Road; and
- The former Fresh and Clean Dry Cleaners [FC Cleaners], located along Railroad Avenue near the eastern portion of the site, see Figure 1-2.

Additional facilities may also be considered potential sources of contamination;

- The former Hotel [Hotel] located on Glen Head Road, with possible dry cleaning activities, located about 200 ft east of Railroad Ave., about 600 ft east of GH Cleaners;
- An Auto Body repair facility [Auto Body] currently occupied by an auto repair facility located 50 ft east of the northeast corner of the intersection of Glen Head Road and Dumond Place, about 125 ft east of GH Cleaners;
- Soundview Cleaners [Soundview] along Glen Cove Ave., west of the site; and
- Glenco Cleaners [Glenco] along Glen Cove Ave., west of the site, see Figure 1-2.

Distinct sources of contamination were not confirmed during the PSA however it is likely that improper handling of PCE/PCE waste or poor housekeeping practices may have occurred at any or all of the potential source facilities, resulting in releases of PCE to the subsurface in the Glen Head Groundwater Plume Study Area.

1.2 *SITE HYDROGEOLOGY*

The Site is at an elevation of approximately 125 feet mean sea level (msl). This western part of the Town of Oyster Bay is geologically complex. The groundwater aquifer system consists of unconsolidated glacial deposits of the Pleistocene age (an epoch of glaciations from 1.8 million to 11,000 years ago) and coastal-plain deposits of continental and marine origin of the Late Cretaceous age (65 million years ago). These unconsolidated deposits consist of gravel, sand and clay and are underlain by bedrock. The bedrock, which is relatively impermeable, forms the base of the groundwater reservoir.

The relationships between hydrogeologic and geologic units underlying the Site are depicted on Figure 1-3[i]. As shown on the figure, the unconsolidated deposits underlying the Site consist of: (descending from land surface) the Upper Glacial Aquifer, the Port Washington confining unit, the Raritan confining unit, and the Lloyd Aquifer. The Magothy Aquifer, the aquifer from which much of the drinking water on Long Island is withdrawn, is likely not present beneath the Site. The deposits making up this formation were removed by glacial processes.

---

[i] Kilburn, C. and Krulikas, R. K. 1987. Hydrogeology and Groundwater Quality of the Northern Part of the Town of Oyster Bay, Nassau County, New York in 1980. U. S. Geological Survey, Water-Resources Investigations Report 85-4051.

Section 2

soil gas sampling points screened at several depths (12 feet, 60 feet and 100 feet) will be installed at three (3) locations along the anticipated plume axis. At each location three separate borings will be performed to install the permanent soil gas implants at the desired depth intervals.

Shallow Soil Vapor: Shallow soil vapor samples will be collected at two (2) locations to evaluate the potential for human exposure. The vapor samples will be collected at a depth of 12 feet by hand driven equipment at temporary sampling locations.

Surface Water and Sediment: A sample of natural spring discharge will be collected to verify the discharge of contaminants of concern into Scudders Pond. One Pond Sediment sample near the natural spring discharge point will also be collected.

Survey: At the completion of field sampling activities a New York State licensed surveyor will establish the location and elevation of each newly installed hydro punch boring monitoring well, soil boring, each soil gas sample location and surface water/sediment sample collected from the natural spring and discharge pond. Elevations of all well casings and ground surface and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, based on USGS datum.

Data Usability Summary Report(DUSR): All soil, groundwater and air analytical data will be evaluated to determine whether the data, meets the site/project specific data quality objectives and data use as specified in the Draft DER10 Technical Guidance.

Letter Report: Upon completion of the Phase I site investigation, a letter report will be generated. The letter will include a summary of the analytical data, evaluation of the data and recommendations for additional investigative activities (Phase II) necessary to fill existing data gaps.

The core field investigative activities of the SC are discussed in Subtasks 2A through 2M below, which comprise the Detailed Field Activities Plan (FAP). To streamline the FAP, and ensure that the field activities are executed in consistent and safe manner, the FAP is supported by the following documents:

- Appendix A: Standard Operating Procedures (SOP);
- Appendix B: Quality Assurance Project Plan (QAPP); and
- Appendix C: Site Specific Health and Safety Plan (HASP).

SStrict adherence to the SOPs, the QAPP and HASP will ensure the generation of reliable data and measurement activities such that resultant data and evaluations of the same are scientifically valid, defensible, comparable and of known precision and accuracy.

2.2.1 *Subtask 2A: Historic Records Search*

Available historic and contemporary information (documents, topographic and tax maps, aerial photos, building permits, reports, etc.) shall be located and reviewed. Information sources may include NYSDEC's Region 1 and Central Office (Albany) files, the Town of Oyster Bay, and Nassau County Health Department (NCHD) files. Additional potential sources and areas of contamination will be identified, if possible.

Additionally, ERM will compile a list of owner names, addresses and tax map numbers for all properties to be investigated. This list will be submitted to the NYSDEC no later than 28 days prior to the start of fieldwork.

2.2.2 *Subtask 2B: Underground Utility Markouts*

ERM requires that underground utility markouts be performed at the areas to be investigated prior to finalization of sampling locations, and/or any intrusive field investigation is undertaken. As part of this survey, the Underground Utilities Protection Organization (UFPO) will be contacted as required by law. Any information identified by utility mark outs that suggests the location of underground utility lines will be considered in design of the field-sampling program. Drilling will only be performed at a safe distance from all utilities. If subsurface lines and other utilities are identified during the proposed utility markouts, they will be surveyed for inclusion on the site topographic base map, if deemed appropriate.

2.2.3 *Subtask 2C: Site Access*

ERM anticipates performing some site investigative activities in the public street right-of-way (ROW). ERM's drilling subcontractor will be tasked with obtaining the necessary road opening permits and/or other authorizations as required by the Town of Oyster Bay, Nassau County, State of New York State or Federal authority to lawfully perform the work described herein, including the payment of any required fees, posting of any bonds, or acquisition of any required additional insurance coverage and providing certificates/proof of the same.

ERM will request access to the nearby town highway yard of Oyster Bay property to temporarily stage:

- Well construction materials;
- Subcontractor vehicles (i.e. weekend parking of the drill rig);
- A self-contained decontamination area; and

- Drums of investigative derived waste (IDW) such as drill cuttings, decontamination water, and groundwater monitoring well development/purge water.

ERM will finalize access arrangements with the town highway yard of Oyster Bay once the schedule for the field investigation is confirmed following issuance of a Notice-To-Proceed by NYSDEC.

2.2.4 *Subtask 2D Drywell and Cesspool Sampling*

ERM will perform an inventory of drywells and cesspool drainage structures with flush grade manhole covers and visually identify the primary pool of each system.

Up to ten (10) bottom samples will be collected from identified primary drywell and cesspool drainage structures. Samples will be collected from the top one (1) foot of sediment from each primary pool and analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory for Target Compound List (TCL) volatile organic compounds (VOCs) using Contract Laboratory Program (CLP) Method OLC03.2.

2.2.5 *Subtask 2E Soil Borings*

Direct push methods will be utilized to collect soil samples as close as possible to suspected areas of disposal. Approximately eight (8) soil borings will be installed at designated areas, identified in the PSA, and historic record searches as potential source areas to the Glen Head Groundwater Plume. Macrocore soil samples will be collected continuously from ground surface to approximately thirty-two (32) feet below land surface. In areas where geoprobe cannot be utilized (behind Former Unnamed Cleaners), the subcontractor will use a tripod with split spoons to collect soil samples. The estimated completion depth using tripod-drilling method is sixteen (16) feet. Figure 2-1 presents the sample locations where soil borings will be performed. Each soil core will be geologically characterized using the unified soil classification system (USCS) and screened with a PID for the presence of VOCs. All geologic descriptions, PID measurements, soil recovery and visual identification of soil contaminants, etc. will be recorded in the soil boring log and cross referenced in the Site field log book. A total of two (2) samples will be collected from each soil boring, the first soil sample corresponding to the soil interval with the highest PID value and the second corresponding to the deepest soil sample. If both samples correspond to the same depth interval then the two deepest samples will be analyzed.

Section	Standard Operating Procedure
A.2	SOP 2 Organic Vapor Screening - Soil Sample Headspace

2.2.6 *Subtask 2F: Permanent Multilevel Soil Gas Sampling Points*

Permanent multi-level soil gas sampling points, screened at 12 feet, 60 feet and 100 bgs, will be installed at three (3) locations along the anticipated plume axis using direct push drilling technologies, see Figure 2-2 for permanent multilevel soil gas locations.

A Geoprobe soil gas implant will be driven to the desired installation depth(s). Once the implant is installed, and as the Geoprobe rod is withdrawn, glass beads will be installed in the annular space around the implant to a depth of six (6) inches above the implant screen. Washed sand will be added to fill the borehole to within one foot of the ground surface. Tamped, and hydrated bentonite pellets will be used to seal the borehole around the Teflon tubing at the surface. Each implant will be finished at grade with either a flush mount well cover or above grade well protection. All well covers will have a locking cap.

2.2.7 *Subtask 2G: Soil Gas Sampling*

To assess the potential for migration of VOCs, emanating from impacted groundwater at the water table surface, soil gas samples will be collected at each of the 3 newly installed multilevel soil gas sampling points (located west of the elementary school, behind the former Unnamed Cleaners and a third location down gradient of the study area). In addition, two (2) temporary shallow soil gas sample, from a depth of 12 feet, will also be collected from behind the Former Unnamed cleaners and in front of the former Fresh & Clean Cleaners using hand driven soil gas sampling equipment, see Figure 2-2 for sample locations. All soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators set for 2-hour collection. Each sample will be submitted to an ELAP-certified laboratory for VOC analyses using United States Environmental Protection Agency (USEPA) Method TO-15. Specific details are presented below.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.4	SOP 4 Soil Gas Sampling Using Summa Canisters

2.2.8 *Subtask 2H: Groundwater Sampling*

Groundwater samples will be collected from each of the existing wells installed during the PSA and related investigations (MWs 1 through 11 and from monitoring wells installed on the Transtechnology Site). Each groundwater sample will be analyzed for TCL VOCs using CLP Method OLC03.2. Please note that existing monitoring wells 4, 9 and 10 were not located during a sampling event conducted by the NYSDEC, therefore prior to the groundwater-sampling event each of former well locations will be investigated with a magnetometer to determine if the well is still present below the asphalt.

It is anticipated that USEPA low-flow well sampling techniques will be utilized. Well purging will continue until the turbidity of the recovered well water is less than 50 Nephelometric Turbidity Units (NTUs), and the pH, conductivity and temperature measurements of the purge water have stabilized within 10% for a minimum of three consecutive measurements.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.3	SOP 3 Water Level Measurement Procedure
A.7	SOP 7 Groundwater Sampling
A.8	SOP 8 Groundwater pH And Temperature
A.9	SOP 9 Measurement Of Groundwater Specific Conductance
A.10	SOP 10 Measurement Of Groundwater Turbidity
A.11	SOP 11 Measurement Of Groundwater Dissolved Oxygen

2.2.9 *Subtask 2I: Surface Water and Sediment*

A sample from the natural spring discharge point on the North Shore Country Club (NSCC) golf course will be collected to assess the discharge of contaminants into Scudders Pond. One (1) Pond Sediment sample near the natural spring discharge point will also be collected. Each of these samples will be collected for VOC analysis by CLP Method OLC03.2.

2.2.10 *Subtaks 2J: Site Survey*

At the conclusion of SC field activities, a New York State-licensed surveyor will survey the Study Area to locate all sampling points including soil/Hydropunch borings, monitoring wells, soil boring and soil gas sample locations. The elevations of all monitoring well casings will be established to within +/- 0.01 feet based on the NGVD 86 datum. A notch will be placed in all interior casings to provide the reference point from which to collect future groundwater elevation measurements.

All surveyor collected latitude, longitude and elevation data will be provided to ERM in an ASCII file and imported in to GISKEY database format.

2.2.11 *Subtask 2K: Management of Investigative Derived Wastes*

The following section describes the general protocol for handling and disposal of solid and liquid investigative derived waste (IDW) generated during the implementation of the RI. Waste generated during the investigation is expected to consist of trash (boxes, paper, etc.), auger cuttings, decontamination wash water, groundwater monitoring well purge water, and used protective clothing.

The following guidance documents and regulations may be relied upon to guide the management, staging, storage and disposal of RI-generated IDW:

- NYSDEC's TAGM #4032 on " Disposal of Drill Cuttings" {November 21, 1989};
- NYSDEC's RCRA TAGM #3028 on " Contained-In Criteria for Environmental Media" {November 30, 1992};
- 40 C. F. R. Part 262 (Standards Applicable to Generators of Hazardous Waste);
- 40 C. F. R. Part 263 (Standards Applicable to Transporters of Hazardous Waste;
- 40 C. F. R. Part 264 (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities); and
- 40 C. F. R. Part 268 (Land Disposal Restrictions).

Accordingly, handling and disposal will be as follows:

- Cuttings from soil borings and the tailings from the unused portion of the samples will be placed back down the borehole. The remainder of the borehole will be grouted by hand or with a tremie pipe. If necessary, the borehole will also be sealed at or near the water table with a non-shrinking impermeable material to prevent the hole from acting as a conduit for surface runoff.
- Cuttings from monitoring well installations (if performed) will be collected on plastic sheeting and stored in reconditioned 55-gallon, New York State Department of Transportation (DOT) open-top drums to be provided by the ERM's drilling subcontractor.
- Liquids generated from equipment decontamination, temporary and permanent groundwater monitoring well development/purging will be collected in drums at the point of generation. The collected water will

be transported and stored in 55-gallon drums that will be staged on the property owned by the town of Oyster Bay highway yard. The water will be sampled for VOCs and then disposed off accordingly.

- Used protective clothing and equipment that is suspected to be contaminated with hazardous waste will be placed in plastic bags, and packed in 55-gallon ring-top drums.
- All drums will be labeled according to the borehole/well number. The drilling subcontractor shall move the drums on a daily basis at the direction of ERM's Hydrogeologist to the staging area.
- ERM will procure waste transport and disposal subcontractor services to properly dispose of all IDW in accordance with all local, State and Federal regulations.
- Non-contaminated trash, debris and protective clothing will be placed in a trash dumpster and disposed of by a local garbage hauler.

2.2.12 *Subtask 2L: Analytical Data Quality Evaluation*

Data quality objectives and analytical requirements are detailed in the QAPP. All laboratory data will be reviewed, validated and qualified as necessary to assess data usability by direct comparison to the specified data quality objectives and/or procedures set forth in the QAPP. A third party that is independent of the laboratory that did the analysis, and independent of ERM will perform data validation. ERM's QA/QC Officer will conduct a Usability Analysis. A Data Usability Report with attached Data Validation Reports from the third party reviewer will be submitted to the NYSDEC along "Category B Deliverables" for all laboratory analytical work.

2.2.13 *Subtask 2M: Letter Report*

Upon completion of the Phase I site investigation, a brief letter report will be generated. The letter report will include a summary of the analytical data, evaluation of the data and recommendations for additional investigative activities necessary to fill existing data gaps.

2.3 TASK 3: SITE CHARACTERIZATION PHASE II

Based upon the findings of the Phase I SC, portions of, or all of the SC Phase II activities may be implemented at the discretion of the DEC. The Phase II SC investigation will continue to evaluate the nature and extent of contamination in the Glen Head groundwater plume and its threat to human health or the environment. At this time no budgetary provisions have been incorporated into the total project budget for Phase II activities. During the Phase II Investigation the ERM may be asked to complete the following subtasks:

Soil Borings: Direct push methods may be utilized to collect soil samples to define the vertical depths of suspected disposal areas. Frequency of borings has not yet been determined. Samples will be analyzed for contaminants of concern.

Soil Borings With Hydropunch Groundwater Sampling: During the second phase of the SC, borings, with collection of lithologic soil and Hydropunch groundwater samples, may be installed at up to seven (7) locations to characterize the stratigraphy and characterize groundwater quality/impacts. Approximate locations of the seven (7) hydropunch borings are shown in Figure 2-3.

Soil and Groundwater samples will be obtained to determine the nature and extent of the Glen Head Groundwater Plume. Soil samples will be collected to characterize local geology and will be screened for the presence of volatile organic constituents (VOCs) with a PID. Soil samples will be logged and screened at 10-foot intervals beginning at the water table (approximatley115 to 125 feet bgs within the 40 acre study area) to a completion depth of 250 feet bgs. Groundwater samples will be collected utilizing the hydropunch sampling method at ten-foot intervals from the water table to approximately 250 feet bgs. If clay is encountered during installation of a hydropunch boring, (i.e. the Port Washington Confining unit) then soil and hydropunch sampling will be terminated at that depth. Soil and groundwater samples will be collected at staggered intervals, therefore every five (5) feet, soil or groundwater will be collected.

The groundwater samples obtained from these locations will be analyzed by an ELAP-certified laboratory for TCLVOCs using Contract Laboratory Program (CLP) Method OLM04.2. Soil samples will be collected to characterize the stratigraphy and will be screened in the field using a PID. There will be not commercial laboratory VOC analysis of soil samples collected during installation of the hydropunch borings.

Initially, primary hydropunch borings (HP-05, HP-06 and HP-07) will be installed to the targeted depths. Groundwater samples will be collected from these borings and analyzed on a two-day turn around time (TAT). Hydropunch boring will be installed at locations (HP-08 and HP-09) based on the analytical results obtained from the groundwater samples collected from HP-05, HP-06 and HP-07. If groundwater collected from HP-05 and HP-07 contains elevated VOC concentrations (i.e. greater than 50 ppb), then hydropunch borings HP-08 and HP-09 will be installed at locations indicated on Figure 2-3. If VOC concentrations in HP-05 and HP-07 are low (i.e. less than 50 ppb) or are not detected then HP-08 and HP-09 will be relocated to locations where the data obtained from the borings may be more useful to define the edges of the plume. Similarly if HP-05 contains elevated concentrations of VOC and HP-07 contains only low/no VOC concentrations then either HP-08 or HP-09 will be relocated to a more optimal location. Hydropunch borings HP-10 and HP-11 will be installed at the locations specified on Figure 2-3.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.1	SOP 1 Soil Borings With Hydropunch Groundwater Sampling
A.2	SOP 2 Organic Vapor Screening – Soil Sample Headspace
A.3	SOP 3 Water Level Measurement Procedure

Monitoring Well Installation: Up to 21 new groundwater monitoring wells may be installed in the Study Area , see Figure 2-4 for proposed monitoring well locations. A cluster of three-(3) ¾ inch inner diameter (ID) monitoring wells will be constructed within each of the seven (7) completed hydropunch borings. The new monitoring wells will be constructed of schedule 80 polyvinyl chloride (PVC) casing and ten (10) foot, 0.010 slot PVC screens. For budgeting purposes it was assumed that the monitoring wells would be screened at 120 to 130, 170 to 180 and 240 to 250 feet bgs. The newly installed monitoring wells will serve to monitor the Glen Head groundwater plume both horizontally and vertically.

At the completion of monitoring well installations each well will be developed following the protocols presented in Appendix A.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.3	SOP 3 Water Level Measurement Procedure
A.5	SOP 5 Monitoring Well Construction
A.6	SOP 6 Monitoring Well Development
A.8	SOP 8 Groundwater pH And Temperature
A.9	SOP 9 Measurement Of Groundwater Specific Conductance
A.10	SOP 10 Measurement Of Groundwater Turbidity
A.11	SOP 11 Measurement Of Groundwater Dissolved Oxygen

Groundwater Sampling: Approximately two weeks following well development activities, groundwater samples may be collected from each of the newly installed wells, and from the existing wells installed during the PSA and related investigations (MWs 1 through 11 and from monitoring wells installed on the Transtechnology Site). Each groundwater sample will be analyzed for TCL VOCs using CLP Method OLC03.2.

It is anticipated that USEPA low-flow well sampling techniques will be utilized. Well purging will continue until the turbidity of the recovered well water is less than 50 Nephelometric Turbidity Units (NTUs), and the pH, conductivity and temperature measurements of the purge water have stabilized within 10% for a minimum of three consecutive measurements.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.3	SOP 3 Water Level Measurement Procedure
A.7	SOP 7 Groundwater Sampling
A.8	SOP 8 Groundwater pH And Temperature
A.9	SOP 9 Measurement Of Groundwater Specific Conductance
A.10	SOP 10 Measurement Of Groundwater Turbidity
A.11	SOP 11 Measurement Of Groundwater Dissolved Oxygen

Soil Gas Points: Temporary or permanent soil gas points may be installed using hand driven, direct push or hollow stem drilling equipment to permit collection of soil vapor samples. Multi-level soil gas points screened at various depths within the same borehole may be required.

Soil Vapor: Soil Vapor samples may be collected to evaluate the potential for human exposure. The vapor samples will be collected at depth by hand driven equipment, direct push equipment, and/or from permanent soil gas points.

Surface Water and Sediment: Samples of surface water and sediment may be collected to verify the extent/distribution of contaminants within Scudders Pond.

Survey: A New York State licensed surveyor will establish the location and elevation of each new well. Elevations of all well casings and their corresponding locations will be determined to within 0.01 feet, based on USGS datum.

Data Validation/Usability Report: The third party independent data validation firm, of the laboratory that did the initial validation will validate all newly collected data and prepare a Data Usability Summary Report.

2.4 *TASK 4: SITE CHARACTERIZATION REPORT PREPARATION*

The SC Report will be prepared following completion of all (Phase I and if required Phase II) SC field activities, and the reduction, validation and interpretation of the data. The SC Report will provide a summary of the Scope of Work, methods, results, conclusions and recommendations from the SC. It will present a conceptual model of the Site including any available waste disposal history, the environmental setting, contamination assessment, and hydrogeology. The SC Report will also identify any data gaps that require further investigation and recommend any IRMs, if required. Further details concerning essential components to the SC Report are discussed below.

- Reporting: The Task 2 deliverables such as the historic records will be appended to the Draft SC Report.
- Summary of Site History and Conditions: The report will include all of the information collected during the historic records and file search and a section detailing the geologic and hydrogeologic conditions.
- Summary of Field Work: The report will include a detailed summary of investigative and analytical methods related to the fieldwork performed during the SC. This account will include figures and tables to show sample locations, parameters analyzed for, etc.
- Summary of Analytical Data: Using tables and maps, the report will summarize to the extent possible, all of the analytical data collected during the SC and historical records search. ERM will include all the tables and figures that the NYSDEC will need to prepare the Proposed Remedial Action Plan.
- Comparison to State Standards, Criteria and Guidelines (SCGs): The SC Report will identify SCGs. The concentrations of each contaminant detected will be compared to the SCGs to assess any potential public health and environmental concerns, and evaluate the fate and transport of site and off-site impacts. Any additional Applicable or Relevant and Appropriate Requirements (ARARs) will also be identified.
- Evaluation of Data Collected: The completeness of the data collected during the SC will be evaluated. Any data gaps or other areas where additional information is desirable will be identified. ERM will make recommendations on ways to fill these data gaps, if required.

In the event that some of the scope of work for the SC is completed by the NYSDEC, or NYSDOH, or if additional data is provided by these agencies, ERM will incorporate the additional information into the appropriate sections of the SC Report. All reports and correspondence will be provided in Adobe Acrobat format in addition to providing paper copies. All drawing and tables will be submitted in AutoCAD LT 2000 and Microsoft Excel formats, respectively.

Section 3

3.0 *MONTHLY PROGRESS REPORTING*

ERM will submit Monthly Progress Reports (MPRs) to NYSDEC on, or before the 20th of each month following NYSDEC issuance of Notice-To-Proceed. Each MPR will address the following topics:

- Accomplishments during the reporting period.
- Problems encountered during the reporting period.
- Compliance with project schedule and budget.
- Projected changes in Scope of Work.

All raw and validated data shall be forwarded to the NYSDEC as soon as it becomes available. All reports and correspondence will be provided in Adobe Acrobat format in addition to providing paper copies. All drawings and tables will be submitted in AutoCAD LT 2000 and Microsoft formats, respectively.

Section 4

4.0 DETAILED WORK ASSIGNMENT SCHEDULE

The Glen Head Groundwater Plume Detailed Work Assignment Implementation Schedule, including milestones and deliverables for the SC is presented in Figure 4-1.

?

The schedule contemplates a 1329 August 2005 start for field activities assuming the Notice-To-Proceed is issued by NYSDEC on or before 15 July 2005. ERM will endeavor to adhere to the schedule at all times, but there are several critical path items related to execution of the SC fieldwork (i.e. drilling site access and logistical issues) and several cycles of draft/final document review by NYSDEC and NYSDOH. As such, it may be necessary to modify and revise the schedule as the SC progresses because of:

- Potential new requirements or activities that may be requested by the NYSDEC, NYSDOH and/or the Town of Oyster Bay;
- Force majeure;
- Severe weather conditions preventing timely completion of scheduled field activities; or
- Other matters beyond ERM's or the NYSDEC's reasonable anticipation and control.

Section 5

management and coordination of multi-disciplinary RI/FS and remedial projects in New York State.

5.4 *ERM QA/QC OFFICER*

The QA/QC Officer, Mr. Andrew Coenen, will report to the ERM PM and the ERM PD. Mr. Coenen will be responsible for interface with the analytical laboratory, third party data validator, and will prepare the Data Usability Report that ERM will prepare as part of this WA. Mr. Coenen will have overall responsibility for QA/QC review of all analytical data generated during the field investigation, data validation and qualification of analytical results in terms of data usability. Mr. Coenen has extensive analytical laboratory experience and experience in the validation of analytical data and the protocols and QC specifications of the analytical methods listed in the NYSDEC ASP and the data validation guidance, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data review (February 1994) and USEPA Region II CLP Data Review SOP.

5.5 *ERM FIELD TEAM LEADER*

The FTL, Mr. Michael Mattern will report to the ERM PM and the ERM PD. Mr. Mattern will be responsible for the day-to-day management and coordination of ERM field staff and subcontractors. Mr. Mattern will be responsible for the implementation and quality of the field activities. Mr. Mattern has extensive environmental field investigation/subcontractor oversight experience in New York State.

5.6 *PROJECT HEALTH AND SAFETY COORDINATOR*

Ms. Paulina Gravier, will be the Project Health and Safety Coordinator. Ms. Gravier will report to the ERM PM and the ERM PD. Ms. Gravier has extensive experience as a Project Health and Safety Coordinator for multi-disciplinary RI/FS and remedial projects in New York State. Ms. Gravier's experience includes the preparation and implementation of site-specific health and safety plans, field oversight, and field health and safety audits.

Section 6

6.0 *SUBCONTRACTOR IDENTIFICATION AND MINORITY BUSINESS/WOMEN-OWNED BUSINESS UTILIZATION PLAN*

ERM has procured subcontractor services by competitive bidding as required by the NYSDEC. ERM included Minority Business and/or Women-Owned Business (MBE/WBE) businesses in the bidding process. Required subcontracting services for the Glen Head Groundwater Plume Site SC are identified below with the corresponding successful bidder's name, and if that company qualifies as an MBE or WBE.

- ***Drilling Subcontractor Services***
  - Delta Well and Pump Company, Inc. (WBE)
  - Environmental Probing Investigations (Multi-level soil gas points)
- ***Land Surveying Services***
  - A.J. Debruin
- ***Laboratory Services***
  - Severn Trent Laboratories (STL)
- ***Data Validation***
  - EDS
- ***IDW Disposal***
  - Metro Environmental Contracting (MEC)

ERM has worked with these firms in the past and they have been successful low bidders. ERM anticipates that we will be able to fulfill our MBE/WBE requirements using these firms.

Section 7

Schedule 2.11 (a)

Summary of Work Assignment Price

Work Assignment Number D003970-25

1)	Direct Salary Costs (Schedules 2.10(a) and 2.11 (b))		$63,349
2)	Indirect Costs (Schedule 2.10(g))		$102,625
3)	Direct Non-Salary Costs (Schedules 2.10 (b)(c)(d) and 2.11(c)(d))		$12,521
4)	Subcontractor Costs		

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

Name of Subcontractor	Services To Be Preformed	Subcontract Price
i) NA		

A) Total Cost-Plus-Fixed-Fee Subcontracts $0

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

Name of Subcontractor	Services To Be Preformed	Subcontract Price
i) Delta Well & Pump Co., Inc.	Drilling Services	$ 18,212.36
ii) Environmental Probing Investigations	Geoprobe for Soil Gas Points	$ 6,452.14
iii) DeBruin	Surveying	$ 6,696.00
iv) STL - Conneticut	Analytical Services	$ 7,067.00
v) EDS	Validation Services	$ 1,613.00
vi) Metro Environmental Contracting	Waste Disposal	$ 989.63
vii) Phase II Investigation Subcontactors		$ -

B)	**Total Unit Price Subcontracts**	$41,030	
5)	SubcontractManagement Fee (Only for Unit Price Subcontracts >$10,000)	$1,264	
6)	Total Subcontract Costs (lines 4A + 4B + 5)		$42,294
7)	Fixed Fee (Schedule 2.10(h))		$11,618
8)	Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)		$232,407

Engineer/Contract #: C003970
Project Name: Glen Head Groundwater Plume
Work Assignment No.: D003970-25

Date Prepared:

Schedule 2.11 (b)
Direct Labor Hours Budgeted

Labor Classification	IX	VIII	VII	VI	V	IV	III	II	I	Admin.	Total Direct Labor Hrs.
Av. Salary Rate ($) (Year 2005)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1 Work Plan Preparation	0	0	0	16	0	55	23	7	0	2	103
Task 2 Health and Safety Plan	0	0	0	0	0	8	1	0	0	1	10
Task 3 Site Investigation Phase I	0	0	0	120	0	275	990	0	0	84.25	1469.25
Task 4 Site Investigation Phase II	0	0	0	0	0	0	0	0	0	0	0
Task 5 Draft & Final Site Characterization Report	0	10	0	45	30	150	60	35	40	30	400
Task 6 Reporting Requirements	0	0	0	30	0	54	0	0	0	27	111
Task 1 Work Plan Preparation	$0.00	$0.00	$0.00	$757.28	$0.00	$1,882.10	$552.46	$145.67	$0.00	$32.16	$3,369.67
Task 2 Health and Safety Plan	$0.00	$0.00	$0.00	$0.00	$0.00	$273.76	$24.02	$0.00	$0.00	$16.08	$313.86
Task 3 Site Investigation Phase I	$0.00	$0.00	$0.00	$5,679.60	$0.00	$9,410.50	$23,779.80	$0.00	$0.00	$1,354.74	$40,224.64
Task 4 Site Investigation Phase II	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 5 Draft & Final Site Characterization Report	$0.00	$633.20	$0.00	$2,129.85	$1,177.20	$5,133.00	$1,441.20	$728.35	$804.40	$482.40	$12,529.60
Task 6 Reporting Requirements	$0.00	$0.00	$0.00	$1,419.90	$0.00	$1,847.88	$0.00	$0.00	$0.00	$434.16	$3,701.94
Total Hours	0	10	0	211	30	542	1074	42	40	144.25	**2093.25**
Total Direct Labor Cost ($)	$0.00	$633.20	$0.00	$9,986.63	$1,177.20	$18,547.24	$25,797.48	$874.02	$804.40	$2,319.54	**$60,139.71**

Engineer/Contract #: C003970
Project Name: Glen Head Groundwater Plume
Work Assignment No.: D003970-25

Date Prepared:

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

Labor Classification	IX	VIII	VII	VI	V	IV	III	II	I	Admin.	Total Direct Labor Hrs.
Av. Salary Rate ($) (Year 2005)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1 Work Plan Preparation				0		4				2	6
Task 2 Health and Safety Plan	0	0	0	0	0	0	0	0	0	2.5	2.5
Task 3 Site Investigation Phase I	0	0	0	0	8	0	0	0	16	64	88
Task 4 Site Investigation Phase II	0	0	0	0	0	0	0	0	0	0	0
Task 5 Draft & Final Site Characterization Report	0	0	0	0	0	0	0	0	20	40	60
Task 6 Reporting Requirements	0	0	0	0	0	0	0	0	0	18	18
Task 1 Work Plan Preparation	$0.00	$0.00	$0.00	$0.00	$0.00	$136.88	$0.00	$0.00	$0.00	$32.16	$169.04
Task 2 Health and Safety Plan	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$40.20	$40.20
Task 3 Site Investigation Phase I	$0.00	$0.00	$0.00	$0.00	$313.92	$0.00	$0.00	$0.00	$321.76	$1,029.12	$1,664.80
Task 4 Site Investigation Phase II	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 5 Draft & Final Site Characterization Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$402.20	$643.20	$1,045.40
Task 6 Reporting Requirements	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$289.44	$289.44
Total Hours	0	0	0	0	8	4	0	0	36	126.5	**174.5**
Total Direct Labor Cost ($)	$0.00	$0.00	$0.00	$0.00	$313.92	$136.88	$0.00	$0.00	$723.96	$2,034.12	**$3,208.88**

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

1) Work Plan Budget Deelopment
Conflict of Interest check
Budget schedules &
supporting documentation
2) Review work assignments (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
Condct Health & Safety Reviews
Word processing and graphic artists
Report Editing

Contract/Project administrative hours would **not** inclde:
1) QA/QC reviews
2) Technical 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 D003970-25

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. Units	Total Estimated Cost ($)
Task 1			
Copies	$0.020 copy	1000	$20.00
Computer Admin	$1.00 hr	100	$100.00
Computer CADD	$7.00 hr	10	$70.00
Mileage	$0.42 mile	50	$20.75
Task 2			
Copies	$0.020 copy	500	$10.00
Task 3			
Shipping	$25.00 package	10	$250.00
Mileage	$0.42 mile	800	$332.00
Field Phone	$15.00 day	45	$675.00
Low Value Equipment	$0.80 field hour	1130	$904.00
Task 4			
Shipping	$25.00 package	0	$0.00
Mileage	$0.42 mile	0	$0.00
Field Phone	$15.00 day	0	$0.00
Low Value Equipment	$0.80 field hour	0	$0.00
Task 5			
Copies	$0.020 copy	2500	$50.00
Computer Admin	$1.00 hr	150	$150.00
Computer CADD	$7.00 hr	70	$490.00
Task 6			
Copies	$0.020 copy	1000	$20.00
Computer Admin	$1.00 hr	150	$150.00
		Total Direct Non-Salary	$3,241.75

Work Assignment No. D003970-25

Schedule 2.11(d) 1

Equipment Purcahsed Under the Contract

Item	Est. Purchase Price ($)	O&M Rate* ($/month)	Terms of Usage (Months)	Est. Usage Cost ($) (Col. 2 + [3 x 4])
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			TOTAL	$ -

* The O&M rate is reimbursable only while the equipment is in the custody of the Engineer.

Schedule 2.11(d) 2

Maximum Reimbursement Rates for Consultant Owned Equipment

Item	Purchase Price ($) x 85%	Usage Rate* ($/Unit of Time)	Capital Recovery** Rate ($/Unit of Time)	O&M Rate ($/Unit of Time)	Est. Usage (Unit of Time)	Est. Usage Cost ($) (Col. 3 x 6)
		$ -				$ -
Field Van	$ 17,000.00	$ 67.00	$ 22.00	$ 45.00	20	$ 1,340.00
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
					TOTAL	$ 1,340.00

*Usage Rate = Capital Recovery Rate + O&M Rate

*The maximum usage rate for an item of equipment reverts to the O&M rate when the total capital recovery reimbursement rate exceed 85% of the purchase price

**The Capital Recovery Rate is the equipment's depreciation for the useful life of the item.

Schedule 2.11(d) 3

Maximum Reimbursement Rate for Vendor Rented Equipment

Item	Max. Reimbursement Rate ($)*			Est. Usage (unit of time)	Number of Units Needed	Est. Rental Cost ($) (Co. 2 x 3)	
Dust Thermo pDR	$	350.00	month	1	2	$	700.00
PID Miniras 2000	$	450.00	month	1	2	$	900.00
YSI 600XL Groundwater Sampler	$	275.00	week	1	4	$	1,100.00
Lamotte 2020 Turbidity Meter	$	158.00	month	1	1	$	158.00
Grundfos Pump	$	300.00	week	1	2	$	600.00
Waterra Pump	$	210.00	week	1	3	$	630.00
Solinst Interfact	$	315.00	month	1	2	$	630.00
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
						$	-
					TOTAL	$	4,718.00

*Reimbursement will be made at the Maximum Reimbursement rate or the actual rental rate, whichever is less.

Schedule 2.11(d) 4

Site-Dedicated Equipment

Item	Estimated Quantity	Unit Cost ($)	Total Budged Cost ($) (Col. 2 x 3)
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
		TOTAL	$ -

Work Assignment No. D003970-25

Schedule 2.11(d) 5

Consumable Supplies

Item	Estimated Quantity	Unit Cost ($)	Total Budged Cost ($) (Col. 2 x 3)
Gloves	600	$ 0.30	$ 180.00
Ear Plugs	60	$ 0.30	$ 18.00
Distilled Water (5 gallon)	10	$ 35.36	$ 353.60
Alcanox	2	$ 2.50	$ 5.00
Padlocks	7	$ 12.42	$ 86.94
Aluminum foil	1	$ 3.45	$ 3.45
Survey flags	50	$ 0.40	$ 20.00
Paper towels	3	$ 1.30	$ 3.90
Plastic Bags (heavy duty)	50	$ 1.75	$ 87.50
S/S teaspons	100	$ 0.60	$ 60.00
Packing tape	5	$ 2.50	$ 12.50
Sampling tubing	6000	$ 0.33	$ 1,980.00
VOC Sampler	5	$ 0.90	$ 4.50
Waste material label	70	$ 1.00	$ 70.00
Zip Lock bags	400	$ 0.20	$ 80.00
Isobutylene	3	$ 45.00	$ 135.00
Tyvek	10	$ 12.10	$ 121.00
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
		TOTAL	$ 3,221.39

Schedule 2.11 (e)
Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor **Services to be Performed** **Subcontract Price**

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 (Co. 3 x 5)
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
Total Direct Salary Costs					$ -

Footnotes:

1) These rates will be held firm until _______________ (DATE).

2) Reimbursement will be limited to the lesser of either the individuals actual hourly rate or the maximum rate for each labor category.

3) Reimbursement will be limited to the maximum reimbursement rate for the professional responsibility level of the actual work performed.

4) Only those labor classifications indicated with an asterisk will be entitled to overtime premium.

5) Reimbursement for technical time of principals, owners and officers will be limited to the maximum reimbursement rate of that labor category, the actual hourly labor rate paid, or the State M-6 job rate, whichever is lower.

6) The maximum rates in each labor category can be modified only by mutual written agreement and approved by both the Department and the Comptroller.

7) This Footnote applies to Schedules for years 4 thru 7 only. If the U.S. cost-of-living index increases at a rate greater than 6% compounded annually, the maximum salary rates will be subject to renegotiation for future years of the contract. There shall be no retroactive adjustments of payment as a result of renegotiated salary schedules

B) Indirect Costs

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of ________% or the actual rate calculated in accordance with 49 CFR Federal Acquisition Regulation, whichever is lower.

Amount budged for indirect cost is: ____________________

C) Maximum Reimbursement Rates for Direct Non-Salary Costs

Item	Max. Reimbursement Rate (Specify Unit)	Ex. No. of Units	Total Est. Cost
1) Travel	See Schedule 2.10(d) for rates		
2) Supplies			

Total Direct Non-Salary Costs ____________________

D) Fixed Fee

The fixed fee is: ____________________
See Schedule 2.10(h) for how the fixed fee should be claimed.

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	Services to be Peromed	Subcontract Price	Management Fee
Delta Well & Pump Co., Inc.	Drilling Services	$ 18,212.36	$ 910.62

Item	Max. Reimbursement Rate	Units	Est. No. of Units	Total Est. Cost
Mobilization/Demobilization	$ 5,437.50	/Lump Sum	1	$ 5,437.50
Utility Mark Out (One Call Center-County/Village/Sewer/Water)	$ 163.13	/each	1	$ 163.13
Soil Borings with Geoprobe to 32 feet	$ 14.14	/foot	224	$ 3,166.80
Macrocore samples (4 foot cores)	$ 10.88	/each	56	$ 609.00
Soil Boring with Tripod to 16'	$ 81.56	/foot	16	$ 1,305.00
Split spoons (2"X2') to max depth of 16-feet	$ 54.38	/sample	8	$ 435.00
Drilling of Hydropunch Borings to 250 feet	$ 29.36	/foot	0	$ -
Hydropunch Groundwater Samples every 10 feet Starting at Water Table (~120 feet to 250 feet bgs)	$ 190.31	/each	0	$ -
Split Spoon Soil Samples every 10 feet Starting at 5 feet below Water Table (~120 feet to 250 feet bgs)	$ 48.94	/each	0	$ -
Drilling of 2 inch Monitoring Wells to 130 feet	$ 27.19	/foot	0	$ -
2 inch PVC Casing/Screens to 130 feet OR	$ 16.31	/foot	0	$ -
2 inch Black Steel Casing threaded with couplings to 120 feet	$ 16.31	/foot	0	$ -
2 inch 10 feet long Stainless Steel Screen with 2 foot sump	$ 489.38	/each	0	$ -
Monitoring Well Surface Completions	$ 217.50	/each	0	$ -
Monitoring Well Development (4 hours per well)	$ 163.13	/hour	0	$ -
Cuttings/Fluids Handling	$ 163.13	/hour	0	$ -
Decontamination Pad	$ 1,087.50	/each	1	$ 1,087.50
Decontamination	$ 163.13	/hour	15	$ 2,446.88
Hydrant Fees - (cost of a permit covers 14 calendar days)	$ 516.56	/each	2	$ 1,033.13
Road Opening Permits - *	$ 326.25	/each	7	$ 2,283.75
Concrete/Asphalt Coring	$ 163.13	/each	0	$ -
Monitoring Well Permits	$ 2,718.75	/each	0	$ -
55 Gallon DOT Drums	$ 48.94	/each	5	$ 244.69
Standby Time	$ 146.81	/hour	0	$ -
Furnish & Install 3/4" sch 80 #10 slot pvc screen	$ 8.70	/foot	0	$ -
Furnish & Install 3/4" sch 80 casing	$ 4.35	/foot	0	$ -
Subtotal Subcontract Price				$ 18,212.36
Subcontract Management Fee				$ 910.62
TOTAL				$ 19,122.98

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	Services to be Perormed	Subcontract Price	Management Fee
Environmental Probing Investigations		$ 6,452.14	$ -

Item	Max. Reimbursement Rate (Specify Unit)	Units	Est. No. of Units	Total Est. Cost
Mobilization/Demobilization	$ 407.81	total	1	$ 407.81
Geoprobe 6600 (two man crew)	$ 1,250.63	total	3	$ 3,751.88
6-Inch Implants	$ 59.81	each	9	$ 538.31
Glass Beads	$ 10.88	bag	1	$ 10.88
Poly-Tubing	$ 0.54	total	516	$ 280.58
Well Gravel	$ 10.88	bag	2	$ 21.75
Grout	$ 1.09	foot	200	$ 217.50
Three-Inch Manhole and Pad	$ 135.94	each	9	$ 1,223.44
Subtotal Subcontract Price				$ 6,452.14
Subcontract Management Fee				$ -
TOTAL				$ 6,452.14

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	Services to be Perormed		Subcontract Price	Management Fee
DeBruin	Surveying		$ 6,696.00	$ -

Item	Max. Reimbursement Rate (Specify Unit)	Units	Est. No. of Units	Total Est. Cost
Survey Horizontal and Vertical to .1 ft Acc.	$ 3,144.00	each	1	$ 3,144.00
Survey 25 Monitoring Wells to .01 ft Acc.	$ 3,552.00	each	1	$ 3,552.00

Subtotal Subcontract Price	$ 6,696.00
Subcontract Management Fee	$ -
TOTAL	$ 6,696.00

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	**Services to be Perormed**	**Subcontract Price**	**Management Fee**
Severn Trent Laboratory - Conneticut	Analytical	$ 7,067.00	$ 353.35

Item	Max. Reimbursement Rate (Specify Unit)	Units	Est. No. of Units	Total Est. Cost
Drywell and Cesspool (Sediment) TCL VOCs by OLM04.2	$63.50	Soil	15	$ 952.50
Soil Sampling TCL VOCs by OLM04.2	$63.50	Soil	21	$ 1,333.50
Groundwater Sampling (HP) TCL VOCs by OLC03.2	$63.50	Aqueous	0	$ -
Soil Gas Sampling TO-15	$250.00	Air	12	$ 3,000.00
Groundwater Sampling (MW) TCL VOCs by OLC03.2	$63.50	Aqueous	25	$ 1,587.50
Management of Investigation Derived Wastes				
TCLP VOCs, Reactivity to Sulfide and Cyanide, Corrosivity, Flammability	$83.50	Aqueous	1	$ 83.50
	$110.00	Soil	1	$ 110.00
Subtotal Subcontract Price				$ 7,067.00
Subcontract Management Fee				$ 353.35
TOTAL				$ 7,420.35

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	**Services to be Peromed**		**Subcontract Price**	**Management Fee**
EDS	Validation Services		$ 1,613.00	$ -

Item	Max. Reimbursement Rate (Specify Unit)	Units	Est. No. of Units	Total Est. Cost
Drywell and Cesspool (Sediment) TCL VOCs by OLM04.2	$21.00	Soil	15	$ 315.00
Soil Sampling TCL VOCs by OLM04.2	$21.00	Soil	21	$ 441.00
Groundwater Sampling (HP) TCL VOCs by OLC03.2	$21.00	Aqueous	25	$ 525.00
Soil Gas Sampling TO-15	$21.00	Air	12	$ 252.00
Groundwater Sampling (MW) TCL VOCs by OLC03.2	$40.00	Aqueous	1	$ 40.00
Management of Investigation Derived Wastes TCLP VOCs, Reactivity to Sulfide and Cyanide, Corrosivity, Flammability	$40.00	Soil	1	$ 40.00
Subtotal Subcontract Price				$ 1,613.00
Subcontract Management Fee				$ -
TOTAL				$ 1,613.00

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	Services to be Perormed	Subcontract Price	Management Fee
Metro Environmental Contracting		$ 989.63	$ -

Item	Max. Reimbursement Rate (Specify Unit)			Est. No. of Units	Total Est. Cost
Hazardous Solid	$	369.75	drum	0	$ -
Hazardous Liquid	$	261.00	drum	0	$ -
Non-Hazardous Solid	$	119.63	drum	5	$ 598.13
Non-Hazardous Liquid	$	119.63	drum	0	$ -
Transportation	$	97.88	lump sum	4	$ 391.50
Subtotal Subcontract Price					$ 989.63
Subcontract Management Fee					$ -
TOTAL					$ 989.63

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-25

Name of Subcontractor	Services to be Perormed	Subcontract Price	Management Fee
Phase II Investigation Subcontractors		$ -	$ -

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
Phase II Investigation Subcontract Serivces	$ -	1	$ -

Subtotal Subcontract Price	$ -
Subcontract Management Fee	$ -
TOTAL	$ -

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page ____ of ____

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Project Summary		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 63,348.59	$ 63,348.59
2. Indirect Costs 162%				$ -		$ -	$ 102,624.72	$ 102,624.72
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 165,973.31	$ 165,973.31
4. Travel				$ -		$ -	$ 352.75	$ 352.75
5. Other Non-Salary Costs				$ -		$ -	$ 12,168.39	$ 12,168.39
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 12,521.14	$ 12,521.14
7. Subcontractors				$ -		$ -	$ 42,294.09	$ 42,294.09
8. Total WA Costs				$ -		$ -	$ 220,788.54	$ 220,788.54
9. Fixed Fee				$ -		$ -	$ 11,618.13	$ 11,618.13
10. Total WA Price				$ -		$ -	$ 232,406.67	$ 232,406.67

Project Manager (Engineer) ______________________ Date __________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 1 Work Plan Preparation		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 3,538.71	$ 3,538.71
2. Indirect Costs 162%				$ -		$ -	$ 5,732.71	$ 5,732.71
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 9,271.42	$ 9,271.42
4. Travel				$ -		$ -	$ 20.75	$ 20.75
5. Other Non-Salary Costs				$ -		$ -	$ 190.00	$ 190.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 210.75	$ 210.75
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 9,482.17	$ 9,482.17
9. Fixed Fee				$ -		$ -	$ 649.00	$ 649.00
10. Total WA Price				$ -		$ -	$ 10,131.17	$ 10,131.17

Project Manager (Engineer) ______________________ Date ____________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 2 Health and Safety Plan		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 354.06	$ 354.06
2. Indirect Costs 162%				$ -		$ -	$ 573.58	$ 573.58
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 927.64	$ 927.64
4. Travel				$ -		$ -	$ -	$ -
5. Other Non-Salary Costs				$ -		$ -	$ 10.00	$ 10.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 10.00	$ 10.00
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 937.64	$ 937.64
9. Fixed Fee				$ -		$ -	$ 64.93	$ 64.93
10. Total WA Price				$ -		$ -	$ 1,002.57	$ 1,002.57

Project Manager (Engineer) ____________________ Date ____________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 3 Site Investigation Phase I		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 41,889.44	$ 41,889.44
2. Indirect Costs 162%				$ -		$ -	$ 67,860.89	$ 67,860.89
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 109,750.33	$ 109,750.33
4. Travel				$ -		$ -	$ 332.00	$ 332.00
5. Other Non-Salary Costs				$ -		$ -	$ 11,108.39	$ 11,108.39
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 11,440.39	$ 11,440.39
7. Subcontractors				$ -		$ -	$ 42,294.09	$ 42,294.09
8. Total WA Costs				$ -		$ -	$ 163,484.82	$ 163,484.82
9. Fixed Fee				$ -		$ -	$ 7,682.52	$ 7,682.52
10. Total WA Price				$ -		$ -	$ 171,167.34	$ 171,167.34

Project Manager (Engineer) ____________________ Date ____________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 4 Site Investigation Phase II		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ -	$ -
2. Indirect Costs 162%				$ -		$ -	$ -	$ -
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ -	$ -
4. Travel				$ -		$ -	$ -	$ -
5. Other Non-Salary Costs				$ -		$ -	$ -	$ -
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ -	$ -
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ -	$ -
9. Fixed Fee				$ -		$ -	$ -	$ -
10. Total WA Price				$ -		$ -	$ -	$ -

Project Manager (Engineer) ______________________ Date __________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 5 Draft & Final Site Characterization Report		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 13,575.00	$ 13,575.00
2. Indirect Costs 162%				$ -		$ -	$ 21,991.50	$ 21,991.50
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 35,566.50	$ 35,566.50
4. Travel				$ -		$ -	$ -	$ -
5. Other Non-Salary Costs				$ -		$ -	$ 690.00	$ 690.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 690.00	$ 690.00
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 36,256.50	$ 36,256.50
9. Fixed Fee				$ -		$ -	$ 2,489.66	$ 2,489.66
10. Total WA Price				$ -		$ -	$ 38,746.16	$ 38,746.16

Project Manager (Engineer) ______________________ Date ____________

Schedule 2.11(g)
Monthly Cost Control Report
Summary of Fiscal Information

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		
Task No./Name	Task 6 Reporting Requirements		
Complete	%		

	A	B	C	D	E	F	G	H
Expenditure Category	*Cost Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct salary Costs				$ -		$ -	$ 3,991.38	$ 3,991.38
2. Indirect Costs 162%				$ -		$ -	$ 6,466.04	$ 6,466.04
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 10,457.42	$ 10,457.42
4. Travel				$ -		$ -	$ -	$ -
5. Other Non-Salary Costs				$ -		$ -	$ 170.00	$ 170.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 170.00	$ 170.00
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 10,627.42	$ 10,627.42
9. Fixed Fee				$ -		$ -	$ 732.02	$ 732.02
10. Total WA Price				$ -		$ -	$ 11,359.43	$ 11,359.43

Project Manager (Engineer) ______________________ Date ________

Schedule 2.11(g) - Supplemental

Cost Control Report for Subcontracts

Page of

Engineer	ERM	Date Prepared	5/25/2005
Contract Number		Billing Period	
Project Name	Glen Head Groundwater Plume	Invoice No.	
Work Assignment No.	D003970-25		

	A	B	C	D	E	F	G
Subcontract Name	*Subcontract Costs Claimed this Application Inc. Resubmittals*	*Subcontract Costs Approved for Payment on Previous Applications*	*Total Subcontract Costs to Date (A+B)*	*Subcontract Approved Budget*	*Management Fee Budget*	*Management Fee Paid*	*Total Costs to Date (C+F)*
Delta Well & Pump Co.			$ -	$ 18,212.36	$ 910.62		$ -
Zebra			$ -	$ 6,452.14	$ -		$ -
DeBruin			$ -	$ 6,696.00	$ -		$ -
Severn Trent Laboratory			$ -	$ 7,067.00	$ 353.35		$ -
EDS			$ -	$ 1,613.00	$ -		$ -
Metro Environmental			$ -	$ 989.63	$ -		$ -
Phase II Subcontractors			$ -	$ -	$ -		$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
TOTALS	$ -	$ -	$ -	$ 41,030.13	$ 1,263.97	$ -	$ -

Project Manager (Engineer) ______________________ Date ____________

NOTES:

1) Costs listed in Colums A, B, C &D do not include any management fee costs.
2) Management fee is applicable to only properly procured, satisfactorily completed, unit price subcontracts over $10,000.
3) Line 11, Column 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

		Page	of
Engineer/Contract No.		Date Prepared	5/25/2005
Project Name		Billing Period	
Work Assignment No.		Invoice No.	

Task Name	IX		VIII		VII		VI		V		IV		III		II		I		Admin		Total No. of Direct Labor Hrs	
	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est	Exp	Est
Task 1		0		0		0		16		0		59		23		7		0		4		109
Task 2		0		0		0		0		0		8		1		0		0		3.5		13
Task 3		0		0		0		120		8		275		990		0		16		148		1557.25
Task 4		0		0		0		0		0		0		0		0		0		0		0
Task 5		0		10		0		45		30		150		60		35		60		70		460
Task 6		0		0		0		30		0		54		0		0		0		45		129
Task 7																						
Task 8																						
Task 9																						
Task 10																						
Task 11																						
Task 12																						
Total Hours		0		10		0		211		38		546		1074		42		76		271		2268

*Expended/Estimated

Schedule 2.11(i)
Monthly Cost Control Report
*Equipment Inventory Control Form**

Engineer ______________________ *Contract No.* ______________________

1) Equipment Description ______________________
Purchase Date ______________________
Purcahse Price ______________________
Dates & Location of Use Since Last Report (Identify WA) ______________________
Present Storage Location ______________________
Condition of Equipment ______________________
Reposible Person and Phone No. ______________________

2) Equipment Description ______________________
Purchase Date ______________________
Purcahse Price ______________________
Dates & Location of Use Since Last Report (Identify WA) ______________________
Present Storage Location ______________________
Condition of Equipment ______________________
Reposible Person and Phone No. ______________________

3) Equipment Description ______________________
Purchase Date ______________________
Purcahse Price ______________________
Dates & Location of Use Since Last Report (Identify WA) ______________________
Present Storage Location ______________________
Condition of Equipment ______________________
Reposible Person and Phone No. ______________________

4) Equipment Description ______________________
Purchase Date ______________________
Purcahse Price ______________________
Dates & Location of Use Since Last Report (Identify WA) ______________________
Present Storage Location ______________________
Condition of Equipment ______________________
Reposible Person and Phone No. ______________________

* This form must be completed for all Department owned equipment in the custody of the Engineer and submitted as part of the Monthly Cost Control Report.

Section 8

8.0 REFERENCES

NYSDEC, 1989. Division Technical and Administrative Guidance Memorandum (TAGM): Disposal of Drill Cuttings. Division of Hazardous Waste Remediation. HWR-94-4032. 21 November 1989.

NYSDEC, 1991. New York State Water Classifications - 6 NYCRR 701. 2 August, 1991

NYSDEC, 1992. Division Technical and Administrative Guidance Memorandum (TAGM): "Contained-In" Criteria For Environmental Media. Division of Hazardous Substance Regulation. HWR-92-3028. 30 November 1992.

NYSDEC, 1994. Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels. Division of Hazardous Waste Remediation. HWR-94-4046. 24 January 1994.

NYSDEC, 1998. New York State Groundwater Quality Standards - 6 NYCRR 703 (12 March 1998) and Division of Water Technical and Operational Guidance Series (1.1.1) - Ambient Water Quality Standards and Guidance Values, (June 1998), Errata Sheet (January 1999), and Addenda (April 2000).

Figures

SOURCE: U.S.G.S. QUADRANGLE MAP, SEACLIFF, NY, 1968, PHOTOREVISED 1979, AND HICKSVILLE, NY 1967, PHOTOREVISED 1979.

TITLE

SITE AREA LOCATION MAP

PREPARED FOR

NYSDEC WORK ASSIGNMENT NO. D003970-25

ERM Environmental Resources Management

SCALE	FIGURE
1"=2000'	1-1

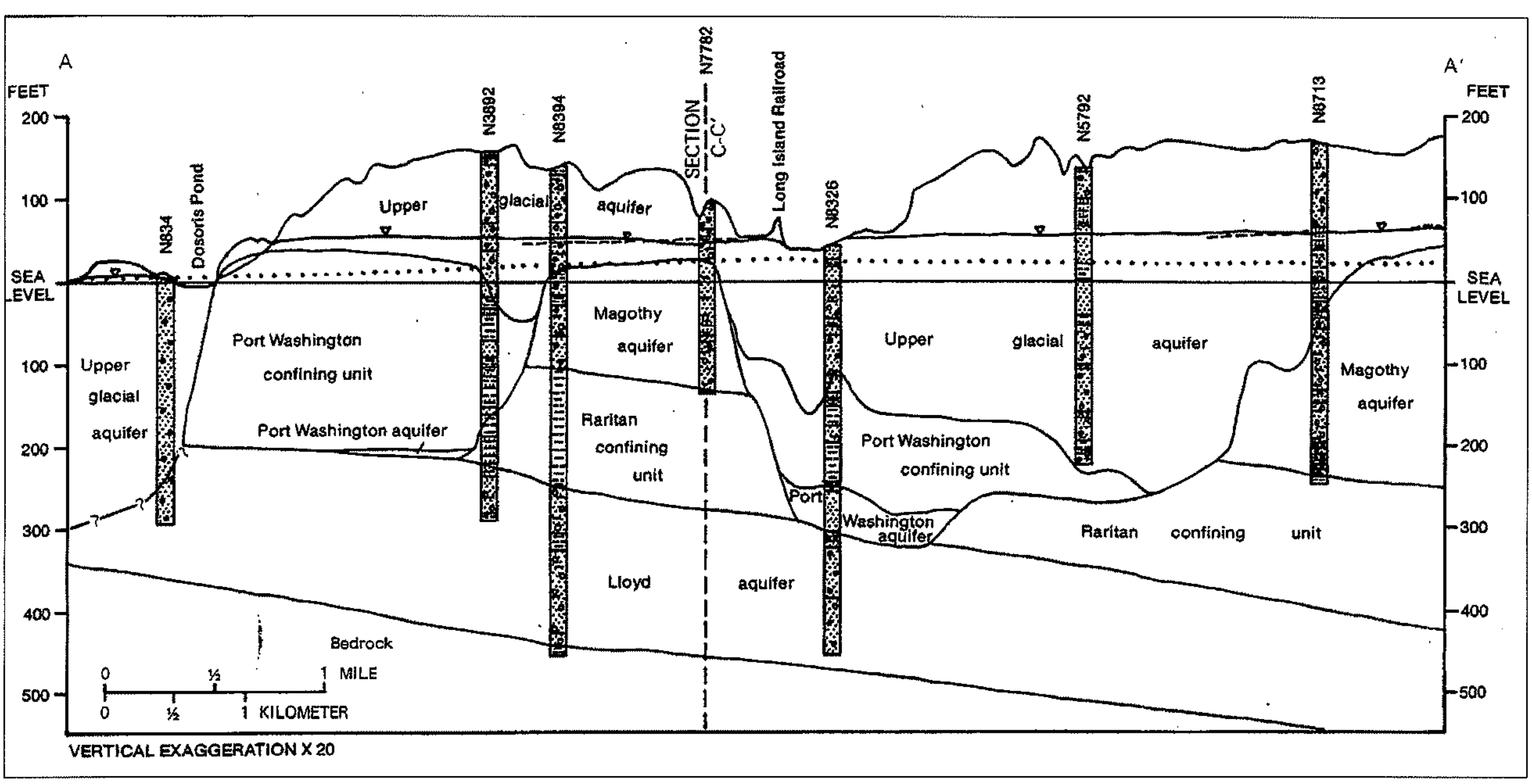
DRAWN:	JOB NO.:	FILE NAME:	DATE
EMF	0030800	0030800-00-005	5/16/05

LEGEND

0 | 0.2 | 0.4 | 0.6 | 0.8 | 1

GRAPHIC SCALE IN MILES

TITLE	GLEN HEAD GROUNDWATER PLUME STUDY AREA PLAN
PREPARED FOR	NYSDEC WORK ASSIGNMENT NO. D003970-25
ERM Environmental Resources Management	SCALE: GRAPHIC
DATE	4/26/05
FIGURE	1-2
DRAWN:	EMF
JOB NO.:	0030800.00
FILE NAME:	0030800-00-007



Source: USGS Water-Resources Investigation Report 85-4051

TITLE Geological Cross Section Glen Head, New York				
PREPARED FOR NYSDEC-WORK ASSIGNMENT NO. D003970-25				
ERM Environmental Resources Management			SCALE as shown	FIGURE 1-3
DRAWN: EMF	JOB NO.: 0030800	FILE NAME: 0030800-00-006	DATE 5/16/05	

LEGEND

✦ PROPOSED SOIL BORING LOCATION

0 | 0.2 | 0.4 | 0.6 | 0.8 | 1

GRAPHIC SCALE IN MILES

TITLE

PROPOSED SOIL BORING LOCATIONS

PREPARED FOR

NYSDEC WORK ASSIGNMENT NO. D003970-25

ERM Environmental Resources Management

DRAWN:	JOB NO.:	FILE NAME:	SCALE	FIGURE
EMF	0030800.00	0030800-00-003	GRAPHIC	2-1
			DATE 4/26/05	

LEGEND

×S PROPOSED SHALLOW SOIL GAS LOCATIONS

×M PROPOSED MULTILEVEL SOIL GAS LOCATIONS

0 0.2 0.4 0.6 0.8 1

GRAPHIC SCALE IN MILES

TITLE	PROPOSED SOIL GAS SAMPLE LOCATIONS
PREPARED FOR	NYSDEC WORK ASSIGNMENT NO. D003970-25
ERM Environmental Resources Management	SCALE: GRAPHIC
DATE	6/29/05
FIGURE	2-2
DRAWN: EMF	JOB NO.: 0030800.00
FILE NAME:	0030800-00-002

LEGEND

5 — PROPOSED HYDROPUNCH LOCATIONS

EXISTING HYPDROPUNCH LOCATIONS

ESTIMATED GROUNDWATER FLOW DIRECTION

0 — 0.2 — 0.4 — 0.6 — 0.8 — 1

GRAPHIC SCALE IN MILES

TITLE: PROPOSED HYDROPUNCH LOCATIONS			
PREPARED FOR: NYSDEC WORK ASSIGNMENT NO. D003970-25			
ERM Environmental Resources Management		SCALE: GRAPHIC	FIGURE: 2-3
DRAWN: EMF	JOB NO.: 0030800.00	FILE NAME: 0030800-00-001	DATE: 5/3/05

LEGEND

- MONITORING WELL LOCATIONS
- PROPOSED MONITORING WELL LOCATIONS

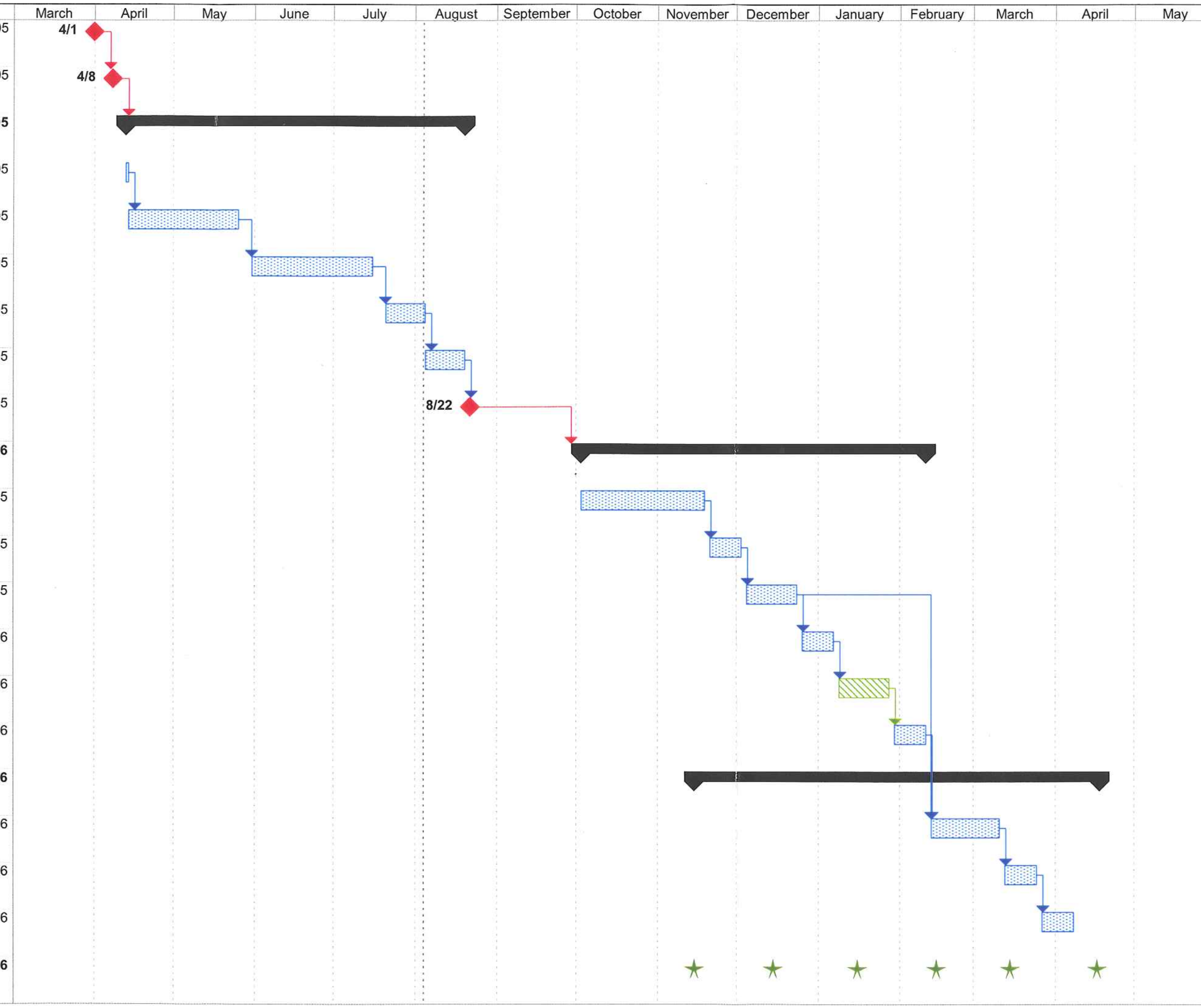
0 0.2 0.4 0.6 0.8 1

GRAPHIC SCALE IN MILES

TITLE	PROPOSED AND EXISTING MONITORING WELL LOCATIONS
PREPARED FOR	NYSDEC WORK ASSIGNMENT NO. D003970-25
ERM Environmental Resources Management	SCALE: GRAPHIC
DATE	4/26/05
FIGURE	2-4
DRAWN:	EMF
JOB NO.:	0030800.00
FILE NAME:	0030800-00-004

FIGURE 4-1
SITE CHARACTERIZATION WORKPLAN SCHEDULE
GLEN HEAD PLUME SITE - GLEN HEAD, NEW YORK
NYSDEC SITE CODE #1-30-098

ID	Task Name	Duration	Start	Finish
1	**Issue Work Assignment (WA)**	1 day	Fri 4/1/05	Fri 4/1/05
2	**Acceptance of Work Assignment**	1 day	Fri 4/8/05	Fri 4/8/05
3	**Site Characterization Workplan Development**	**93 days**	**Wed 4/13/05**	**Fri 8/19/05**
4	Site Reconnaissance	1 day	Wed 4/13/05	Wed 4/13/05
5	Draft Site Characterization Work Plan	30 days	Thu 4/14/05	Wed 5/25/05
6	DEC Review of Draft Site Characterization Workplan	34 days	Tue 5/31/05	Fri 7/15/05
7	Final Site Characterization Workplan	11 days	Thu 7/21/05	Thu 8/4/05
8	DEC Approval of Site Characterization Work Plan	11 days	Fri 8/5/05	Fri 8/19/05
9	**Notice to Proceed**	1 day	Mon 8/22/05	Mon 8/22/05
10	**Site Investigation**	**95 days**	**Mon 10/3/05**	**Fri 2/10/06**
11	Phase I Site Investigation	35 days	Mon 10/3/05	Fri 11/18/05
12	Laboratory Analysis	10 days	Mon 11/21/05	Fri 12/2/05
13	Letter Report of Phase I Findings	15 days	Mon 12/5/05	Fri 12/23/05
14	NYSDEC Review and Approval of Letter Report	10 days	Mon 12/26/05	Fri 1/6/06
15	Phase II Site Investigation (if req'd)	15 days	Mon 1/9/06	Fri 1/27/06
16	Laboratory Analysis	10 days	Mon 1/30/06	Fri 2/10/06
17	**Reports**	**110 days**	**Tue 11/15/05**	**Mon 4/17/06**
18	Draft Site Characterization Report	20 days	Mon 2/13/06	Fri 3/10/06
19	DEC Review of Draft Site Characterization Report	10 days	Mon 3/13/06	Fri 3/24/06
20	Final Site Characterization Report	10 days	Mon 3/27/06	Fri 4/7/06
21	**Monthly Progress Reports**	**110 days**	**Tue 11/15/05**	**Mon 4/17/06**



Date: Thu 8/4/05 | Task | Add-on Task | Milestone | Recurring Activity | Summary

Appendices

APPENDIX A

STANDARD OPERATING PROCEDURES (SOPS)

Section	Standard Operating Procedure
A.1	SOP 1 Soil Borings With Hydropunch Groundwater Sampling
A.2	SOP 2 Organic Vapor Screening – Soil Sample Headspace
A.3	SOP 3 Water Level Measurement Procedure
A.4	SOP 4 Soil Gas Sampling Using Summa Canisters
A.5	SOP 5 Monitoring Well Construction
A.6	SOP 6 Monitoring Well Development
A.7	SOP 7 Groundwater Sampling (Conventional & Low-Flow)
A.8	SOP 8 Groundwater pH And Temperature
A.9	SOP 9 Measurement Of Groundwater Specific Conductance
A.10	SOP 10 Measurement Of Groundwater Turbidity
A.11	SOP 11 Measurement Of Groundwater Dissolved Oxygen

TABLE OF CONTENTS - APPENDIX A

A.0 STANDARD OPERATING PROCEDURES

A.1 SOP 1: SOIL BORINGS WITH HYDROPUNCH GROUNDWATER SAMPLING

Soil borings with collection of lithologic soil samples and Hydropunch groundwater sampling will be installed at 7 locations to characterize the stratigraphic conditions and characterize groundwater quality/impacts Approximate locations are shown in Figure 2-3.

A NYSDOH ELAP-certified laboratory will analyze the groundwater samples obtained from these locations for TCL VOCs using CLP Method OLM04.2.

A.1.1 Drilling Methods

All boreholes (for soil borings or groundwater monitoring wells) will be advanced using hollow stem augers and a truck-mounted rotary drilling rig. Where possible, borings will be placed immediately adjacent to any concrete slabs. If areas are identified where a concrete slab must be penetrated, then concrete coring will be required prior to installation of the soil borings/groundwater monitoring wells.

A.1.2 Source of Water

The use of drilling mud and/or foams shall not be allowed. All water used during drilling and/or steam-cleaning operations shall be from a potable source and so designated in writing. ERM's drilling subcontractor will obtain all permits from the local water purveyor and any other concerned authorities, and provide of any required back-flow prevention devices.

A.1.3 Drilling Equipment Decontamination

All drilling equipment and the back of the drilling rig shall be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This shall include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment shall be capable of generating live steam with a minimum temperature of 212° degrees Fahrenheit. The equipment shall be cleaned to the satisfaction of the ERM's Hydrogeologist.

A.1.4 *Lithologic Sample Collection*

Split-spoon soil samples shall be collected at ten-foot intervals to the termination depth of approximately 250 feet bgs or until the Port Washington Confining Unit (which contains significant clays) becomes present in the drilling process.

All soil sampling shall be performed by driving two-foot split-barrel (split-spoon) samplers in advance of the bottom of the borehole. Split-spoon samplers shall be driven in accordance with the general intent of ASTM Standards for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586-84).

Split-spoons will be advanced by either the wire-line method (downhole cable hammer) or with a cathead and standard 140-pound hammer simulating a free-fall of 30 inches. The soil samples will be collected using a properly decontaminated 2-foot by 2-inch carbon steel split-spoon sampler driven by a 140-lb. hammer dropped 30 inches repeatedly. An ERM Hydrogeologist will examine and identify the sample immediately upon collection. The sample will also be screened for VOCs using a hand-held photoionization detector (PID) total organic vapor analyzer.

A.1.5 *Borehole Logging*

The ERM Hydrogeologist will examine each split-spoon sample and use visual and field test criteria to classify the soils. The cuttings brought to the surface during the drilling will also be:

- Screened for VOCs using a hand-held PID total organic vapor analyzer; and
- Examined for any physical soil characteristics that may have not been observed in the split-spoon samples.

A standard "Geologic Log" will be maintained for each boring that will include all of the geological information gathered in the field, including the following:

- The structure of the soils sampled, including layering stratification features, and the dominant soil types;
- The color of soils, using Munsell Soil Color Charts;
- The moisture content of soils;
- Soil grain features, including grain sizes, degree of sorting or grading, angularity, and mineralogy. The soils will be classified using the ASTM Method D2488-84, a visual manual procedure;

- Identification of any rock fragments, organic material or other components; and
- The consistency of clay-dominated soils.

All of the soil information collected will be recorded as a designation under the USCS along with additional observations for each distinctive soil type within each sample. All soil samples will be collected and stored in glass jars or plastic ziplock bags. The ERM Hydrogeologist will label the jars or plastic bags with soil boring or well number, sample interval and date.

The ERM Hydrogeologist shall record penetration resistance, recovery and sample description for each split-barrel sample in soil boring logs.

A.1.6 *Hydropunch Groundwater Sample Collection*

Groundwater samples will be collected from each of the 7 soil borings utilizing the Hydropunch method at ten-foot intervals from the water table [approximately 120 feet bgs] to 250 feet bgs. Accordingly, the lithologic soil samples and Hydropunch groundwater samples will alternate at five-foot intervals below the water table. ERM's drilling subcontractor will be responsible for provision of the Hydropunch sampling tool and all necessary accessory items (reusable and disposable) to collect groundwater samples.

The hollow stem augers will be advanced to just above the designated sample depth starting with the upper most sample in the profile. A properly decontaminated Hydropunch sampler will then be lowered through the augers to the bottom of the lead auger. The Hydropunch will then be driven in advance of the augers to the sample location depth and pulled back just enough to expose the screen within the Hydropunch. A new disposable bailer will be used for each sample. This will allow each sample zone to be purged until an acceptable sample can be obtained. Once the sample has been obtained with the bailer, it will be immediately transferred to laboratory-supplied bottles.

The augers will then be advanced five feet to collect the next lithologic sample using the procedures presented above. The augers will then be advanced an additional five feet to the next Hydropunch sample location, the Hydropunch decontaminated, and the same procedure will be used to obtain the next groundwater sample as described above. This alternating sequence of lithologic soil sample and Hydropunch groundwater sample collection will continue to the borehole termination depth of 125 feet bgs.

A.1.7 *Borehole Abandonment*

Boreholes will be abandoned by backfill with the drill cuttings to within 2-feet of land surface. The remaining 2-feet will be filled with cement/bentonite grout, consisting of 5.0 pounds of high grade bentonite for each 94 pounds of Type I or Type II Portland cement mixed with 8.3 gallons of water for a target density of 13.9 pounds/gallon with an acceptable range of 13.4 to 14.5 pounds/gallon.

A.1.8 *Work Site Restoration*

Upon completion of the work, the drilling subcontractor shall restore all work areas/drilling locations to a pre-drilling condition. The drilling subcontractor shall remove and dispose of all debris, remove all equipment and materials from the each work site promptly and leave the location in a neat and orderly fashion to the satisfaction of ERM's Hydrogeologist. The restoration shall include repair of any holes, trenches, tire ruts, damage to pavement, etc. caused by the movement or operation of the drilling subcontractor's equipment.

A.2 *SOP 2: ORGANIC VAPOR SCREENING - SOIL SAMPLE HEADSPACE*

Field screening for organic compounds in soil samples will be performed as one of several field screening criteria, and continuously in the breathing zone of all work areas where intrusive activities are to occur as of the part of the Health and Safety monitoring program. This will serve as an immediate indication as to volatile organic hazards at the work location and will determine if personnel health and safety protection is adequate. Screening with a hand-held PID meter will be performed during all intrusive work activities (i. e. installation of soil borings and/or groundwater monitoring wells, or collection of groundwater samples) field investigation and all sample collection activities.

(1) Calibrate the PID daily in accordance with the particular manufacturer's procedures.

(2) For health and safety monitoring during intrusive activities, the PID will be used to continuously monitor for organic vapors in the breathing zone of all work areas in accordance with the HASP.

(3) For soil samples, a container separate from any jars that may be used for laboratory analysis will be used to check for total organic vapor concentrations using the PID. Generally, the sample aliquot retained for geologic description and archive is used for headspace total organic vapor screening.

(4) Fill the sample container approximately 2/3 full with soil.

(5) Place aluminum foil over the sample jar mouth, tightly sealing the opening.

(6) Allow the jar to stand for 5 minutes in a location where the sample temperature change will be minimal.

(7) After the 5 minutes, shake to jar for 1 minute to aid the desegregation of VOCs from the soil matrix.

(8) Allow the jar to stand for an additional 5 minutes in a location where the sample temperature change will be minimal.

(9) After the 5 minutes, insert the probe of a PID through the foil seal and observe the instrument for the maximum organic vapor reading.

(10) Record the sample number and maximum headspace organic vapor concentration reading.

A.3 *SOP 3: WATER LEVEL MEASUREMENT PROCEDURE*

Groundwater elevation measurements are to be obtained using the following general procedures whenever depth to groundwater or groundwater elevation data is required. This may include activities such as soil borings, groundwater monitoring well installation/development, groundwater monitoring well sampling, and/or synoptic groundwater level measurements. The measurements will be collected concurrent with the groundwater sampling event and the water levels will be obtained prior to well evacuation and sample collection. The static water level will be measured to the nearest 0.01 foot.

(1) Clean all water-level measuring equipment using appropriate decontamination procedures.

(2) Remove locking well cap, note weather, time of day, and date, etc. in field notebook, or on an appropriate form.

(3) Remove well casing cap.

(4) Monitor headspace of well with a PID to determine presence of VOCs, and record in field notebook.

(5) Lower water level measuring device into well until the water surface is encountered.

(6) Measure distance from water surface to reference measuring point on well casing, and record in field notebook.

NOTE: if water level measurement is from either the top of protective steel casing, top of PVC riser pipe, from ground surface, or some other position on the wellhead.

(7) Measure total depth of well and record in field notebook or on log form.

(8) Remove all downhole equipment; replace well casing cap and locking steel caps.

(9) Calculate elevation of water:

$Ew = E - D$

Where

Ew = Elevation of Water

E = Elevation at point of measurement

D = Depth to Water

A.4 SOP 4: SOIL GAS SAMPLING USING SUMMA CANISTERS

In order to assess the potential for migration of VOC vapors emanating from impacted groundwater at the water table surface, soil gas samples will be collected at each of the 3 newly installed multilevel soil gas sampling points (located west of the elementary school, from behind the former Unnamed Cleaners and at a third location down gradient of the study area). In addition two (2) temporary shallow soil gas samples will be collected from behind the former Unnamed cleaners and in front of the former Fresh & Clean in the parking lot using hand driven soil gas sampling equipment from a depth of 12 feet. The soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators. A NYSDOH ELAP-certified laboratory will analyze each sample for TCL VOCs using USEPA Method TO-15. Specific details are presented below. When collecting samples from the permanent soil gas implants begin from step 4. For temporary shallow soil gas samples begin at step 1.

(1) A 5/8-inch diameter pilot hole will be drilled to a total depth of twelve (12) feet below ground surface at each soil vapor sampling location. The pilot hole will be drilled with an electric rotary hammer-drill powered by a portable generator. At locations where a concrete pad or asphalt covers the ground surface, an industrial-grade rotary drill equipped with a masonry bit will first be used to drill a pilot hole through the concrete pad/asphalt.

(2) After the pilot hole is completed, an initial VOC measurement will be made using a PID immediately following the removal of the bit. The initial reading will be recorded in the field logbook and/or on a soil gas sampling log form.

(3) A dedicated length of new Teflon tubing will be threaded through a cork and inserted into the pilot hole. The cork will serve to seal the pilot hole at ground surface or the concrete pad. The sealed borehole will then be allowed to equilibrate for a period of several hours to one day.

(4) After observing the required equilibration period, the tubing will be purged using a PID to evacuate 1 - 2 volumes (maximum) of the soil gas-sampling probe. The maximum PID reading (if any) and the subsequent sustained reading will be recorded in the field notebook and/or data collection forms. The Summa canister will then be attached to the Teflon tubing and the sampling regulator set to collect a soil vapor sample over a two-hour period, ensuring that the flow rate for the extraction of soil vapor samples shall not exceed 0.1 to 0.2 liters per minute. After the sample is collected, all Teflon tubing/corks will be removed and disposed of in the general refuse dumpster. All

penetrations of concrete pads/asphalt will be sealed with cement/black top patch. The analytical detection limits shall be no greater than 0.5 parts per billion by volume (ppbv) or 1 microgram per cubic meter (ug/m^3).

(5) For each soil vapor sample location, all the pertinent data will be recorded in the field notebook and/or data collection forms. This information should include the following for each soil vapor sample:

- Sampler's name;
- Date, time and initial PID reading;
- Date and time of Teflon tubing insertion and pilot hole sealing;
- Date, time and sustained PID reading;
- Summa canister serial number;
- Survey location number, and descriptive location of the sampling area;
- Weather conditions;
- Sampling depth(s);
- Soil type at sample location, if known;
- Description of the surface features (i.e., drainage, facilities), soils, any contamination noted, and trenches or any other feature that may impact the soil vapor measurement; and
- All calibrations performed.

A.5 *SOP 5: MONITORING WELL CONSTRUCTION*

A.5.1 *Source of Water*

The use of drilling mud and/or foams shall not be allowed. All water used during drilling and/or steam-cleaning operations shall be from a potable source and so designated in writing. ERM's drilling subcontractor will obtain all permits from the local water purveyor and any other concerned authorities, and provision of any required back-flow prevention devices.

A.5.2 *Monitoring Well Borehole Construction*

Boreholes shall be advanced by hollow-stem auger drilling method. Each monitoring well cluster shall be installed within a separate borehole. Prior to the starting each borehole, the drilling rig will be positioned over the new well location and leveled to ensure the borehole is drilled as plumb and true as practical. Well borings shall have an inside diameter of at least four (4) inches larger than the outside diameter of the casing and well screen to ensure that a tremie may be employed during well construction procedures.

In order to reduce the potential for "running sands", a hydraulic head of potable water will be applied within the augers when the water table is encountered to maintain a positive hydrostatic head on subsurface materials. Each borehole will be advanced to the prescribed completion depth below grade. The drilling subcontractor shall verify by measurement that the borehole is open, and drill cuttings have been removed from the borehole prior to assembly of the well string.

Cuttings generated from the construction of the boreholes will be contained in New York State Department of Transportation (NYSDOT)-approved 55-gallon ring-top drums. The drums will be labeled according to the borehole/temporary well number.

A.5.3 *Well Construction Materials*

All monitoring wells shall be constructed of 3/4-inch inside diameter, threaded flush joint, schedule 80 PVC casing and screens ten (10) feet in length, of wire-wrapped construction having slot openings of 0.010-inches.

ERM' Hydrogeologist shall inspect all well materials for dents, cracks, grease, etc. and to ensure that the materials are in accordance with the specifications. Any materials found to be defective shall be rejected by ERM's Hydrogeologist and replaced by the drilling subcontractor at no cost to the NYSDEC. All well casing and screen shall be steam cleaned, wrapped in clean polyethylene sheeting and stored until the time of well construction.

A.5.4 *Monitoring Well Construction Procedures*

A.5.4.1 *Well Assembly and Screen Placement*

Once the well cluster is assembled in each borehole, the wells shall be suspended in a manner such that the screen is set approximately one (1) foot above the bottom of the borehole. When the well screens are properly positioned the augers will be slowly removed. The well pipe will also be pulled up no more than ½ foot to allow the natural formation material to fill the borehole and collapse around the well screen.

A.5.5 *Well Completions At Grade*

For each of the wells, a 3/4-inch diameter PVC riser will extend from the top of the screen to approximately 4-inches below ground surface. A permanent mark will be made at the top of the well casing to provide a reference point from which to make future water level measurements.

Each well will be fitted with a flush-mounted steel well vault which is a minimum of two (2) inches larger in diameter than the well casings, and secured in a surface seal to adequately protect the casing. A locking cap will be provided for each well with one (1) to two (2) inches clearance between the top of the well cap and the bottom of the locking cap of the protective casing when in the locked position. The ERM Hydrogeologist will provide keyed-alike padlocks for the wells.

Each well will have a concrete surface seal that will secure the protective casing in place. The surface seal will extend below the frost depth (a minimum of 24 inches) to prevent potential well damage. The top of the seal will be constructed by pouring concrete into a pre-built form with a minimum of 2-foot long sides. The seal will be finished with a sloping surface to prevent surface runoff from ponding and entering the well vault.

A.6 *SOP 6: MONITORING WELL DEVELOPMENT*

All monitoring wells shall be developed by check valve purging methods to ensure the removal of any drilling fines and to restore the hydraulic properties of the surrounding formation. All wells shall be developed as soon as possible after installation. At no time shall water be introduced into the well during well development procedures.

New lengths of dedicated ASTM Drinking Water quality polyethylene hose shall be used as a discharge line. Each well shall be developed to the point that the turbidity of the recovered well water is less than 50 NTUs. Additionally, pH, conductivity and temperature measurements of the development water shall be within 10% for a minimum of three consecutive measurements. ERM's Hydrogeologist shall be responsible for collection of turbidity, pH, conductivity and temperature measurements.

Development water will be handled in accordance with the project-specific protocol for handling and disposal of solid and liquid IDW generated during the implementation of the SC.

Wells will not be sampled for a minimum of one (1) week following development. Analytical results of the samples collected from the groundwater monitoring wells will determine the ultimate disposition of the development water.

A.7 SOP 7: GROUNDWATER SAMPLING

Groundwater sampling will be performed using USEPA low-flow well purging/sample collection techniques based on historic records that indicated that existing Site wells tend to yield turbid samples using conventional well purging and sampling techniques. The following subsections present general preliminary well sampling procedures common to both techniques followed by low-flow sampling procedures, and if for some reason it is not possible perform low-flow sampling, conventional procedures are also presented for reference.

The low-flow groundwater purging/sampling technique employs the use of a flow-through cell equipped with probes and a meter for measuring groundwater quality parameters such as pH, temperature, specific conductivity, and dissolved oxygen. One example of this equipment is the Horiba U-22 Flow-Through Cell and the specific manufacturer's calibration and operation instructions should be followed. In the event that low-flow purging/sampling cannot be performed and conventional procedures must be employed, SOPs 8, 9, 10 and 11 are presented to describe operating procedures for the measurement of pH, temperature, specific conductivity and dissolved oxygen using standard hand-held meters.

A.7.1 General Procedures

The following procedure will be used for all monitoring well groundwater sampling:

- Clean all water-level measuring equipment using appropriate decontamination procedures.
- Wear appropriate health and safety equipment as outlined in the HASP. In addition, samplers will don new sampling gloves at each individual well prior to sampling.
- Visually examine the exterior of the monitoring well for signs of damage or tampering and record in the field logbook.
- Unlock well cap.
- Take and record in field logbook PID readings.
- Measure the static water level in the well with a decontaminated steel tape or electronic water level indicator. The tape or water level indicator will be rinsed with deionized water in between individual wells to prevent cross-contamination. Synoptic round of water level measurements will all be completed on the same day.
- All wells will also be checked for the presence and thickness of Light or Dense Non Aqueous Phase Liquids (LNAPL/DNAPL).

- If LNAPL or DNAPL is encountered on the top of the water table at the time of sampling, a sample of the LNAPL or DNAPL will be collected for analysis if accumulations are sufficient. Measurement of the thickness of this layer will be taken using an interface probe. A sample of the LNAPL or DNAPL may be obtained using a dedicated bottom-loading bailer. The sample will be sent to the laboratory for analysis of its chemical composition and physical properties (e.g., specific gravity, and gas chromatograph (GC) fingerprint). Initially, no groundwater sample will be collected from wells that contain LNAPL or DNAPL.

- If LNAPL or DNAPL is not detected in the well, continue with the low-flow sampling procedures described below.

A.7.2 *Low-Flow Sampling*

The low-flow sampling procedure is intended to facilitate the collection of minimum-turbidity groundwater monitoring well samples.

A.7.2.1 *Sample Equipment*

- Adjustable-rate, positive displacement pumps (e.g., centrifugal, submersible or bladder pumps constructed of stainless-steel or Teflon®). Peristaltic pumps may be used only for inorganic sample collection. The selected pump must be specifically designed for low-flow rates (i.e., use of a high volume pump that is adjusted down to a low flow setting is not permitted).

- Tubing: Tubing used in purging and sampling each well must be dedicated to that well. Once properly located, moving the pump in the well should be avoided. Consequently, the same tubing should be used for purging and sampling. Teflon® and Teflon®-lined polyethylene tubing must be used to collect samples for organic analysis. For samples collected for inorganic analysis, Teflon® or Teflon®-lined polyethylene, PVC, Tygon, or polyethylene or silicon tubing may be used.

- Electronic water level measuring device, 0.01-foot accuracy.

- Flow measurement supplies (e.g., graduated cylinder and stop watch).

- Interface probe.

- Power or air source (generator, compressed air tank, etc.).

- In-line purge criteria parameter monitoring instruments - pH, turbidity, specific conductance, temperature, and dissolved oxygen.

- Decontamination supplies.

- Logbook and field forms.

- Sample bottles.
- Sample preservation supplies (as specified by the analytical methods).
- Sample tags or labels, chain of custody forms.
- Well construction data, location map, field data from last sampling event.

A.7.2.2 *Sample Procedure*

1) Lower pump, safety cable, tubing, and electrical lines very slowly into the well to a depth corresponding to the center of the saturated screen section of the well. The pump intake must be kept at least two feet above the bottom of the well to prevent mobilization of any sediment. Lowering the pump quickly, or even at a moderate rate, will result in disturbing sediment in the well. This is one of the most important steps in low flow sampling at the Site.

2) Measure the water level again with the pump in well before starting the pump. Start pumping the well at 100 to 500 milliliters per minute. Ideally, the pump rate should cause little or no water level drawdown in the well (less than 0.3 foot and the water level should stabilize).

   - Measure and record the depth to water and pumping rate every 3 to 5 minutes (or as appropriate) during pumping. If purging continues for more than 30 minutes, readings will be recorded at approximately 10-minute intervals. However, once stabilization is indicated, a minimum of 3 consecutive readings at 3 to 5 minute intervals will be recorded prior to sample collection.
   - Care should be taken not to cause pump suction to be broken or entrainment of air in the sample. Do not allow the groundwater level to go below the pump intake.
   - Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to minimize drawdown and/or to ensure stabilization of indicator parameters.

3) During purging, measure and record the field indicator parameters using the in-line meter (turbidity, temperature, specific conductance, pH, Eh, and dissolved oxygen) every 3 to 5 minutes (or as appropriate). If purging continues for more than 30 minutes, readings will be recorded at approximately 10-minute intervals. However, once stabilization is indicated, a minimum of 3 consecutive readings at 3 to 5 minute intervals will be recorded prior to sample collection.

   - The well is considered stabilized and ready for sample collection once all the field indicator parameter values remain within 10 percent for 3 consecutive readings.

- If drawdown in the well is measured at 1 foot or more, continue to low flow purge until a minimum of the equivalent volume of 1 well casing volume is removed. Using the flow equation to calculate the volume of purge water. Then collect the groundwater sample.

4) Before sampling, either disconnect the in-line cell or use a by pass assembly to collect groundwater samples before the in-line cell. All sample containers should be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

5) Samples requiring pH adjustments will have their pH checked to ensure that the proper pH has been obtained. For VOC samples, this will necessitate the collection of a test sample to determine the amount of preservative that needs to be added to the sample container prior to sampling.

6) Label the samples using waterproof labels, or apply clear tape over the paper labels. Place all samples in a cooler as described in the QAPP with bagged ice or frozen cold packs and maintain at 4°C for delivery to the laboratory.

7) Do not use ice for packing material; melting will cause bottle contact and possible breakage.

8) Measure and record well depth. Take final water quality reading using low flow cell.

9) Secure the well.

A.7.3 *Standard Purging and Sampling Procedure*

1) Calculate the volume of water in the well as follows:

$$\text{Volume (in gallons)} = 3.14r^2(h) \times 7.48\ \text{gal/ft}^3$$

Where

h - well depth (feet) - static water level (feet)

r = well radius (feet)

2) Lower the decontaminated submersible pump with new, dedicated lengths of polyethylene tubing into the well so the pump is set at the screen interval. Purge 3 to 5 volumes of water from the well, using the submersible pump.

3) Measure and record time, temperature, pH, turbidity, and specific conductance as each volume of well water is purged. Once the temperature, pH, and specific conductance have stabilized to within 10% for two successive well volumes and the turbidity is less than 50 NTUs, a groundwater sample may be collected. Measure DO and remove the submersible pump from the well.

4) After purging, allow static water level to recover to approximate original level.

5) Place polyethylene sheeting around well casing to prevent contamination of sampling equipment in the event equipment is dropped.

6) Obtain sample from well with a dedicated, factory pre-cleaned polyethylene Voss ™ bailer. The bailer will be suspended on a new, dedicated length of polypropylene string. The maximum time between purging and sampling will be three (3) hours. All the bailers for one day of sampling will be pre-cleaned and dedicated to each individual wells.

   Sample for VOCs first by lowering the bailer slowly to avoid degassing, then collect any other organic and inorganic samples by pouring directly into sample bottles from bailers.

   The sample preservation procedure will be to immediately place analytical samples in the cooler and chill to 4°C. Samples will be delivered to the appropriate laboratory within 24 hours. Samples will be maintained at 4°C until time of analysis.

7) Decontaminate the submersible pump and discard the pump discharge line.

8) Re-lock well cap.

9) Fill out field notebook, Well Sample Log Sheet, labels, Custody Seals and Chain-of-Custody forms.

A.8 *SOP 8: GROUNDWATER pH AND TEMPERATURE*

(1) Immerse the tip of the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode tip in water for at least an hour before use.

(2) Rinse the electrode with demineralized water.

(3) Immerse the electrode in pH 7 buffer solution.

(4) Adjust the temperature compensator to the proper temperature.

(5) Adjust the pH meter to read 7.0.

(6) Remove the electrode from the buffer and rinse with demineralized water.

(7) Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the vertical profile wells) and pour a small amount of this sample into an extra sample jar, which will not be used to store chemically analyzed samples.

(8) Immerse the electrode into the extra sample jar. Do not immerse the electrode into a sample that will be chemically analyzed.

(9) Read and record the pH of the solution, after adjusting the temperature compensator to the sample temperature (obtained during measurement of specific conductance or from a standard scientific thermometer).

(10) Rinse the electrodes with demineralized water.

(11) Keep the electrode immersed in demineralized water when not in use.

(12) All results are to be recorded in the Field Notebook.

A.9 *SOP 9: MEASUREMENT OF GROUNDWATER SPECIFIC CONDUCTANCE*

(1) Immerse the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode for at least an hour before use.

(2) Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the well purging activities) and pour a small amount of this sample into an extra sample jar, which will not be used to store chemically analyzed samples.

(3) Rinse the cell with one or more portions of the sample to be tested.

(4) Immerse the electrode in the sample and measure the temperature. Do not immerse the electrode into a sample, which will be chemically analyzed.

(5) Adjust the temperature setting to the sample temperature.

(6) Immerse the electrode in the sample and measure the conductivity. Do not immerse the electrode into a sample, which will be chemically analyzed.

(7) Record the results in the Field Notebook.

SOP 10: MEASUREMENT OF GROUNDWATER TURBIDITY

(1) Ensure that the sample cell (sample vials) is clean, with no dust and lint on the inside or outside surface.

(2) Ensure that instrument has been standardized recently and span control has not been changed.

(3) Range calibration of instrument is performed at the factory, but it should be checked from time to time against fresh formalin turbidity standard dilutions.

(4) Check the mechanical zero setting while instrument is off.

(5) Turn on the power and press the battery check switch and verify the battery check range. The needle should be in the battery check area. If battery was not recharged before use, switch to a charged instrument. The battery pack should be charged on a daily basis.

(6) Select the range that will exceed the expected turbidity of the sample under test and press the appropriate range switch.

(7) Place the focusing template into the cell holder and adjust the zero control for a reading of zero NTU. Remove the focusing template.

Note: If the instrument will be used in the 100 range, place the cell riser into the cell holder before inserting the test sample. When using the 1 and 10 ranges, the cell riser must not be used.

(8) Collect a groundwater sample using a bailer (or from the pump discharge line in the case of the vertical profile wells) and pour a small amount of this sample into an extra sample jar, which will not be used to store chemically analyzed samples.

(9) Fill a clean sample cell to the marked line with the sample to be measured and place it into the cell holder. Use the white dot on the sample cell to orient the cell in the same position each time. Cover the sample cell with the light shield and allow the meter to stabilize. Read the turbidity of the sample.

Notes:

The sample size for all turbidity measurements should be 18 ml. Use the line on the sample cell as a level indicator. Variation in sample volume can affect the accuracy of the determinations. When measuring the lower range (0 - 10 and 0 - 1 NTU), air bubbles in the sample will cause false high readings - before covering the cell with the light shield, observe the sample in its cell. A five-minute wait period can eliminate air bubbles from the sample and thereafter a valid reading can be taken.

(10) Record the results in the Field Notebook.

A.11 SOP 11: MEASUREMENT OF GROUNDWATER DISSOLVED OXYGEN

The dissolved oxygen (DO) meter will be properly calibrated prior to each sampling event.

Calibration Procedure

(1) Prepare the DO meter with a thin Teflon membrane stretched over the sensor.

(2) Perform a battery check.

(3) Set mode switch to operate and the operation switch to zero, and zero the instrument.

(4) Take a temperature measurement and determine the calibration value from the manufacturers table for the appropriate atmospheric pressure.

(5) Select the desired range and adjust the instrument to an appropriate calibration value (determined in the preceding step).

(6) Place the probe in a water sample with a known dissolved oxygen level and read mg/L-dissolved oxygen.

(7) Record temperature and dissolved oxygen calibration information on the equipment calibration and maintenance log for that instrument.

Operating Procedure

(1) Calibrate the dissolved oxygen meter.

(2) Perform the battery check.

(3) Immerse the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode for at least an hour before use.

(4) Collect a groundwater sample using a bailer and pour a small amount of this sample into an extra sample jar, which will not be used to store chemically analyzed samples.

(5) Rinse the cell with one or more portions of the sample to be tested.

(6) Set mode switch to operate and the operation switch to the desired range.

(7) Immerse the probe in the water sample.

(8) Take a temperature and adjust the temperature compensator to the sample temperature (obtained during measurement of specific conductance or from a standard scientific thermometer).

(9) Switch the dissolved oxygen content measurement and allow reading to stabilize.

(10) Record the results in the Field Notebook.

(11) Repeat procedure and record a second reading. Average the results and record the average.

(12) Rinse the probe with distilled water and replace protective cover on probe with a small amount of distilled water to keep the probe membrane wet.

TABLE OF CONTENTS - APPENDIX B

LIST OF TABLES

LIST OF FIGURES

B.0 QUALITY ASSURANCE PROJECT PLAN

B.1 PURPOSE AND OBJECTIVES

B.1.1 Purpose

This QAPP was prepared for the SC to set guidelines for the generation of reliable data measurement activities such that data generated are scientifically valid, defensible, comparable, and of known precision and accuracy. This QAPP contains a detailed discussion of the QA/QC protocols to be used by ERM and subcontractor personnel. The SC sampling program and relevant field/laboratory QA/QC requirements are summarized in Tables B-1 through B-9.

B.1.2 Definitions

The parameters that will be used to specify data quality objectives, and to evaluate the analytical system performance for all analytical samples are precision, accuracy, representativeness, completeness and comparability (PARCC). Definitions of these and other key terms used in this QAPP are provided below.

- ***Accuracy*** - the degree of agreement of a measurement with an accepted reference value. Accuracy is generally reported as a percent recovery, and calculated as:

$$\frac{\text{Measured Value}}{\text{Accepted Value}} \times 100$$

- ***Analyte*** - the chemical or property for which a sample is analyzed.

- ***Comparability*** - the expression of information in units and terms consistent with reporting conventions; the collection of data by equivalent means; or the generation of data by the same analytical method. Aqueous samples will be reported as µg/l and solid samples will be reported in units of mg/kg, dry weight.

- ***Completeness*** - the percentage of valid data obtained relative to that which would be expected under normal conditions. Data are judged valid if they meet the stated precision and accuracy goals.

- ***Duplicate*** - two separate samples taken from the same source by the same person at essentially the same time and under the same conditions that are placed into separate containers for independent analysis. Duplicate samples are intended to assess the effectiveness of equipment decontamination, the precision of sampling efforts, the impacts of ambient environmental conditions on sensitive analyses (e.g., VOC analysis), and the potential for contaminants attributable to reagents or decontamination fluids. Identifying such potential sources of error is essential to the success of the sampling program and the validity of the environmental data. Each QC sample is described below. As a minimum, each set of ten or fewer field samples will include a trip blank, a duplicate and one sample collected in a sufficient volume to allow the laboratory to perform a matrix spike.

- ***Episode*** - a continuous period of time during which sampling activities are undertaken. Cessation of activities for more than 48 hours terminates the episode.

- ***Field Blanks*** - field blanks (sometimes referred to as "equipment blanks" or "sampler blanks") are the final analyte-free water rinse from equipment decontamination in the field and are collected at least once during a sampling episode. If analytes pertinent to the project are found in the field blank, the results from the blanks will be used to qualify the levels of analytes in the samples. This qualification is made during data validation. The field blank is analyzed for the same analytes as the sample that has been collected with that equipment.

- ***Precision*** - a measure of the agreement among individual measurements of the sample property under prescribed similar conditions. Precision is generally reported as Relative Standard Deviation (RSD) or Relative Percent Difference (RPD). Relative standard deviation is used when three or more measurements are available and is calculated as:

$$\text{RSD} = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} \times 100$$

Relative percent difference is used for duplicate measurements and is calculated as:

$$\text{RPD} = \frac{\text{Value 1 - Value 2}}{\text{Arithmetic Mean}} \times 100$$

- ***Quality Assurance (QA)*** - all means taken in the field and inside the laboratory to make certain that all procedures and protocols use the same calibration and standardization procedures for reporting results; also, a program which integrates the quality planning, quality assessment, and quality improvements activities within an organization.

- ***Quality Control (QC)*** - all the means taken by an analyst to ensure that the total measurement system is calibrated correctly. It is achieved by using reference standards, duplicates, replicates, and sample spikes. Also, the routine application of procedures designed to ensure that the data produced achieve known limits of precision and accuracy.

- ***Replicate*** - two aliquots taken from the same sample container and analyzed separately. Where replicates are impossible, as with volatile organics, duplicates must be taken.

- ***Representativeness*** – degree to which data represents a characteristic of a set of samples. The representativeness of the data is a function of the procedures and caution utilized in collecting and analyzing the samples. The representativeness can be documented by the relative percent difference between separately collected but otherwise identical samples.

- ***Trip Blanks*** - trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic samples. One trip blank should accompany each cooler containing volatile organics; it will be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOCs.

B.1.3 Data Quality Objectives

B.1.3.1 Overall Data Quality Objectives

Data Quality Objectives (DQO) are quantitative and qualitative statements specifying the quality of the environmental data necessary to support the decision-making process to guide the SC and any subsequent corrective actions. DQO define the total uncertainty in the data that is acceptable for each specific activity during the SC. This uncertainty includes both sampling error and analytical error. Ideally, the prospect of zero uncertainty is the objective; however, the very processes by which data are collected in the field and analyzed in the laboratory contribute to the uncertainty of the data. It is the overall objective to keep the total uncertainty to a minimal level such that it will not hinder the intended use of the data.

In order to achieve the project DQO, specific data quality parameters such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability and data completeness must be specified. The overall objectives are established such that there is a high degree of confidence in the measurements.

The parameters that will be used to specify data quality objectives and to evaluate the analytical system performance for soil and groundwater samples are PARCC.

B.1.3.2 Field Investigation Quality Objectives

One objective of the field investigation with respect to both soil and groundwater sampling is to maximize the confidence in the data in terms of PARCC.

In order to permit calculation of precision and accuracy for the soil and groundwater samples, duplicates, trip blanks, and field blanks will be collected, analyzed and evaluated. Through the submission of field QC samples, the distinction can be made between laboratory problems, sampling technique considerations, sample matrix effects, and laboratory artifacts. To assure groundwater and soil sample representativeness, all sample collection will be performed in strict accordance with the procedures set forth in this WP.

Precision will be calculated as RPD if there are only two analytical points and percent relative standard deviation (% RSD) if there are more than two analytical points. Blind field duplicate and MS/MSD sample analyses will provide the means to assess precision. The submission of field and trip blanks will provide a check with respect to accuracy and will monitor chemicals that may be introduced during sampling, preservation, handling, shipping and/or the analytical process. In the event that the blanks are contaminated and/or poor precision is obtained, the associated data will be appropriately qualified.

Representativeness will be assured through the implementation of the structured and coherent WP of which this QAPP is a part. This WP has been designed so that the appropriate numbers of samples of each matrix and of each location of interest are obtained for analysis.

Ideally, 100% completeness is the goal of this SC. However, it must be recognized that unforeseen issues may result in the generation of some data that may not be acceptable for use. Therefore, a completeness target of 90%, as determined by the total number of usable data points versus the total number of data points measured, will be the realistic goal of this program.

Comparability is defined as the extent to which data from one data set can be compared to similar data sets. Comparability between data sets is often questionable due to issues such as different analytical methods used or inter-laboratory differences. In order that the data generated as part of this project remain comparable to any previously generated data or data to be generated in the future, currently published analytical methods have been identified for the analysis of the collected samples. These methods will be performed by an analytical laboratory with a demonstrated proficiency in the analysis of similar samples by the referenced methods. In addition, samples will be collected using documented procedures to ensure consistency of effort and reproducibility if necessary.

B.1.3.3 *Laboratory Data Quality Objectives*

The analytical laboratory will demonstrate analytical precision and accuracy by the analysis of various QC samples (i.e., laboratory duplicates, spike samples, matrix spike duplicates and laboratory control samples). Tables B-8 through B-9 present the relevant precision and accuracy criteria for the analytical parameters related to this SC. Precision, as well as instrument stability, will also be demonstrated by comparison of calibration response factors from the initial calibration to that of the continuing calibrations. Laboratory accuracy will be evaluated by the addition of surrogate and matrix spike compounds, and will be presented as percent recovery. Precision will be presented as RPD, % RSD, or percent difference (%D), whichever is appropriate for the number and type of QC samples analyzed. Laboratory blanks can also be used to demonstrate the accuracy of the analyses and possible effects from laboratory artifact contamination.

B.2 *FIELD QUALITY ASSURANCE/QUALITY CONTROL*

B.2.1 *Equipment Maintenance*

In addition to the laboratory analyses conducted during the course of this SC, field measurements will be collected for total volatile organics (air monitoring and soil sample screening), pH, conductivity, dissolved oxygen and turbidity in groundwater. A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. The program will be QA/QC Officer and the field team members. Monthly and annual maintenance, calibration and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments.

B.2.2 *Equipment Calibration*

Trained field team members will be familiar with the field calibration, operation, and maintenance of the equipment. They will perform field calibrations, checks, and instrument maintenance daily. The PID will be calibrated on a periodic basis with isobutylene. A trained team member will perform daily field checks and instrument maintenance prior to use. A trained team member using standard calibration solutions will calibrate the pH, conductivity, DO and turbidity meters. Field maintenance, calibration and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments.

B.2.3 *Equipment Decontamination*

In order to minimize the potential for cross-contamination, all drilling and sampling equipment will be properly decontaminated prior to and after each use.

B.2.3.1 *General Procedures*

All heavy equipment will be decontaminated in a designated clean area. Sampling equipment and probes will be decontaminated in an area covered by plastic near the sampling location. All solvents and wash water used in the decontamination process will be collected and drummed for off-site disposal. All disposable sampling equipment will be properly disposed of in dry containers.

All well casing and screen will be steam cleaned, wrapped in clean polyethylene sheeting and stored until the time of well construction.

Extraneous contamination and cross-contamination will be controlled by wrapping the sampling equipment with aluminum foil when not in use and changing and disposing of the sampler's gloves between samples. Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated sampling equipment will be used. Personnel directly involved in equipment decontamination will wear appropriate protective equipment.

B.2.3.2 *Heavy Equipment (drill rigs, etc.)*

All drilling equipment and the back of the drilling rig will be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This will include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment will be capable of generating live steam with a minimum temperature of 212 °F.

All water used during drilling and/or steam-cleaning operations will be from a potable source and so designated in writing. The drilling contractor will obtain all permits from the local potable water purveyor and any other concerned authorities, and provision of any requested back-flow prevention devices. The equipment will be cleaned to the satisfaction of the ERM Hydrogeologist or FTL.

B.2.3.3 *Non-Aqueous Sampling Equipment (trowels, split-spoons, bowls, bailers, etc.)*

All non-aqueous sampling equipment will be decontaminated before each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse; and
- Distilled and deionized (American Standard for Testing of Materials (ASTM) Type II) water rinse.

B.2.3.4 *Aqueous Sampling Equipment*

Factory pre-cleaned disposable bailers will be used during the SC. In the event that field decontamination of reusable sampling equipment is necessary, decontamination procedures will be as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse; and
- Distilled and deionized (ASTM Type II) water rinse;
- 10% nitric acid rinse, followed by a distilled and deionized water rinse (metals only), or
- Methanol (pesticide grade) rinse (volatiles only);
- Total air dry; and
- Distilled and deionized water rinse.

The submersible sampling pumps that are placed in the borehole will be decontaminated with an Alconox detergent rinse and by pumping approximately 5 gallons of potable water through the pump. Since dedicated new lengths of polyethylene tubing will be used for sampling each well, the tubing will not be decontaminated. Unless otherwise specified, the submersible pumps will be decontaminated prior to the sampling the first well and between each subsequent well as follows:

- Potable water rinse.
- Alconox detergent and potable water scrub.
- Potable water rinse.
- Distilled/deionized water rinse.
- Wrap in aluminum foil, shiny side facing out.

B.2.3.5 *Meters and Probes*

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., oxygen meters, explosimeters, etc.) will be decontaminated between use as follows:

- Phosphate-free laboratory detergent solution;
- Tap water;

- Methanol rinse (at the FTL's discretion);
- Deionized water (triple rinse).

A methanol rinse will be used if deemed necessary by the FTL.

B.2.4 *Quality Assurance/Quality Control Sampling*

The field sampling quality assurance-sampling program is summarized in Table B-3. Specific guidance regarding the collection of field and laboratory QA/QC samples is presented separately below.

B.2.4.1 *Field QA/QC Samples*

Trip Blanks

The trip blank will be used to determine if any cross-contamination occurs between aqueous samples during shipment. The analytical laboratory will supply trip blanks as aliquots of distilled, deionized water that will be sealed in a sample bottle prior to initiation of each day of fieldwork. Glass vials (40 ml) with Teflon®-lined lids will be used for trip blanks. The sealed trip blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank. Trip blanks are analyzed for VOCs only. Trip blanks will only be used with aqueous samples and will not be used with soil vapor samples.

Field Blanks

Field blanks will be collected to evaluate the cleanliness of soil and aqueous sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment, sample bottles and contaminants present in the air. The following list provides a summary of field blank/trip blank collection frequency to be employed during field activity sampling. Field blanks will not be collected in association with soil vapor samples.

Hydropunch Groundwater Samples: Field blanks/trip blanks will be collected at a frequency of one per 20 samples.

Monitoring Well Sampling: Field blanks/trip blanks will be collected at a frequency of one per day of groundwater monitoring well sampling.

Soil Boring Soil Samples: Field blanks/trip blanks will be collected at a frequency of one per 20 samples.

Septic Pool/Drywell Samples: Field blanks/trip blanks will be collected at a frequency of one per 20 samples.

Field blanks will be collected prior to the occurrence of any analytical field-sampling event by pouring deionized or potable water over a particular piece of sampling equipment and into a sample container. The analytical laboratory will provide field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars will be used for organic blanks. The field blanks as well as the trip blanks will accompany field personnel to the sampling location. The field blanks will be analyzed for the same analytes as the environmental samples being collected that day and will be shipped with the samples taken.

Field blanks will be taken in accordance with the procedure described below:

- Decontaminate sampler using the procedures specified in the QAPP;
- Pour distilled/deionized water over the sampling equipment and collect the rinseate water in the appropriate sample bottles;
- The sample will be immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory; and
- Fill out sample log, labels and COC forms, and record in field notebook.

Temperature Blanks

The temperature blank will be used to determine the temperature of the samples within the cooler upon arrival at the analytical laboratory. A laboratory-supplied temperature blank will be an aliquot of distilled, deionized water that will be sealed in a sample bottle. The sealed temperature blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport samples, then each cooler must contain an individual temperature blank.

B.2.4.2 *Laboratory QA/QC*

Duplicate Samples

Duplicate aqueous and soil samples will be collected and analyzed to check laboratory reproducibility of analytical data. Duplicate samples will not be collected in association with soil vapor samples.

Duplicate samples will be collected at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. All duplicate samples will be submitted to the analytical laboratory as a "blind duplicate", having a fictitious sample identification name and time of sample collection. Each blind duplicate will be cross-referenced to document which real sample it is a duplicate of in the field notes and on the master sample log.

Matrix Spike/Matrix Spike Duplicate

Additional environmental sample volume will be collected for use as MS/MSD samples at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. To ensure the laboratory has sufficient volume for MS/MSD analysis, triple sample volume must be submitted for aqueous organic extractable and volatile samples once per every 20 samples in a sample delivery group (SDG).

B.2.4.3 *Field Records*

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the WP, and QAPP in an efficient and high quality manner. Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Field management forms and field logbook will be used to document all field activities, as this documentation will support that the samples were collected and handled properly, making the resultant data complete, comparable and defensible. Field logbook procedures and field management forms are identified in the following sections.

B.2.4.4 *Field Logbook*

The sample team or individual performing a particular sampling activity will keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use this notebook, which will be kept as a permanent record. The field notebook will be filled out at the location of sample collection immediately after sampling. It will contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook will contain any deviations from protocol and why, visitor's names, or community contacts made during sampling, geologic and other site-specific information which may be noteworthy.

B.2.4.5 *Field Management Forms*

In addition to maintenance of a field logbook, the use of field management forms will supplement field logbook entries for all field activities associated with this project. Field management forms provide a regular format to record the relevant information for a particular field activity. Use of these forms will ensure that the field team consistently and completely records all pertinent data relative to a particular field activity on a regular basis. All forms, sample labels, custody seals and other sample documents will be filled out completely. A list of forms and the associated activities for which each form could potentially be completed is presented below.

Form	***Activity***
Daily Field Report	Every day of field activity
Daily Instrument Calibration Log	Every day a field instrument is used
Soil Boring Logs	All borings
Monitoring Well Construction Logs	All permanent well installations
Well Development Data Sheet	All well development efforts
Sampling Equipment Checklist	All field sampling efforts
Laboratory Sample Bottle Request	All field sampling efforts
Groundwater Sampling Record	All permanent well sampling
Well Inspection Log	All permanent well sampling
Chain of Custody (COC) Form	All field sampling efforts
Status of Laboratory Sample Data	All field sampling efforts (Master Log)

Copies of each of these forms, with the exception of the HASP forms, are provided at the end of this Appendix.

B.2.5 *Sample Management*

B.2.5.1 *Sample Containers*

- The analytical laboratory will provide all sample containers.
  - If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur.
  - If sample preservation is specified, the necessary preservatives will be placed in the sample bottles by the laboratory.

The sample bottles will be handled carefully so that any preservatives are not inadvertently spilled.

B.2.5.2 *Sample Identification*

In order to provide for proper identification in the field, and proper tracking in the laboratory, all samples must be labeled in a clear and consistent fashion using the procedures and protocols described below and within the following subsections.

- Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.
- Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities will be sequentially recorded in the notebook.
- The notebook, along with the COC form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.
- Each sample will have a corresponding notebook entry which includes:
    - Sample ID number;
    - Well or other sample location and number;
    - Date and time;
    - Analysis for which sample was collected;
    - Additional comments as necessary; and
    - Samplers' name.
- Each sample must have a corresponding entry on a COC manifest.
- The manifest entry for sampling at any one well is to be completed before sampling is initiated at any other well by the same sampling team.
- In cases where the samples leave the immediate control of the sampling team (i.e., shipment via common carrier) the shipping container must be sealed.

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

Sample identifications will contain a sequential code consisting of two segments. The first segment will identify the location type and specific sample location. For new monitoring wells, location types will be identified by a two-letter code, for example: Monitoring well (MW), etc.

The specific sampling location will be identified using a three-digit number.

The second segment will identify the matrix type and a sample designation or identifier that identifies the sample depth, the sampling event number, or other designation depending on the sample type. The matrix type will be designated by a two-letter code, for example: Groundwater (GW). The sample identifier will be represented by a two to four-digit numeric code such as a depth internal for soil samples (e.g., 6"-12"). In the case of QC samples such as trip and field blanks, the third segment will be six digits to represent the date (e.g., 080101 would represent 1 August 2001). In the case of groundwater sampling events, use of the identifier segment will be optional; except for in the case of MS/MSD sample sets where the identifier will identify the samples as the same.
The following will be a general guide for sample identification:

First Segment		**Second Segment**
AA or A	NN-NN	AANNNNNN
Location Type	Specific Type	Matrix Sample Identifier
MW	21	
MW	21	MS/MSD
SB	01	SS-6"-12"
FB		010801
TB		010801
XF	03	WP0001
HY	05	PW010801

Symbol Definition:	
A = Alphabetic	N = Numeric
Location Type:	**Matrix Type:**
B = Pre-existing Monitoring Well	GW = Groundwater
MW = Monitoring Well	PW = Potable Water
TW = Temporary Well	SS = Soil
TB = Trip Blank	SG = Soil Gas
FB = Field Blank	SE = Sediment
HY = Hydrant	CO = Concrete
XF = Transformer	WO = Wood
SB = Soil Boring	WP = Wipe
GP = Geoprobe Boring	GP = Geoprobe Boring

B.2.5.3 *Sample Preservation*

Soil samples collected during the SC will be preserved by cooling to 4°C and maintained at this temperature until time of analysis. Groundwater samples for VOC analysis during the SC will be preserved by acidification to a pH of <2 using hydrochloric acid (HCl), cooled to 4°C, and maintained at this temperature until time of analysis.

- Immediately following collection of the samples, they will be placed in a cooler with "freezer-pacs" in order to maintain sample integrity. All volatile sample bottles to be filled to capacity with no headspace for volatilization. If necessary to meet a maximum recommended holding time, the samples are to be shipped by overnight courier to the laboratory.
- The shipping container used will be designed to prevent breakage, spills and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the "freezer-pacs". The container is to be securely sealed, clearly labeled, and accompanied by a COC record. Separate shipping containers should be used for "clean" samples and samples suspected of being heavily contaminated. During winter months, care should be taken to prevent samples from freezing. Sample bottles will not be placed directly on "freezer-pacs".

B.2.5.4 *Sample Holding Time*

- All samples will be shipped the same day they are obtained to the analytical laboratory.
- The samples must be stored at or near 4°C and analyzed within specified holding times.
- The analytical laboratory will be a NYSDOH ELAP-certified laboratory, and conform to meeting specifications for documentation, data reduction and reporting. The laboratory will follow all method specifications pertaining to sample holding times contained in the NYSDEC ASP (revised 1995) and/or as prescribed by the specific analytical method.

B.2.5.5 *Sample Custody*

Chain of Custody - The primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. All field-sampling personnel will adhere to proper sample custody procedures because samples collected during an investigation could be used as evidence in litigation. Therefore, possession of the samples must be traceable from the time each sample is collected until it is analyzed at the laboratory.

Custody Transfer to Field Personnel - The ERM Hydrogeologist or the field personnel will maintain custody of samples collected during this investigation. All field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory. COC records will be completed at the time of sample collection and will accompany the samples inside the cooler for shipment to the selected laboratory.

Each individual who has the samples in their possession will sign the COC record. Preparation of the COC record is as follows:

- For every sample, the person collecting the sample will initiate the COC record in the field. Every sample will be assigned a unique identification number that is entered on the COC Record.
- The record will be completed in the field to indicate project, sampling team, etc.
- If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for Relinquished By __________, Received By __________ will be completed in the field.
- The person transporting the samples to the laboratory or delivering them for shipment will sign the record form as Relinquished By ____________.
- If commercial carrier is used to ship the samples to the laboratory, the original COC record will be sealed in a watertight container and placed in the shipping container, which will be sealed prior to being given to the carrier. The carbonless copy of the COC record will be maintained in the field file.
- If the samples are directly transported to the laboratory, the COC will be kept in possession of the person delivering the samples.
- For samples shipped by commercial carrier, the waybill will serve as an extension of the COC record between the final field custodian and the laboratory.
- Upon receipt in the laboratory, the Sample Custodian or designated representative, will open the shipping containers, compare the contents with the COC record, and sign and date the record. Any discrepancies will be noted on the COC record.
- If discrepancies occur, the samples in question will be segregated from normal sample storage and the field personnel immediately notified.

- COC records will be maintained with the records for a specific project, becoming part of the data package.

Custody Transfer to Laboratory - All samples collected during the SC will be submitted to a NYSDOH ELAP-certified laboratory meeting specifications for documentation, sample login, internal chain of custody procedures, sample/analysis tracking, data reduction and reporting. The laboratory will follow all specifications pertaining to laboratory sample custody procedures contained in the NYSDEC ASP (revised 2000).

In general, the following procedures will be followed upon sample receipt. The laboratory will not accept samples collected by project personnel for analysis without a correctly prepared COC record.

The first steps in the laboratory receipt of samples are completing the COC records and project sample login form. The laboratory Sample Custodian, or designee, will note that the shipment is accepted and notify the Laboratory Manager or the designated representative of the incoming samples.

Upon sample receipt, the laboratory Sample Custodian, or designee, will:

- Examine all samples and determine if proper temperature has been maintained during shipment. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected will also be considered damaged. It will be noted on the COC record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be re-sampled, or the testing program changed, and provide an explanation of the cause of damage.
- Compare samples received against those listed on the COC record.
- Verify that sample holding times have not been exceeded.
- Sign and date the COC record and attach the waybill to the COC record.
- Denote the samples in the laboratory sample log-in book which contains the following information:
  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory
  - Record of the verified time of sample receipt (VTSR)

- Date put into storage after analysis is completed
- Date of disposal.

The last two items will be added to the log when the action is taken.

- Notify the Laboratory Manager of sample arrival.
- Place the completed COC records in the project file.

The VTSR is the time of sample receipt at the laboratory. The date and time the samples are logged in by the Sample Custodian or designee, will agree with the date and time recorded by the person relinquishing the samples.

B.2.5.6 *Sampling Packaging And Shipping*

Sample bottles and samples will either be delivered/picked up at the site daily by the analytical laboratory, or delivered/shipped via overnight courier. Once the samples have been collected, proper procedures for packaging and shipping will be followed as described below.

Packaging

Prior to shipment, samples must be packaged in accordance with current United States Department of Transportation (USDOT) regulations. All necessary government and commercial carrier shipping papers must be filled out. The procedure below should be followed regardless of transport method:

- Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or styrofoam containers are unacceptable).
- Remove previously used labels, tape and postage from cooler.
- Ship filled sample bottles in same cooler in which empty bottles were received.
- Affix a return address label to the cooler.
- Check that all sample bottles are tightly capped.
- Check that all bottle labels are complete.
- Be sure COC forms are complete.
- Wrap sample bottles in bubble pack and place in cooler.
- Pack bottles with extra bubble pack, vermiculite, or styrofoam "peanuts". Be sure to pack the trip blank, if one is being submitted with the samples.

- Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.

- Separate and retain the sampler's copy of COC and keep with field notes.

- Tape paperwork (COC, manifest, return address) in zipper bag to inside cooler lid.

- Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.

- Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

Shipping

Samples should arrive at the lab as soon as possible following sample collection to ensure holding times are not exceeded. All samples must be hand delivered on the same day as sampling or sent via overnight courier. When using a commercial carrier, follow the steps below.

- Securely package samples and complete paperwork.

- Weigh coolers for air transport.

- Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

- Keep customer copy of air bill with field notes and COC form.

- When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of arrival.

- Call the lab on day following shipment to be sure all samples arrived intact. If bottles are broken, locations can be determined from COC and re-sampled.

B.2.6 Analytical Laboratory

The data collected during the course of the SC activities will be used to determine the presence and concentration of certain analytes in groundwater and soil vapor samples. These locations were described in preceding sections.

All groundwater and soil vapor samples collected during the SC activities will be submitted to Severn Trent Laboratories, Connecticut Facility located in 128 Long Hill Cross Road, Shelton, Connecticut is a NYSDOH

ELAP-certified laboratory meeting specifications for documentation, data reduction and reporting.

B.2.7 *Analytical Test Parameters*

The specific analyses and analytical methodologies employed for investigation of these media are:

Sample Type	Analysis/Reporting List	Analytical Method
Drywell and Cesspool Drainage Structures	TCL VOCs	CLP Method OLM04.2
Hydropunch Groundwater	TCL VOCs	CLP Method OLC03.2
Soil Boring Soil Samples	TCL VOCs	CLP Method OLM04.2
Soil Vapor	Full Method List VOCs	TO-15
Monitoring Well Groundwater	TCL VOCs	CLP Method OLC03.2
Derived Wastes	TCL VOCs	CLP Method OLC03.2

B.2.8 *Instrument Calibration*

The frequency of laboratory instrument calibration and associated procedures for the specific analytical methods to be followed by the selected laboratory are specified in the individual analytical method procedures. The selected laboratory's calibration schedule will adhere to all analytical method specifications.

B.2.9 *Data Management and Reporting Plan*

B.2.9.1 *Data Use and Management Objectives*

Data Use Objectives

The typical data use objectives for this SC are:

- Locating and identifying potential sources of impacts to soil or groundwater.
- Delineation of horizontal and vertical constituent concentrations, identifying clean areas, delineating the extent and/or volume of impacted soil and groundwater.
- Ascertaining if there is a threat to public health or the environment.
- Determining treatment and disposal options.

Data Management Objectives

The primary objective of proper data management is to ensure and document that all necessary work is conducted in accordance with the WP and QAPP in an efficient and high quality manner thereby maximizing the confidence in the data in terms of PARCC. Data management procedures not only include field and laboratory documentation, but also include how the information is handled after the conclusion of field investigation and laboratory analyses area completed. Data handling procedures include project file management, reporting, usability analysis (review and validation) and use of consistent formats for the final presentation of the data.

Project File Specifications

All project information will be kept in a central Project File maintained by the ERM Project Manager in ERM's Melville, New York office location. The Project File will be assigned a unique project number that will be clearly displayed on all project file folders (including electronic files). Electronic files will be maintained in a similarly organized Project File located on the ERM Central Network system that is backed up on a weekly basis. Both hard copy and electronic Project Files will contain, at a minimum copies or originals of the following key project information:

- All correspondence including letters, transmittals, telephone logs, memoranda, and emails;
- Meeting notes;
- Technical information such as analytical data; field survey results, field notes, field logbooks and field management forms;
- Project calculations;
- Subcontractor agreements/contracts, and insurance certificates;
- Project-specific health and safety information/records;
- Access agreements;
- Project document output review/approval documentation; and
- Reports: Monthly Progress, Interim Technical and Draft/Final Technical.

B.2.9.2 *Reporting*

Field Data

Field data will be recorded and reported by field personnel using appropriate field data documentation materials such as the field logbook, field management forms and COC forms.

Good field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Proper completion of these forms and the field logbook are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly making the resultant data complete, comparable and defensible.

Laboratory Data

The analytical results of all samples collected as part of the SC will be reported following 1995 NYSDEC ASP Rev-00 specifications. All laboratory analytical data will be reported as NYSDEC Category B deliverables. The Category B data deliverables include all backup QA/QC documentation necessary to facilitate a complete validation of the data.

In addition, NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for VOC Analysis) will be completed and included with each data package. The sample tracking forms are specified and supplied by the 2000 NYSDEC ASP.

The laboratory will also transmit the analytical data in an electronic format to minimize the chances of transposition errors in summarizing the data. The data will be transmitted in an electronic data deliverable (EDD) in GISKEY (most recent version) format and a PDF copy of each ASP deliverable.

B.2.9.3 Data Validation

All field and laboratory data will be reviewed, validated and qualified as necessary to assess data usability by direct comparison to the specified data quality objectives and/or procedures set forth in this QAPP. Information that can be obtained includes comparison of results obtained from samples taken at the same location, and the identification of missing data points. Examination of the data at the end of the process allows for the assessment of data quality with respect to PARCC.

Field Data Validation Protocol

Field data generated in accordance with the project-specific WP will primarily consist of field temperature, pH, and specific conductance data, and data associated with soil boring advancement, monitoring well installation and development, and soil classification. This data will be validated by review of the project documentation to check that all forms specified in the Field Sampling Plan and this QAPP have been completely and correctly filled out and that documentation exists for the specified instrument calibrations. This documentation will be considered sufficient to provide that proper procedures have been followed during the field investigation.

Laboratory Data Validation Protocol

Data validation is the assessment of data quality with respect to method specifications and technical performance of the analytical laboratory. Analytical data packages will be examined to ensure that all specified lab components are included, all QA/QC specifications were performed or met, and the data use restrictions are well defined.

Summary documentation regarding QA/QC results will be completed by the laboratory using NYSDEC ASP forms and will be submitted with the raw analytical data packages (NYSDEC ASP B deliverables) for all soil and groundwater QC samples.

Data validation will be performed in order to assess and document analytical data quality in accordance with the project data quality objectives. The data review will evaluate data for its quality and usability. This process will qualify results so that the end user of the analytical results can make decisions with consideration of the potential accuracy and precision of the data. For example, the results are acceptable as presented, qualified as estimated and flagged with a "J", or rejected and flagged with an "R".

The NYSDEC ASP is based on the USEPA CLP, the USEPA Region II CLP Organics Data Review guidelines and the USEPA National Functional Guidelines for Evaluating Organics Analyses for the CLP will be used for the data validation process. Consequently, the data will be validated according to the protocols and QC specifications of the analytical methods, the NYSDEC ASP, USEPA Region II CLP Organics Data Review (CLP/SOW OLM 03.2) SOP No. HW-6 Revision #11 (May 1996), USEPA CLP National Functional Guidelines for Organic Data Review (October 1999), and the reviewer's professional judgment. The order in which the aforementioned guidance documents and/or criteria are listed does not imply a hierarchy of reliance on a particular document for validation. ERM will utilize all guidance documents and/or criteria relying on the most comprehensive reference sources to perform the most complete validation possible.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual obligations and specific analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results.

During the review process, it will be determined whether sufficient back-up data and QA/QC results are available so the reviewer may conclusively determine the quality of data support laboratory submittals for sample results. Each data package will be checked for completeness and technical adequacy of the data. Upon completion of the review, the reviewers will develop a QA/QC data validation report for each SDG.

For the organic parameter analyses, the following items or criteria will be reviewed:

- Quantitation, detection limits;
- Holding times;
- Gas Chromatogram/ Mass Spectrometer (GC/MS) tuning and performance;
- Initial and continuing calibration data;
- Procedural method blank data;
- Field and trip blank data;
- Field duplicate results;
- Internal standard areas, and retention times;
- Surrogate compound recoveries;
- MS/MSD duplicate recoveries;
- Data system printouts;
- Chromatograms and mass spectra;
- Qualitative and quantitative compound identification; and
- Case narrative and deliverables compliance.

For the inorganic parameter analyses, the following items or criteria will be reviewed:

- Holding times;
- Calibrations;
- Laboratory and field blanks;
- Inductively Coupled Plasma (ICP) interference check sample analysis;

- CRDL standard analysis;
- Matrix spike analysis;
- Lab and field duplicate sample analysis;
- Laboratory control sample (LCS) results;
- ICP serial dilution analysis;
- Graphite Furnace Atomic Absorption Analysis (GFAA) post-digestion spike results;
- Method of standard additions (MSA) results;
- Detection limits; and
- Case narrative and deliverable specifications.

B.2.9.4 Data Presentation Formats

Project data will be presented in consistent formats for all letters, Monthly Progress Reports, Interim Technical Reports, and Draft/Final Technical Reports. Specific formats will be tailored to best fit the needs of the data being presented but general specifications are described below.

Data Records

The data record will generally include one or more of the following:

- Unique sample or field measurement code;
- Sampling or field measurement location and sample or measurement type;
- Sampling or field measurement raw data;
- Laboratory analysis ID number;
- Property or component measured; and
- Result of analysis (e.g., concentration).

Tabular Displays

The following data will generally be presented in tabular displays:

- Unsorted (raw) data;
- Results for each medium or for each constituent monitored;
- Data reduction for statistical analysis;
- Sorting of data by potential stratification factors (e.g., location, soil layer/depth, topography, etc.); and

- Summary data.

Graphical Displays

The following data will be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

- Sample locations and sampling grid;
- Boundaries of sampling area;
- Areas where additional data are necessary;
- Constituent concentrations at each sample location;
- Geographical extent of impacts;
- Constituent concentration levels, averages, minimums and maximums;
- Changes in concentration in relation to distance from the source, time, depth or other parameters;
- Features affecting intra-media transport; and
- Potential receptors.

B.2.10 Performance Audits

B.2.10.1 Field Audits

During field activities, the QA/QC Officer will accompany sampling personnel into the field to verify that the sampling program is being properly implemented and to detect and define problems so that corrective action can be taken. All findings will be documented and provided to the ERM Project Manager and FTL.

B.2.10.2 Laboratory Audits

The NYSDOH ELAP CLP certified laboratory that has satisfactorily completed performance audits and performance evaluation samples will be used for all sample analysis. The results of the most recent performance audits and performance evaluations will be made available upon request.

B.2.10.3 Corrective Actions

The NYSDOH ELAP CLP certified laboratory utilized for this project will meet the specifications for corrective action protocols typical for performing contract laboratory services. Laboratory corrective action may include instrumentation maintenance, methods modification, cross contamination/carry over issues, sample tracking practices, laboratory information management (LIMs), etc.

Prior to mobilization for the field investigation, a meeting may be scheduled among representatives of ERM and the laboratory to discuss general corrective action approach and establish procedures to ensure good and timely communications among all parties during the investigation. New procedures will be put into effect as appropriate.

Tables

TABLE B-2
DETAILED SUMMARY OF AQUEOUS SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS

Analytical Parameters	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [1]	*Container* [2,3]
TCL VOCs	CLP SOW OLC02.1	Cool 4°C, pH<2 (HCl)	14 days	3 – 40 ml glass Teflon-lined cap
Toxicity Characteristic Leaching Procedure (TCLP)	Sample preparation: USEPA SW-846 Method 1311 Sample analysis: 8260B	Cool, 4°C	VOCs 14 days/NA/14 days	See above
Reactivity to Sulfide and Cyanide	USEPA SW-846 Methods 9034 and 9014 (Chapter Seven)	Cool, 4°C	Not Regulated (14 day holding time is suggested)	1 - 1000 ml (1 Liter) plastic bottle
Corrosivity	USEPA SW-846 Method 9045C	Cool, 4°C	Not Regulated	1 - 1000 ml (1 Liter) plastic bottle
Flammability (Ignitability)	USEPA SW-846 Method 1010	Cool, 4°C	Not Regulated	1 - 1000 ml (1 Liter) plastic bottle

<u>Notes:</u>

1. VOC holding times are days after collection until analysis; TCLP holding times are days after collection until leaching/days from leaching until extraction (if required)/days from extraction until analysis.
2. As specified by Severn Trent Laboratories (STL) Shelton, Connecticut.
3. Reactivity to Sulfide and Cyanide, Corrosivity, and Flammability (Ignitability) will be collected into the same 1000 ml sample container.

TABLE B-3
DETAILED SUMMARY OF SOIL SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS

Analytical Parameters	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [1]	*Container* [2,3]
TCL VOCs	CLP SOW OLM04.2	Cool 4°C,	14 days	1 – 4oz. glass jar
Toxicity Characteristic Leaching Procedure (TCLP)	Sample preparation: USEPA SW-846 Method 1311 Sample analysis: 8260B	Cool, 4°C	VOCs 14 days/NA/14 days	1 – 8 oz. glass jar
Reactivity to Sulfide and Cyanide	USEPA SW-846 Methods 9034 and 9014 (Chapter Seven)	Cool, 4°C	Not Regulated (14 day holding time is suggested)	1 – 8 oz. glass jar
Corrosivity	USEPA SW-846 Method 9045C	Cool, 4°C	Not Regulated	1 – 8 oz. glass jar
Flammability (Ignitability)	USEPA SW-846 Method 1010	Cool, 4°C	Not Regulated	1 – 8 oz. glass jar

Notes:
1. VOC holding times are days after collection until analysis. TCLP holding times are days after collection until leaching/days from leaching until extraction (if required)/days from extraction until analysis.
2. As specified by Severn Trent Laboratories (STL) Shelton, Connecticut.
3. TCLP, Reactivity to Sulfide and Cyanide, Corrosivity, and Flammability (Ignitability) will be collected into the same sample container.

TABLE B-4
DETAILED SUMMARY OF AIR SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS

Analytical Method Reference	*Sample Preservation*	*Holding Time* [1]	*Container*
USEPA Method TO-15A	Cool, 4°C	14 days	1 – Summa Canister

<u>Notes:</u>
1. Holding times are days after collection until analysis.

TABLE B-5
AQUEOUS
VOLATILE TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List	*CAS Number* [1]	*Quantitation Limits (μg/l)* [2]
Chloromethane	74-87-3	1
Bromomethane	74-83-9	1
Vinyl chloride	75-01-4	1
Chloroethane	75-00-3	1
Methylene chloride	75-09-2	2
Acetone	67-64-1	5
Carbon disulfide	75-15-0	1
1,1-Dichloroethene	75-35-4	1
1,1-Dichloroethane	75-34-3	1
cis-1,2-Dichloroethene	156-59-2	1
trans-1,2-Dichloroethene	156-60-5	1
Chloroform	67-66-3	1
1,2-Dichloroethane	107-06-2	1
2-Butanone	78-93-3	5
Bromochloromethane	74-97-5	1
1,1,1-Trichloroethane	71-55-6	1
Carbon Tetrachloride	56-23-5	1
Bromodichloromethane	75-27-4	1
1,2-Dichloropropane	78-87-5	1
cis-1,3-Dichloropropene	10061-01-5	1
Trichloroethene	79-01-6	1
Dibromochloromethane	124-48-1	1
1,1,2-Trichloroethane	79-00-5	1
Benzene	71-43-2	1
trans-1,3-Dichloropropene	10061-02-6	1
Bromoform	75-25-2	1
4-Methyl-2-pentanone	108-10-1	5
2-Hexanone	591-78-6	5
Tetrachloroethene	127-18-4	1
1,1,2,2-Tetrachloroethane	79-34-5	1
1,2-Dibromoethane	106-93-4	1
Toluene	108-88-3	1
Chlorobenzene	108-90-7	1
Ethylbenzene	100-41-4	1
Styrene	100-42-5	1
Xylenes (total)	1330-20-7	1

TABLE B-5 continued)
AQUEOUS
VOLATILE TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List	*CAS Number* [1]	*Quantitation Limits (μg/l)* [2]
1,3-Dichlorobenzene	541-73-1	1
1,4-Dichlorobenzene	106-46-7	1
1,2-Dichlorobenzene	95-50-1	1
1,2-Dibromo-3-chloropropane	96-12-8	1
1,2,4-Trichlorobenzene	120-82-1	1

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. As per CLP SOW OLC02.1.

TABLE B-6
SOIL
VOLATILE TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List (TCL)	*CAS Number*[1]	*Quantitation Limits*[2] *Low Soil (µg/kg)*	*Med. Soil (µg/kg)*
Dichlorodifluoromethane	75-71-8	10	1200
Chloromethane	74-87-3	10	1200
Vinyl chloride	75-01-4	10	1200
Bromomethane	74-83-9	10	1200
Chloroethane	75-00-3	10	1200
Trichlorofluoromethane	75-69-4	10	1200
1,1-dichloroethene	75-35-4	10	1200
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	10	1200
Acetone	67-64-1	10	1200
Carbon disulfide	75-15-0	10	1200
Methyl acetate	79-20-9	10	1200
Methylene chloride	75-09-2	10	1200
Trans-1,2-dichloroethene	156-60-5	10	1200
Methyl tertiary butyl ether	1634-04-4	10	1200
1,1-dichloroethane	75-34-3	10	1200
Cis-1,2-dichloroethene	156-59-2	10	1200
2-butanone	78-93-3	10	1200
Chloroform	67-66-3	10	1200
1,1,1-trichloroethane	71-55-6	10	1200
Cyclohexane	110-82-7	10	1200
Carbon tetrachloride	56-23-5	10	1200
Benzene	71-43-2	10	1200
1,2-dichloroethane	107-06-2	10	1200
Trichloroethene	79-01-6	10	1200
Methylcyclohexane	108-87-2	10	1200
1,2-dichloropropane	78-87-5	10	1200
Bromodichloromethane	75-27-4	10	1200
Cis-1,3-dichloropropene	10061-01-5	10	1200
4-methyl-2-pentanone	108-10-1	10	1200
Toluene	108-88-3	10	1200
Trans-1,3-dichloropropene	10061-02-6	10	1200
1,1,2-trichloroethane	79-00-5	10	1200

<u>Notes:</u>

1. Chemical Abstracts Service (CAS) Registry Number.
2. As per CLP SOW OLM04.2.

TABLE B-6 continued)
SOIL
VOLATILE TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List (TCL)	*CAS Number*[1]	*Quantitation Limits*[2] *Low Soil (µg/kg)*	*Med. Soil (µg/kg)*
Tetrachloroethene	127-18-4	10	1200
2-Hexanone	591-78-6	10	1200
Dibromochloromethane	124-48-1	10	1200
1,2-Dibromoethane	106-93-4	10	1200
Chlorobenzene	108-90-7	10	1200
Ethylbenzene	100-41-4	10	1200
Xylene (total)	1330-20-7	10	1200
Styrene	100-42-5	10	1200
Bromoform	75-25-2	10	1200
Isopropylbenzene	98-82-8	10	1200
1,1,2,2-Tetrachloroethane	79-34-5	10	1200
1,3-Dichlorobenzene	541-73-1	10	1200
1,4-Dichlorobenzene	106-46-7	10	1200
1,2-Dichlorobenzene	95-50-1	10	1200
1,2-Dibromo-3-chloropropane	96-12-8	10	1200
1,2,4-Trichlorobenzene	120-82-1	10	1200

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. As per CLP SOW OLM04.2.

TABLE B-7
AIR
TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List	CAS Number[1]	Molecular Weight	Reporting Limit (ppbv)[2]	Reporting Limit (ug/m³)[2]
Acetone (2-propanone)	67-64-1	58.08	5.0	12
Benzene	71-43-2	78.11	0.20	0.64
Bromodichloromethane	75-27-4	163.83	0.20	1.3
Bromoethene	593-60-2	106.96	0.20	0.87
Bromoform	75-25-2	252.75	0.20	2.1
Bromomethane (Methyl bromide)	74-83-9	94.95	0.20	0.78
1,3-Butadiene	106-99-0	60.14	0.20	0.49
2-Butanone (Methyl ethyl ketone)	78-93-3	72.11	0.50	1.5
Carbon disulfide	75-15-0	76.14	0.50	1.6
Carbon tetrachloride	56-23-5	153.84	0.20	1.3
Chlorobenzene	108-90-7	112.56	0.20	0.92
Chloroethane	75-00-3	64.52	0.20	0.53
Chloroform	67-66-3	119.39	0.20	0.98
Chloromethane (Methyl chloride)	74-87-3	50.49	0.20	0.41
3-Chloropropene (allyl chloride)	107-05-1	76.53	0.20	0.63
2-Chlorotoluene (o-Chlorotoluene)	95-49-8	126.59	0.20	1.04
Cyclohexane	110-82-7	84.16	0.20	0.69
Dibromochloromethane	124-48-1	242.74	0.20	2.0
1,2-Dibromoethane	106-93-4	187.88	0.20	1.5
1,2-Dichlorobenzene	95-50-1	147.01	0.20	1.2
1,3-Dichlorobenzene	541-73-1	147.01	0.20	1.2
1,4-Dichlorobenzene	106-46-7	147.01	0.20	1.2
Dichlorodifluoromethane (Freon 12)	75-71-8	120.92	0.20	0.99
1,1-Dichloroethane	75-34-3	98.97	0.20	0.81
1,2-Dichloroethane	107-06-2	98.96	0.20	0.81
1,1-Dichloroethene	75-35-4	96.95	0.20	0.79
cis-1,2-Dichloroethene	156-59-2	96.95	0.20	0.79
trans-1,2-Dichloroethene	156-60-5	96.95	0.20	0.79
1,2-Dichloropropane	78-87-5	112.99	0.20	0.92
cis-1,3-Dichloropropene	10061-01-5	110.98	0.20	0.91
trans-1,3-Dichloropropene	10061-02-6	110.98	0.20	0.91
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	170.93	0.20	1.4
Ethylbenzene	100-41-4	106.16	0.20	0.87
4-Ethyltoluene (p-Ethyltoluene)	622-96-8	120.2	0.20	0.98
n-Heptane	142-82-5	101.2	0.20	0.83
Hexachlorobutadiene	87-68-3	260.76	0.20	2.1

TABLE B-7 (continued)
AIR
TARGET COMPOUND LIST (TCL) AND QUANTITATION LIMITS

Target Compound List	*CAS Number* [1]	*Molecular Weight*	*Reporting Limit (ppbv)* [2]	*Reporting Limit (ug/m³)* [2]
n-Hexane	110-54-3	86.18	0.20	0.70
Methylene chloride	75-09-2	84.94	0.50	1.7
4-Methyl-2-pentanone (MIBK)	108-10-1	100.16	0.50	2.05
MTBE (Methyl tert-butyl ether)	1634-04-4	88.15	0.50	1.8
Styrene	100-42-5	104.14	0.20	0.85
Tertiary butyl alcohol (TBA)	75-65-0	74.12	5.0	15
1,1,2,2-Tetrachloroethane	79-34-5	167.86	0.20	1.4
Tetrachloroethene	127-18-4	165.85	0.20	1.4
Toluene	108-88-3	92.13	0.20	0.75
1,2,4-Trichlorobenzene	120-82-1	181.46	0.50	3.7
1,1,1-Trichloroethane	71-55-6	133.42	0.20	1.1
1,1,2-Trichloroethane	79-00-5	133.42	0.20	1.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	187.38	0.20	1.5
Trichloroethene	79-01-6	131.4	0.20	1.07
Trichlorofluoromethane (Freon 11)	75-69-4	137.38	0.20	1.1
1,2,4-Trimethylbenzene	95-63-6	120.19	0.20	0.98
1,3,5-Trimethylbenzene	108-67-8	120.19	0.20	0.98
2,2,4-Trimethylpentane	540-84-1	132.38	0.20	1.08
Vinyl chloride	75-01-4	62.5	0.20	0.51
m+p-Xylene	179601-23-1	106.16	0.20	0.87
o-Xylene	95-47-6	106.16	0.20	0.87
1,2-Dichloroethene (total)	540-59-0	96.95	0.20	0.79
1,4-Dioxane	123-91-1	88.11	5.0	18
Isopropyl Alcohol	67-63-0	61.09	5.0	12.5
Methyl Butyl Ketone	591-78-6	100.16	0.50	2.05
Methyl methacrylate	80-62-6	100.1	0.50	2.05
Naphthalene	91-20-3	142.2	0.50	2.9
Tetrahydrofuran	109-99-9	72.11	5.0	15

<u>Notes:</u>

1. Chemical Abstracts Service (CAS) Registry Number.
2. As per Severn Trent Laboratories (STL) Burlington, Vermont and are subject to change per quarter.

TABLE B-8
AQUEOUS
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs)
FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*System Monitoring Compound Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (% RPD)*	*Method Blanks*	*LCS Accuracy (% Rec.)* [1]
Aqueous	all compounds		< 50	≤ CRQL for each	
	vinyl chloride			target compound	60 - 140
	1,2-dichloroethane				60 – 140
	carbon tetrachloride			< 2.0 ug/l for	60 – 140
	1,2-dichloropropane			non-target compounds	60 – 140
	trichloroethene				60 – 140
	1,1,2-trichloroethane				60 – 140
	benzene				60 – 140
	cis-1,3-dichloropropene				60 – 140
	bromoform				60 – 140
	tetrachloroethene				60 – 140
	1,2-dibromoethane				60 – 140
	1,4-dichlorobenzene				60 – 140
	p-bromofluorobenzene	80 - 120			

Notes:
1. As per CLP SOW OLC02.1

QC = Quality Control; % Rec. = Percent Recovery; % RPD = Relative Percent Difference; LCS = Lab Check Sample; RL = Reporting Limit

TABLE B-9
SOIL
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs)
FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Matrix	*QC Compounds*	*System Monitoring Compound Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (% RPD*	*Method Blanks*	*MS/MSD Accuracy (% Rec.)* [1]	*MS/MSD Precision (% RPD)*
Soil	all compounds		< 100	≤ 2.5 x RL for		
	1,1-dichloroethene			methylene chloride,	59 – 172	22
	trichloroethene			and cyclohexane.	62 – 137	24
	benzene				66 – 142	21
	toluene			≤5 x RL for acetone,	59 – 139	21
	chlorobenzene			2-butanone.	60 - 133	21
	toluene-d8	84 – 138				
	bromofluorobenzene	59 – 113		≤ RL for all other		
	1,2-dichloroethane-d4	70 - 121		compounds.		

Notes:
1. As per CLP SOW OLM04.2.
   QC = Quality Control; % Rec. = Percent Recovery; % RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate;
   RL = Reporting Limit

Figures

SEVERN TRENT **STL**

STL Newburgh

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME	
ADDRESS	
CITY, STATE, ZIP	
NAME OF CONTACT	PHONE NO.
PROJECT LOCATION	
PROJECT NUMBER / PO NO.	

REPORT TYPE	TURNAROUND	REPORT # (Lab Use Only)
STANDARD☐ ISRA ☐	☐ NORMAL ____	SAMPLE TEMP ____ C
NJ REG ☐	☐ QUICK ____	SAMPLE REC'D ON ICE Y ____ N ____
NYASP A☐ B☐ CLP☐	☐ VERBAL ____	pH CHECK Y ____ N ____
OTHER ____		CHLORINE (RESIDUAL) Y ____ N ____
		REVIEWED BY: ____

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

NY PUBLIC WATER SUPPLIES
SOURCE ID ____
ELRP TYPE ____
FEDERAL ID ____

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

STL #	SAMPLING DATE	TIME AM PM	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	Liter Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	8 oz. Soil	2 oz. Cornwall	250ml Plastic NaOH/ZN ACC	ANALYSIS REQUESTED

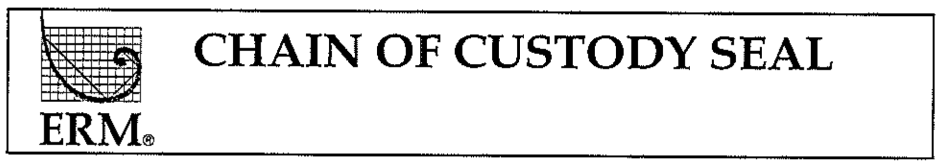
SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECTED TO THE STL TERMS AND CONDITIONS OF SALE (SHORT FORM) UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
SAMPLED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

COMMENTS ____

STL COC.jpg (1730x2196x16M jpeg)

FIGURE B-2
EXAMPLE CUSTODY SEAL



APPENDIX C
SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

Glen Head Groundwater Plume Site
Glen Head
Township of Oyster Bay, Nassau County, NY
NYSDEC Site No. 1-30-098
NYSDEC Work Assignment No. D003970-1325

August 2005

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway
Albany, New York 12233-7015

Prepared by:

Environmental Resources Management
520 Broad Hollow Road, Suite 210
Melville, New York 11747

APPENDIX C

SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

Gregory Shkuda
Project Director

Michael Mendes
Project Manager

Paulina Gravier
Project Health and Safety Coordinator

Michael Mattern
Field Team Leader

Michael Mattern
Site Safety Officer

TABLE OF CONTENTS – APPENDIX C

LIST OF TABLES

LIST OF ATTACHMENTS

C.0 SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

C.1 INTRODUCTION

This Health and Safety Plan (HASP) has been developed by ERM for the SC. The procedures set forth in this HASP are designed to reduce the risk of exposure to chemical substances and physical or other hazards that may be present. The procedures described herein were developed in accordance with the publications indicated below:

- Safety and Health Standards 29 CFR 1910 (General Industry), US Department of Labor, Occupational Safety and Health Administration (OSHA). Hereafter, referred as "29 CFR 1910."
- OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, U.S. Dept. of Labor, OSHA.
- OSHA Safety and Health Standards 29 CFR 1926 (Construction Industry), U.S. Department of Labor, OSHA.
- OSHA Safety and Health Standards 29 CFR 40 Part 61 Nation Emissions Standards of Hazardous Air Pollutants, U.S. Dept. of Labor, OSHA.
- OSHA Safety and Health Standards 29 CFR 40 Part763 Asbestos, U.S. Dept. of Labor, OSHA.
- Standard Operating Safety Guides, U.S. Environmental Protection Agency (EPA), Office of Emergency and Remedial Response.
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health (NIOSH).

The recommended health and safety guidelines within this HASP will be modified if future information changes the activities to be performed or the characterization of the area in which work is to be performed.

C.1.1 *Health And Safety Policy Statement*

ERM considers the health, safety, and well being of its employees to be of unconditional importance. Reflecting that concern, it is the policy of management to support the implementation of the Health and Safety Program. The proper resources (financial and human resources) are provided to ensure operation of a comprehensive program. The following policies will be employed:

- Prevention of occupational illnesses, accidents, resulting personal hardship, and financial loss takes precedence in the conduct of our business. Objectives of the Health and Safety Program include the identification of and the elimination or control of all hazards to personnel, products, equipment, and facilities.

- The active participation and involvement of all levels of management are essential to the success of the program. The Health and Safety Program Manager (HSPM) directs, reviews, and evaluates Health and Safety Program activities. The HSPM reports directly to the Presidents of ERM.

- All levels of supervision are responsible for maintaining safe working conditions, instructing each subordinate in proper health and safety practices, and enforcing health and safety program specifications. In addition, each supervisor is responsible for discussing the specifications of the HASP with each employee, and verifying that each employee understands/complies with health and safety directives.

- All employees have personal responsibility to conscientiously follow health and safety procedures, and to notify the project manager of potential or existing hazards to worker health or safety, so that they may be corrected prior to initiation or continuation of work.

Safe conduct is a condition of employment. Disregard for company safety rules are a serious infraction, and disciplinary action will be taken as outlined in this Section.

C.2 *ERM PROJECT PERSONNEL AND RESPONSIBILITIES*

ERM Project Director (PD) Gregory Shkuda
Responsible for all work and conducts ultimate Quality Assurance/Quality Control (QA/QC) overview.

ERM Project Manager (PM): Michael Mendes
Manages day-to-day activities; reports to PD.

ERM Project Health and Safety Coordinator: Paulina Gravier
Directs development of HASP; provides technical advice on health and safety issues.

ERM Site Safety Officer (SSO): Mike Mattern
Responsible for implementation of HASP; reports to PD and PM.

C.3 FIELD ACTIVITIES

C.3.1 *Task 2: Site Characterization*

The objective of the SC is to identify and delineate onsite and off-site groundwater impacts that pose a threat to public health or the environment. The Scope of Work contemplated by the WA involves a Site investigation that is comprised of the following subtasks:

Utility Markout: Will be performed by Regional One-Call service, non-intrusive.

Data and Records Search: Available historic information (documents, maps, aerial photos, building permits, reports, etc.) shall be located and reviewed. The consultant will also review the PSA reports and existing data. Potential sources and areas of contamination will be identified.

Property Ownership: ERM will compile a list of owner names, addresses and tax map numbers for all properties to be investigated. This list will be submitted to the NYSDEC no later than 28 days prior to the start of field work.

Drywell and Cesspool Sampling: Up to ten (10) bottom samples will be collected from identified drainage structures within the 40-acre study area and analyzed for the presence of contaminants of concern.

Soil Borings: Direct push methods via Geoprobe® are to be utilized to collect soil samples as close as possible to suspected areas of disposal. Approximately eight (8) soil borings within the 40-acre study area have been initially identified as appropriate sample locations.

Hydropunch Soil &Groundwater Sampling: Soil and Groundwater samples will be obtained at seven locations to determine the nature and extent of the groundwater plume. Soil samples will be collected to characterize local geology and will be screened for the presence of volatile organic constituents (VOCs) using photo ionization detection (PID). Soil samples will be logged and screened at 10-foot intervals beginning at the water table (~115 to 125 feet below ground surface (bgs) within the 40 acre study area) to a completion depth of 250 feet bgs. Groundwater samples will be collected utilizing the hydropunch method at ten-foot intervals from the water table to approximately 250 feet below land surface. If clay is encountered (i.e. the Port Washington Confining unit) soil and hydropunch sampling will be terminated at that depth. Soil and groundwater samples will be collected at staggered intervals, therefore every five feet soil or groundwater will be collected. Groundwater samples will be analyzed for VOCs with two-week turn around time

(TAT). Soil samples will be collected for the purpose of characterizing stratigraphy and screening with a PID instrument. No soil samples will be collected during hydropunch sampling.

Groundwater Monitoring Wells: Ground water monitoring wells will be installed in up to seven locations. Monitoring well locations and screen zone settings will be selected based upon hydropunch sampling results and will serve to monitor the Glen Head groundwater plume horizontally and vertically. For budgeting purposes it was assumed that three ¾ inch wells would be installed through the HSAs at the completion of each hydropunch boring. Monitoring wells would be screened between 120 to 130, 170 to 180 and 240 to 250 feet bgs.

Groundwater Sampling: Groundwater samples will be collected from each of the newly installed wells in addition to the existing wells (installed during the PSA and wells that have been installed at the Trans Technology Site) within the 40-acre study area. Groundwater samples will be analyzed for VOCs by EPA method CLP Method OLC03.2B.

Soil Gas Points: Permanent multilevel soil gas points will be installed via direct push drilling equipment for the purpose of collecting soil vapor samples. Multi-level soil gas sampling points screened at various depths (12 feet, 60 feet and 100 feet) will be installed at three (3) locations along the anticipated plume axis. At each location three separate borings will be performed to install the permanent soil gas implants at the desired depth intervals.

Shallow Soil Vapor: Shallow soil vapor samples will be collected at two (2) locations to evaluate the potential for human exposure. The vapor samples will be collected at a depth of 12 feet by hand driven equipment at temporary sampling locations.

Surface Water and Sediment: A sample of the natural spring discharge point will be collected to verify the discharge of contaminants of concern into Scudders Pond. One Pond Sediment sample near the natural spring discharge point will also be collected.

Survey: At the completion of field sampling activities a New York State licensed surveyor will establish the location and elevation of each newly installed hydro punch boring monitoring well, soil boring, each soil gas sample location and surface water/sediment sample collected from the a natural spring and discharge pond. Elevations of all well casings and ground surface and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, based on USGS datum.

Data Usability Summary Report(DUSR): All soil, groundwater and air analytical data will be evaluated to determine whether or not the data, meets the site/project specific criteria for data quality and data use as specified in the Draft DER10 Technical Guidance.

Letter Report: Upon completion of the Phase I site investigation, a letter report will be generated. The letter will include a summary of the analytical data, evaluation of the data and recommendations for additional investigative activities (Phase II) necessary to fill existing data gaps.

C.4 HAZARD IDENTIFICATION AND CONTROL

C.4.1 Hazard Identification Process

Prior to initiating any new project activity or when there is a change in site conditions, the Site Safety Officer (SSO) will assist project team members in completing a Job Hazard Analysis (JHA). A copy of the JHA form is located in Attachment 1.

C.4.2 Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and groundwater sampling, the chemicals of concern may be encountered at the site are listed in Table C-1 along with pertinent health and safety information.

C.4.3 Ambient Air Monitoring

Ambient air monitoring will be conducted by the ERM and coordinated by the Project Manager and the Site Health and Safety Officer as directed by the NYSDEC Case Manager, Mr. Robert DeCandia. The air monitoring protocol that will be followed will be the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). The CAMP is included as Attachment 2. Additional monitoring might also be conducted under any of the following circumstances.

- Work begins on a different portion of the site.
- Change in job tasks.
- Change in weather.

- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or groundwater.

- When new hazardous substances are encountered.

Ambient air monitoring will be conducted using direct-reading real-time instruments as indicated in Table C-3. The MiniRae will be used for continuous perimeter monitoring and a PID with an 11.6 eV bulb or a flame ionization detector (FID) will likely be used for ambient air in breathing zone. Not all work at the site will require ambient air monitoring for all contaminants. During the mobilization phase of a particular project task or activity, either the Project Manager or the SSO will determine what contaminants may be encountered in order to have the appropriate instrumentation on-site. The Project Health and Safety Consultant is available to assist the Project Manager or the SSO in determining the appropriate instrumentation.

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas will be required for fieldwork lasting longer than one day.

The NYSDOH CAMP (Attachment 2) will be followed for air monitoring procedures and outlines the steps to be taken by the SSO when the action levels of the various contaminants are exceeded.

C.4.4 Site-Specific and Task-Specific Hazards and Control Strategies

The hazards and control strategies associated with planned work activities are summarized in Table C-4. During the mobilization phase of a specific work task, the project team can quickly review the hazards and control strategies by locating the task or activity to be performed on the table. Hazards that are common to all activities performed at the site at listed first. The hazards listed for a particular task or activity includes the common hazards.

C.5 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.

- Potential for exposure to substances in air, splashes of liquids or other direct contact with material due to work being done.

- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table C-5 also serves as the written certification that the PPE Hazard Assessment has been conducted.

C.5.1 Respiratory Protection

The type of respiratory protection required will be based on the results of ambient air monitoring, the results of any models used to predict ambient air concentrations, and the professional judgment of either the SSO or the Project Health and Safety Coordinator.

As required by 29 CFR 1910.134, *Respiratory Protection*, a cartridge change-out schedule will be developed if it is necessary to upgrade to Level C based on either the results of ambient air monitoring, the results of any models used to predict ambient air concentration; or the professional judgment of the Project Health and Safety Coordinator. At a minimum, new respirator cartridges must be placed on the respirator at the beginning of the shift and after lunch.

C.6 HEAT AND COLD STRESS

C.6.1 Heat Stress

The timing of these activities may be such that heat stress may pose a threat to the health and safety of Site personnel. Acclimation periods and work/rest regimens will be implemented as necessary so that personnel do not suffer adverse effects from heat stress. Heat stress, if necessary, will be monitored in accordance with the American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) for Heat Stress or equivalent when the temperature is greater than 80°F. The following work/rest regimen will be utilized:

Temp °F	*Work-Rest Regimen*
80	Work Break Every 2 hours.
82	75% Work - 25% Rest, each hour.
85	50% Work - 50% Rest, each hour.
88	25% Work - 75% Rest, each hour.
90	Delay work until cooler temperatures prevail.

Special clothing and an appropriate diet and fluid intake will be recommended for all Site personnel to further reduce these temperature-related hazards. A good rule of thumb to prevent dehydration from heat stress is that fluid intake should equal fluid loss from the body, which can be accomplished through frequent small intakes of water. Potable water and/or a drink substitute (i.e., Gatorade) will be available for employee consumption.

C.6.2 *Cold Stress*

The timing of investigative or remediation activities may be such that cold stress may also present a threat to the health and safety of Site employees. Work/rest schedules, with rest in a warming shelter, will be implemented as necessary to reduce adverse effects from cold exposure. Cold stress, if necessary, will be monitored in accordance with the ACGIH TLV for Cold Stress or equivalent. The addition of wind speed and the resulting wind chill will be considered when determining an appropriate work/rest schedule and appropriate clothing.

Site personnel will be encouraged to consume water to avoid dehydration. Potable water and/or a drink substitute (i.e., Gatorade) shall be available for employee consumption. Workers will wear adequately insulated clothing to limit exposure to cold.

C.7 *CLIENT SPECIFIC REQUIREMENTS*

The NYSDEC has requested that this HASP include provisions for a community Air Monitoring Plan (CAMP). Accordingly, a copy of the NYSDOH CAMP has been incorporated herein as Attachment 2 and will be implemented during the field investigation.

C.8 *SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES*

C.8.1 *General Site Provisions*

C.8.1.1 *Smoking and Eating Areas*

Smoking will only be allowed in designated areas. Upon mobilization at the site, the SSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the SSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition.

C.8.1.2 *Temporary Facilities*

This project will not require any temporary facilities.

C.8.1.3 *Standard Operating Procedures*

The following standard operating procedures will be adhered to at all times.

- All personnel entering the site must check in with the SSO.
- All individuals entering the site must demonstrate to the SSO that they have been adequately trained as defined in Section 10.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the SSO, who will document such conditions in the field log. The SSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.

C.8.2 ***Safe Work Practices***

C.8.2.1 *Ergonomics*

Ergonomic risk factors include repetitive motion, force, awkward posture, and vibration. The key to preventing ergonomic injuries is education of personnel relative to the hazards and risk factors and implementation of proper controls and work practices.

Several tasks associated with this project have the potential to cause back injuries, if proper lifting techniques are not followed. Site workers should not lift objects that are beyond their physical capabilities and the use of mechanical devices such as forklifts is encouraged. In addition, when shoveling, site workers should not twist their backs while moving materials with the shovel. The proper technique is to move the feet.

Proper lifting techniques are summarized below.

- Place feet shoulder width apart with toes pointing slightly out.
- Bend at your knees keeping back straight.
- Get a good grip on the object and pull object close to your body.
- Tighten abdominal muscles.
- Keep your head up, looking forward, and lift with your legs while maintaining a straight back.
- Keep load close to your body and ensure your view is not obstructed.
- If one end of the load is heavier than the other, the heavier end should be closest to your body.
- Move your feet to relocate the object as opposed to twisting your back.
- When placing the object down, bend your knees and use your leg muscles while keeping your back straight.

Pre-Drilling/Pre-Excavation and Probing Protocol

Prior to mobilizing to the field, the Project Manager will be responsible for ensuring the following issues have been adequately addressed:

- Contacting One-Call or equivalent to identify underground pipelines, utility lines, and fiber optic cable.
- Contacting appropriate municipality to identify underground and sewer lines.
- Contacting posted pipeline companies.

C.8.3 Fall Protection

This project does not involve working from heights more than six feet above grade.

C.8.4 Weather Related Events

Weather related events that may impact fieldwork include, but are not limited to, rain, snow, thunder, and lightning. The SSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning.

During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle.

C.8.5 *Night Work*

This project will not involve activities being performed at night.

C.8.6 *Noise*

Employees performing any noisy task, such as but not limited to, operating heavy equipment, drilling, using power tools, or employees working within 20 feet of the person performing the task will wear hearing protection consisting of either earplugs or earmuffs. Personnel operating a drilling rig or standing within 20 feet of a drilling rig during operation will also wear hearing protection.

C.9 *EMPLOYEE TRAINING*

All employees and subcontractors working on-site, who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site will receive training meeting the requirements of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) before they are permitted to engage in any job task. Employees will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. Once on-site all site workers will receive training covering at a minimum the following.

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on the site
- Use of PPE
- Safe use of engineering controls and equipment on the site
- Medical surveillance requirements including recognition of symptoms and signs that might indicate overexposure to hazards.

C.9.1 *Subcontractor Training*

The SSO will verify that subcontractor personnel have received all appropriate training as required by this HASP prior to their arriving on-site. <u>Verification will consist of reviewing written training documentation such as copies of training certificates or cards.</u> Copies of the written training documentation will be retained in the project file. Subcontractor personnel will not be allowed to work at the site unless said training documentation is available.

C.9.2 *Daily Tailgate Safety Meeting*

A tailgate safety meeting will be conducted each morning. The daily safety meeting meetings will include awareness concerns such as special concerns regarding health and safety, pollution prevention or a discussion of recent incidents or safety observations. Issues such as any changes to the HASP will be addressed daily. The meetings will include a discussion of what tasks will be completed that day and how those tasks will be conducted safely. The meetings will be documented on the Daily Safety Meeting form found in Attachment 3.

C.10 *MEDICAL SURVEILLANCE*

All ERM employees are enrolled in a medical surveillance program. All employees receive an initial medical examination and consultation prior to assignment to any job site. In addition, employees receive an annual medical examination, a medical examination upon termination of employment, and a medical examination when the employee exhibits signs or symptoms relating to possible overexposure to hazardous substances or when an injury or exposure above published exposure limits has occurred in an emergency situation.

Additional medical surveillance should be provided for employees who:

- Are or may be exposed to hazardous substances or health hazards at or above published exposure levels for these substances for 30 days or more a year;
- Wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134, *Respiratory Protection*; and
- Are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

C.11 *SITE CONTROL MEASURES*

The drilling location and surrounding area will be considered the work zone. Drilling will take place in different areas and new work zones will be delineated by the SSO as the drill rig is moved and during monitoring well sampling. The work area will be delineated using traffic cones and/or "Caution" tape. The SSO will ensure that no one enters the work zone without the proper training and requirements. All personnel entering the Work Zone will sign the project sign-in sheet in Attachment

4. Furthermore, all ERM personnel and subcontractor will sign-in at the start of each workday and sign out at the end of each workday.

C.12 *DECONTAMINATION PROCEDURES*

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination.

C.12.1 *Personnel Decontamination*

The following decontamination procedures will be utilized:

- Clean rubber boots with water.
- Remove all PPE and dispose of the PPE in the designated drums.
- Wash hands and any skin that may have come in contact with affected soil or groundwater with moistened disposable towels, such as baby wipes, or soap and water.

C.12.2 *Equipment Decontamination*

All drilling equipment and the back of the drilling rig shall be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This shall include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment shall be capable of generating live steam with a minimum temperature of 212° degrees Fahrenheit. The equipment shall be cleaned to the satisfaction of the ERM's Hydrogeologist.

C.13 *CONFINED SPACE ENTRY PROCEDURES*

Entry into permit-required confined spaces is not anticipated or permitted.

C.14 *SPILL CONTAINMENT PROGRAM*

The project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over packed into an appropriate container.

C.14.1 *Hydraulic Fluid/Engine Oil/Fuel Spills*

In the event of an unexpected release of hydraulic fluid, engine oil, gasoline or diesel fuel, the release material will be absorbed with sorbent pads, which will be placed in a designated drum for disposal. Impacted soil will be excavated and placed on plastic sheeting and covered until characterization and/or disposal can be arranged.

C.15 *SITE COMMUNICATION*

Cell phones will be used for communication between the project team and the client and office.

C.16 *COMMUNICATION AND REVIEW OF SITE-SPECIFIC HEALTH AND SAFETY PLAN*

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. Daily tailgate safety meetings will be held each morning to review work practices for the day and to discuss safety issues. Any new hazard or safety information will be disseminated at the daily tailgate safety meeting or as needed throughout the day.

C.17 *EMERGENCY RESPONSE PLAN*

This section describes possible contingencies and emergency procedures to be implemented at the site.

C.17.1 *Personnel Roles and Lines of Authority*

The SSO has primary responsibility for site evacuation and notification in the event of an emergency situation. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the SSO is not available, the ERM Project Geologist/Engineer will assume these responsibilities. Subcontractors are responsible for assisting the SSO in their mission within the parameters of their scope of work.

C.17.2 *Emergency Alarms*

Because of the small work area and mobility of work areas, an emergency evacuation plan and meeting place will decide on the drilling or sampling locations.

C.17.3 *Reporting Emergencies*

All, including any late developing or aggravated injuries, must receive prompt medical attention. For non-life threatening injuries or illnesses site workers should be transported to the hospital. For life threatening injuries or illnesses, the local emergency responders should be contacted via 911.

The SSO is responsible for reporting all injuries, illnesses, fires, spills/releases, property damage or near misses to the following individuals.

- Injured/involved employee's supervisor
- ERM Project Manager
- ERM Partner-In-Charge
- ERM Project Health and Safety Consultant
- Client Contact

C.17.4 *Emergency Contacts*

In case of an emergency, the SSO will contact the following as appropriate.

Title/Name	*Phone Numbers*
ERM Project Director Gregory Shkuda, Ph.D.	Work: 631-756-8900 Mobile: 516-652-6412
Project Manager Michael Mendes	Work: 631-756-8900 Mobile: 516-250-6325
Site Safety Officer Mike Mattern	Work: 631-756-8900 Mobile: 516-315-6645
Project Geologist/Engineer Mike Mattern	Work: 631-756-8900 Mobile: 516-315-6645
Project Health and Safety Coordinator Paulina Gravier	Work: 212-447-1900 Mobile: 917-664-2590
Mr. Robert DeCandia. NYSDEC	Work: 518-402-9693
Local Emergency Responders – all services	Phone: 911
Hospital: North Shore University 101 Saint Andrews Lane Glen Cove NY 11590	Phone: (516) 674-7300

C.17.5 *Incident Investigations*

An ERM Incident Form (Attachment 5) will be completed and forwarded to the Project Manager within 24 hours of an incident. All incidents will be investigated in a timely manner. The SSO and/or the Project Manager will schedule the investigation and include project supervision (ERM, subcontractors, and client), the injured/involved employee(s) and the Project Health and Safety Coordinator. Root cause analysis will be performed to assess the apparent cause and identify corrective measures to be implemented to prevent re-occurrence. The last page of the Incident Form is used to document the investigation.

C.17.6 *Directions to Nearest Hospital*

The nearest hospital is *North Shore University Hospital*. A map to both medical facilities is located in Attachment 6.

North Shore University Hospital
Address: 101 Saint Andrews Lane, Glen Cove, NY 11542
516-674-7300

Directions to the hospital and a map to the hospital from the Site are provided in Attachment 6.

C.17.7 *Emergency Drills*

In accordance with the HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined on Table C-6. All drills will be documented on the Emergency Drill Evaluation Form found in Attachment 8. Drills do not need to be elaborate. A tabletop scenario during the daily safety meeting is an adequate drill.

C.18 *SAFETY EQUIPMENT*

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM Northeast vehicle. If you are driving a personal vehicle or a rental vehicle, please rent a first aid kit and fire extinguisher from the equipment room.

C.19 CERTIFICATION OF FAMILIARITY WITH PLAN BY SITE PERSONNEL

By signing below, your signature certifies that you have read, understand and will abide by the contents of this HASP.

Name	Signature	Company	Date

Tables

TABLE C-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Chemical	**Published Exposure Limit 1 (8-hour TWA 2)**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **1,1-dichloroethane** CAS: 75-35-4 Vapor Pressure: 500 mmHg Ionization Potential: 10 eV	None - Carcinogen	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, Skin, Respiratory System, Liver, Kidneys, And Central Nervous System.	Acute: Irritation eyes, skin, nose, throat, dizziness, headache, nausea, breathing difficulty, liver, kidney disturbance, Chronic: cancer	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention

NOTES:
1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. TWA = time weighted average.

3. PPM – PARTS OF CONTAMINANT PER MILLION PARTS OF AIR.

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE C-2
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Chemical	Exposure Limit (1) (8-hr TWA (2))	Routes of Exposure	Target Organs	Signs/Symptoms of Exposure (Acute versus Chronic Effects)	First Aid & Emergency Response
Chemical Name: **Portland Cement** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	10 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system; skin burns Chronic Contains trace amounts of crystalline silica which cause silicosis and may be carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Bentonite** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV for crystalline silica)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system Chronic Contains trace amounts of crystalline silica which may cause silicosis; potential carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Silica sand** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, respiratory system	Acute Irritation of eyes; coughing Chronic Silicosis; lung carcinogen	Flush eyes with water Move to fresh air Seek medical attention

TABLE C-2
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Chemical	Exposure Limit (1) (8-hr TWA (2))	Routes of Exposure	Target Organs	Signs/Symptoms of Exposure (Acute versus Chronic Effects)	First Aid & Emergency Response
Chemical Name: **Isobutylene Balance Air** CAS: N/A, mixture Vapor Pressure: N/A, gas at ambient conditions Ionization Potential: N/A, mixture	None established	Inhalation	Respiratory system	Acute: Simple asphyxiant, difficulty breathing, cyanosis, rapid pulse, impairment of senses, mental disturbances, and convulsions Chronic: None known	Move to fresh air, administer artificial respiration if not breathing See medical attention

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. TWA = time weighted average
3. mg/m^3 = milligrams of contaminant per cubic meter of air
4. ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value
5. ppm = parts of contaminant per million parts of air
6. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE C-3
AMBIENT AIR MONITORING INSTRUMENTS
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Contaminant	***Instrument***
Organics	Photovac PID with 11.6 eV lamp or, MiniRae 2000 with 11.6 eV lamp or, Flame ionization detector
Dust	MIE DR 1000 Personal DataRAM Aerosol Monitor

TABLE C-4
SITE-SPECIFIC AND TASK-SPECIFIC HAZARDS AND CONTROL STRATEGIES
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Task/Activity	*Hazards*	*Control Strategy*
All activities at site Level D PPE	Poisonous plants	• Identify suspect plants • Vegetation control at or below ankle height by having client mow/weed-eat path and work area • Appropriate protective clothing disposable Tyvek™ coveralls, thin nitrile gloves, disposal boots, tape at wrists and ankles • Barrier cream for uncovered skin • Wash exposed body parts and equipment thoroughly after work in highly-vegetated areas
	Non-stinging insects	• Insect repellant
	Stinging insects	• Survey work area for presence of nests • Eliminate nests
	Thunder/Lightning	• If drilling, cease work following first indication of thunder/lightning • Shelter in buildings or vehicles not underneath trees or near drilling equipment • Begin work after 15 minutes has elapsed from last thunder/lightning
Drilling	Heavy equipment movement	• Personnel maintain eye contact with operators when near the rig.
	Dropped equipment, slip, trip or fall.	• Hard hats, steel-toe safety shoes and safety glasses worn during equipment operation.
	Noise	• Hearing protectors with proper noise reduction rating.
Completion and development of groundwater well	Splashing of chemical in groundwater	• Safety glasses; chemical-resistant suits (as determined necessary by SSO)

TABLE C-5
PERSONAL PROTECTION EQUIPMENT REQUIREMENTS
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

PPE Level	Ensemble Components	Anticipated Use
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	• Long pants and shirt with sleeves • Steel-toed footwear • Safety glasses with molded side shields or goggles. • Hard hat if potential for head injury or falling debris is possible/or client requirement • General purpose work gloves if task does not involve water or wet materials • Hearing protection • High visibility traffic vest when in traffic areas	All activates unless otherwise directed by the SSO, PM, and Project Manager and Project Health and Safety Coordinator .
Modified Level D	Level D and the following: • Disposal Tyvek coveralls • Steel-toed rubber boots or disposal boot covers over shoes • Thin nitrile gloves • Green nitrile gloves over thin nitrile gloves when primary gloves may tear or puncture	Any of the above-referenced tasks in which there is moderate potential for skin contact
Level C Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D or Modified Level D and the following: • Half-face air purifying respirator with combination organic vapor/high efficiency particular air (HEPA) cartridges	Any of the above-referenced tasks in which there is moderate potential for skin contact with constituents and data indicating need for respiratory protection. No upgrade to Level C without approval from Project Manager and Project Health and Safety Coordinator
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	Not anticipated to be required	Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised.
Level A Should be worn when the highest level of respiratory, skin, and eye protection is needed.	Not anticipated to be required	Tasks requiring Level A PPE are not anticipated during this project. If Level A PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised

TABLE C-6
EMERGENCY DRILL FREQUENCY
GLEN HEAD GROUNDWATER PLUME SITE, GLEN HEAD, NEW YORK

Project Duration	***Drill Frequency***
Less than 30 days	None, cover during review/sign-off of HASP
Greater than one month but less than one year	Once
Greater than one year	Annually

Attachment

Job Hazard Analysis

Attachment 1

Site No. 1-30-098

Work Assignment No. D003970-25

ERM.

JOB HAZARD ANALYSIS

Required for those field projects that do not require a HASP (see Project Safety Evaluation Checklist). JHAs also are used to supplement HASPs.

Prior to conducting fieldwork a Job Hazard Analysis must be completed and reviewed with all members of the Project Team. At the time of site mobilization, the job Hazard Analysis will be verified and reviewed again with the Project Team at the beginning of each day as fieldwork continues.

Client:	W.O.#
Project Name:	
Location:	
ERM Project Director:	Date:
ERM Project Manager:	Revision No.:
ERM Project Team:	
Subcontractors:	

Field Work Description

NOTE: For any hazards that are not applicable for your task, mark the left hand column with N/A. Do not leave any hazards blank.

Hazard Identification	Describe Hazard Control (appropriate for site)
Job Location/Setting:	☐ Industrial facility ☐ Commercial are ☐ Urban area ☐ Residential area ☐ Undeveloped/vacant ☐ Lone worker
☐ Chemicals at site List or attach separate page:	☐ MSDS or chemical information available to project team for each chemical (required) ☐ PPE (see PPE Section) ☐ Exposure monitoring ☐ Decontamination: Specify methods:
☐ Chemicals ERM will take to site	☐ Attach copies of MSDSs for all chemicals to en to clients site.
☐ Dust-Describe source	☐ PPE (*see* PPE Section) ☐ Exposure monitoring (see monitoring section) ☐ Dust suppression
☐ Confined Space	Coordinator ERM Health and Safety for assistance

Hazard Identification	Describe Hazard Control (appropriate for site)
☐ Slips (Wet Surface), Trips and Falls ☐ fall less than 6 feet ☐ fall more than 6 feet	☐ Clean/ dry surfaces ☐ Barricade the unsafe area ☐ Eyes on path ☐ Relocate the work area ☐ Use alternate route ☐ Use a construction platform ☐ Tie-off to equipment ☐ Move work to ground level ☐ Fall restraint, guardrails, short lanyard
☐ Electrical Shock	☐ Area around electrical equipment dry ☐ Energy isolation or Lock-out/Tag-out (LOTO) ☐ Grounding ☐ GCFI ☐ Shielding on equipment
☐ Combustible materials, Fire, Explosion	☐ Remove combustible materials ☐ Relocate work ☐ Isolation/ LOTO ☐ Area air monitoring ☐ PPE/ Flame Retardant Clothing (FRC) (See PPE Section) ☐ Fire watch ☐ Fire extinguisher available
☐ Heat/Cold Stress	☐ Work/Rest regimen ☐ Task rotation, shared tasks ☐ Source of cool water/electrolyte replacement drinks ☐ Ventilation
☐ Noise - Describe source	☐ PPE (see PPE Section) ☐ Relocate work ☐ Control noise source
☐ Lighting/ Visibility	☐ Adequate for task ☐ Nighttime considerations ☐ PPE (see PPE Section) ☐ Safety cones
☐ Lifting, Pulling, Pushing, Repetitive Motion	☐ Get equipment designed for the job ☐ Proper technique ☐ Smaller, lighter loads ☐ Prepared for "unexpected release" ☐ Move feet to turn with load
☐ Airborne/Flying Material	☐ Cover/Shield source ☐ PPE (see PPE Section) ☐ Positioning
☐ Rotating/Moving Equipment and Pinch Points	☐ Energy isolation, Lock-out/Tag-out (LOTO) ☐ Guarding, barricading ☐ No loose clothing ☐ Positioning
☐ Sharp Objects	☐ Guarding ☐ PPE (see PPE Section) ☐ Positioning
☐ Falling Objects	☐ Secure objects ☐ Guarding, covers ☐ PPE (see PPE Section) Barricading
☐ Hazards from others working in	☐ Communication: Specify Method
☐ Hazards to other working in vicinity	☐ Communication: Specify Method

Hazard Identification	Describe Hazard Control (appropriate for site)
☐ Environmental Spill	☐ Containment ☐ Waste Plan ☐ Waste containers ☐ Other
☐ Overhead lines/subsurface lines	☐ Spotter ☐ Verify clearance with client ☐ One-Call ☐ Mark line
☐ Site-specific training required	☐ Specify training requirement
☐ Client-specific safety procedure/policy required?	☐ Specify client specific safety procedure or policy (attach a copy)
☐ Client permit required?	☐ Specify method for obtaining permit:
☐ Subcontractor on-site	☐ Obtain proof of required (including site-specific) training ☐ Obtain proof of required (including site-specific) medical surveillance
☐ Other Hazards	☐ Description:

Exposure Monitoring

The following equipment will be used to monitor personnel exposure:

Emergency Plan required for every site job

Method of obtaining assistance	
Evacuation Route	
Prevailing wind direction	
Emergency call list	911 or Other emergency #: ERM Project Manager: ERM Project Director: Client Coordinator: Subcontractor Coordinator:
Emergency assembly area	

Emergency Plan

First aid equipment availability	
Nearest Medical Assistance Address: Phone Number:	Direction or attach map:

Personal Protective Equipment Required (Check boxes to indicate PPE requirements)

☐ Field clothes (long or short sleeve shirt, long pants)
☐ Disposable coveralls: specify type ____________________
☐ High visibility or reflective vests
☐ Flame Retardant Clothing
☐ Hard-hat
☐ Steel toe boots/shoes
☐ Disposable shoe covers
☐ Respiratory Protection
  ☐ Half-face cartridge respirator, cartridge type: ____________________
  ☐ Cartridge change frequency ____________________
  ☐ Other respirator type
☐ Gloves: specify type(s)

☐ Hearing protection: specify type(s)

☐ Eye Protection: specify type

PPE Hazard Assessment Certified by:
(Note: PPE can be certified by any knowledgeable staff member) Date: _____

Project team (including subcontractors) has seen, been briefed and understand the contents of this job Hazard Analysis.

Name	Signature	Date

Community Air Monitoring Plan

Attachment 2

Site No. 1-30-098

Work Assignment No. D003970-25

New York State Department of Health
Metal Etching 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.

Last Updated: June 20, 2000

Daily Safety Meeting Form

Attachment 3

Site No. 1-30-098

Work Assignment No. D003970-25

ERM

Daily Safety Meeting Form

Date of Safety Meeting	Name of Meeting Facilitator
Topics Discussed	
Safety Concerns and Action Plan to Correct	

Name	Signature	Company	Employee Number

Project Sign-in Sheet

Attachment 4

Site No. 1-30-098

Work Assignment No. D003970-25

ERM

PROJECT SITE SIGN-IN FORM

Site: *Glen Head Groundwater Plume, N.Y* Date:________________

Employee	Company	Time In	Time Out

ERM Incident Reporting Form

Attachment 5

Site No. 1-30-098

Work Assignment No. D003970-25

Environmental Resources Management

ERM INCIDENT REPORT FORM

Client Name: ____________________

Date and Time of Incident: ____________________

Type of Incident: ____________________

Location of Incident: ____________________

Employee: ____________________

Employee Job Title: ____________________

Specific Job At Time of Incident: ____________________

Level of Protection Worn at Time of Exposure: ____________________

Summary of What Occurred: ____________________

____

____

Actions Taken To Correct Situation (Engineering, PPE, etc.): ____________________

____

____

Employee Signature: ____________________

Site Safety Officer: ____________________

ERM Project Manager: ____________________

Time and Date of Report: ____________________

Please return completed forms to the Health and Safety Program Manager

Hospital Route Map and Directions

Attachment 6

Site No. 1-30-098

Work Assignment No. D003970-25

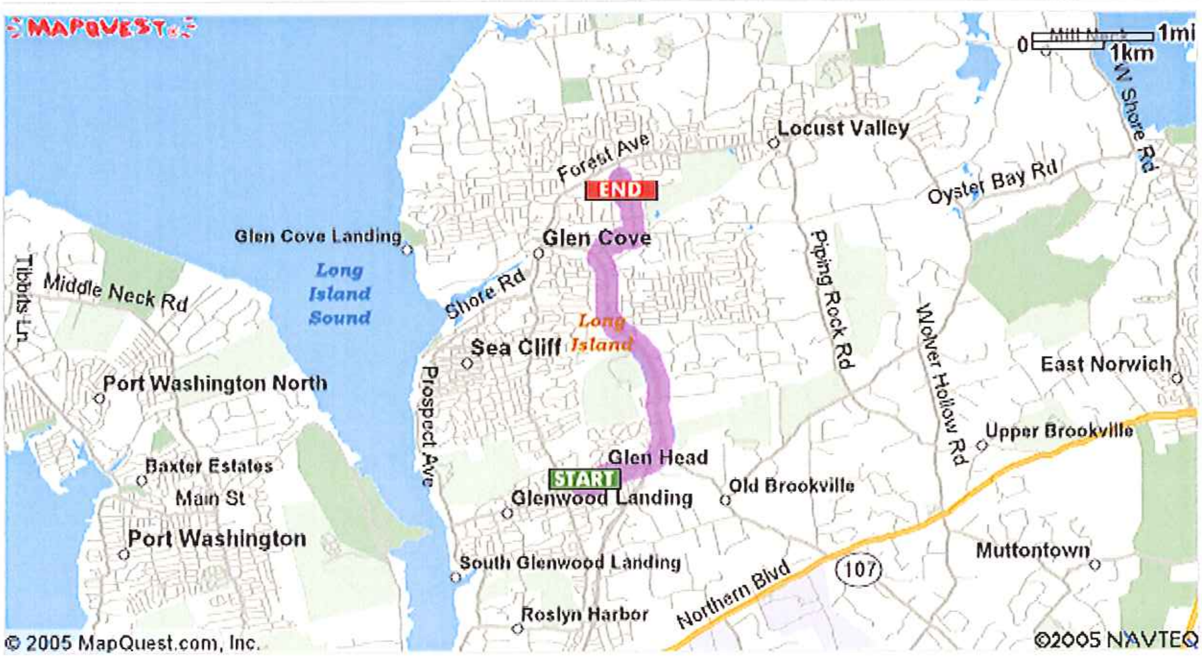
MAPQUEST

Start: **[33-52] Glen Head Rd**
Glen Head, NY 11545, US

End: **101 Saint Andrews Ln**
Glen Cove, NY 11542-2254, US

Directions	Distance
START 1: Start out going EAST on GLEN HEAD RD toward MAPLE PL.	0.6 miles
2: Turn SLIGHT LEFT onto GLEN COVE RD/GREENVALE-GLEN COVE RD. Continue to follow GLEN COVE RD.	1.9 miles
3: Turn RIGHT onto TOWN PATH.	0.3 miles
4: Turn LEFT onto WALNUT RD.	0.5 miles
END 5: End at **101 Saint Andrews Ln** Glen Cove, NY 11542-2254, US	

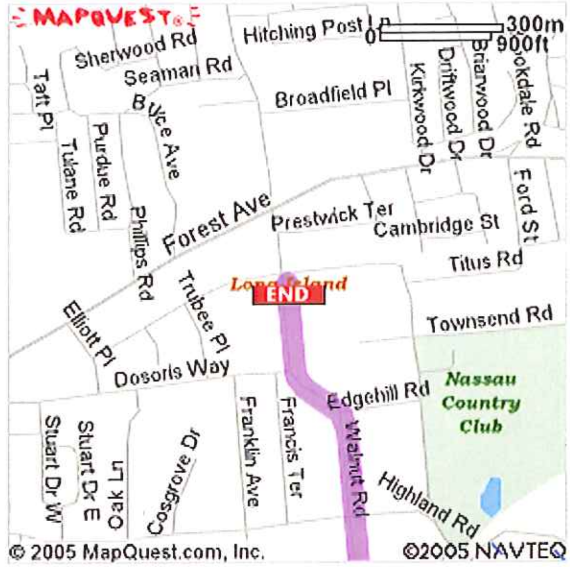
Total Est. Time: 9 minutes **Total Est. Distance: 3.49 miles**



Start: **End:**

Glen Head, NY 11545, US

Glen Cove, NY 11542-2254, US



Notes:

These directions are informational only. No representation is made or warranty given as to their content, road conditions or route usability or expeditiousness. User assumes all risk of use. MapQuest and its suppliers assume no responsibility for any loss or delay resulting from such use.

Yahoo! My Yahoo! Mail

YAHOO! LOCAL Maps Sign In New User? Sign Up

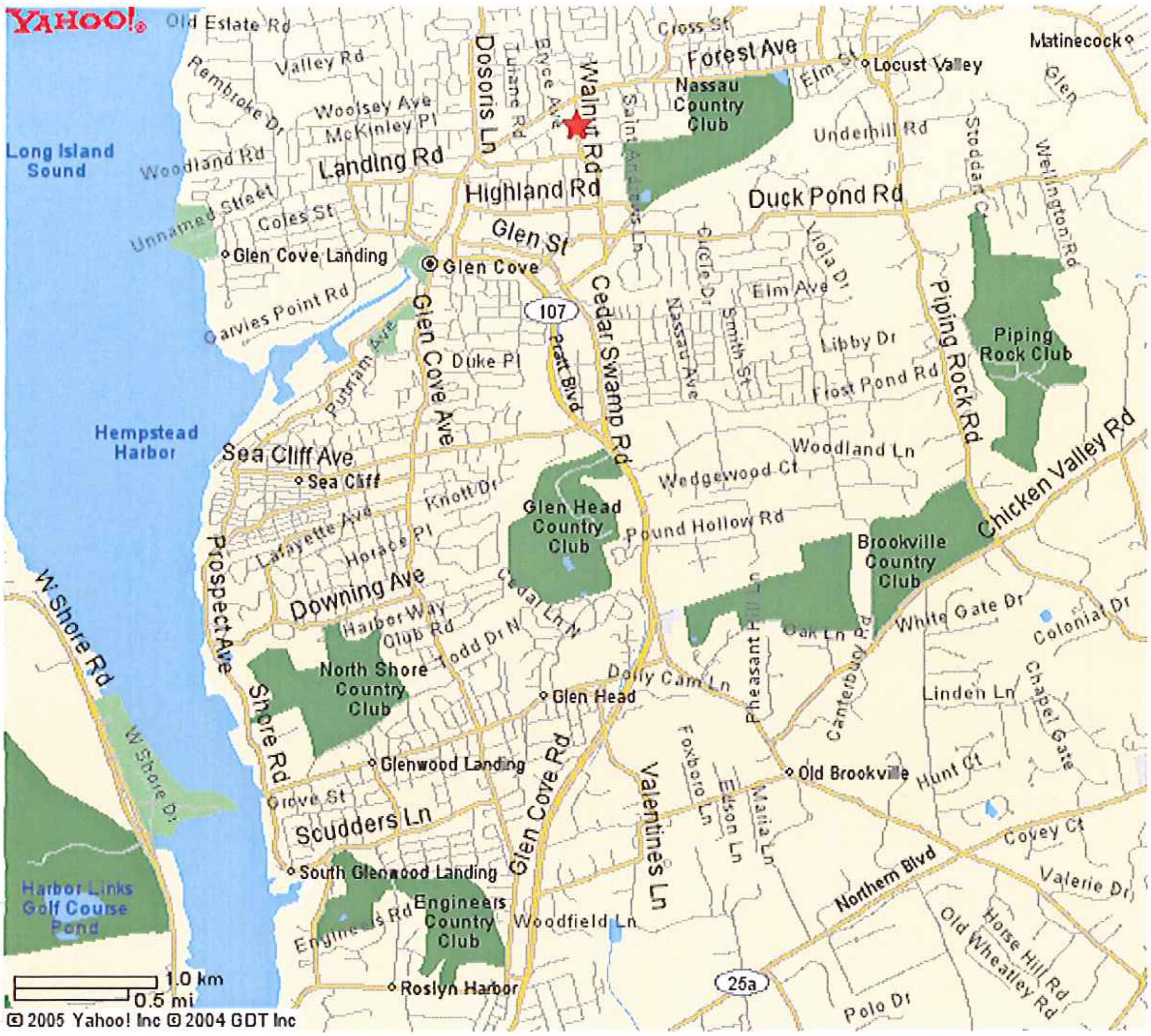
Search the Web Search

Maps Home - Help

Yahoo! Maps - Glen Cove NY 11542

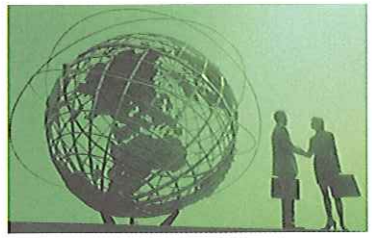
« Back to Map

North Shore University Hosp, 101 Saint Andrews Ln Glen Cove NY 11542 (516) 674-7300



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Gregory K. Shkuda, Ph.D.



Mr. Shkuda has more than 20 years of environmental consulting experience including project direction, regulatory agency negotiation, cost and schedule control, and expert opinion/testimony in matters ranging from fate and transport of chemical contaminants to hydrocarbon fingerprinting.

Publications

Jalajas, P. Gregory Shkuda, and Thomas A. Mackie. Petroleum Release Dating: A Case Study Emphasizing Site Specific Conditions. NWWA 1997 - Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, November 12-14, 1997, Houston, Texas.

Rodgers, J.A. and G.K. Shkuda. Training and Safety Considerations in Using Self-Contained Breathing Apparatus (SCBA) and Tethered Cascade Breathing Apparatus (TCBA) in Hazardous Atmosphere at Uncontrolled Hazardous Waste Sites. Procedures of the American Chemical Society 184th Annual Meeting, Kansas City, MO, September 1982.

Geller, S., S.C. Wei, G.K. Shkuda, D.M. Marcus, and C.F. Brewer, 1980. Carbon- 13-Enriched Tetra-L-Alanine Hapten to Fab' Fragments of Antipoly (L-Alanine) Antibodies. Biochemistry 1980, 3614-3623.

Shkuda, G.K., 1976. The Decomposition of Bicyclic Diazo Compounds: A Mechanistic Study. New York University, New York.

Shkuda, G.K., Coenen, A., Morgan, R.L., and Speis, D. 2004. Analysis of Samples Containing Polychlorinated Biphenyls and Polychlorinated Naphthalenes. Remediation of Chlorinated and Recalcitrant Compounds, Fourth International Conference, Monterey, California.

Registrations & Professional Affiliations

- American Chemical Society

Fields of Competence

- Federal and State environmental regulations
- Evaluation of complex ground-water quality problems
- Analysis of biodegradation of organics in ground water
- Expert testimony on hazardous waste compliance
- Review of QA/QC plans
- Development of analytical protocols for litigation purposes
- Fingerprinting of petroleum fuels/oils/PCBs/MGP waste
- Risk Evaluation/Communication

Education

- Ph.D. Organic Chemistry, New York University, 1976
- M.S. Organic Chemistry, New York University, 1973
- B.A. Chemistry, New York University, 1968

Key Projects

Provided litigation support and expert testimony for a Potentially Responsible Party (PRPs) Group at a Superfund site in Indiana. The litigation support required detailed analysis of production records to of the PRPs and other landfill users to determine the chemical manufacturing processes used, likely products and whether unwanted by-products could be contained in waste streams. Identified hazardous substances contained in the waste streams of potential users of the disposal site to identify additional PRPs to require them to share in clean-up costs.

Provided litigation support at a New Jersey Superfund site. Detailed analysis of production records of chemical manufacturing, review of analytical methodologies and the fate and transport of product chemicals and by products was required for the production of an Expert Report. Assisted in critique of other experts.

Analyzed the groundwater transport and fate, distribution, and analytical methodology used to quantify a pesticide used on Long Island. Provided expert testimony on behalf of the manufacturer to defend a toxic tort.

Evaluated dioxin analytical methodologies and the potential for dioxin formation from copper recovery operations at New Jersey Secondary Smelter impacting New York City.

Evaluated dioxin formation for a chemical manufacturer in Newark, New Jersey to determine the likelihood of dioxin formation and transport of putative dioxins to the Passaic River.

Provided expert testimony on behalf of a petroleum company regarding the origin of product detected in a former tank pit. Use of high-resolution gas chromatography allowed determination that the product was not related to the client's operations but resulted from subsequent usage of the property. The expert opinion was a key element in the summary judgment motion, which was granted by the court.

Provided expert testimony for the Department of Justice regarding the nature, mobility, persistence, and fate of organic and inorganic contaminants at a Superfund site in Jacksonville, Florida.

Directed an RI/FS at a former MGP site in Syracuse, NY. Identified new approaches to rapidly collect vertical profile data on DNAPL MGP wastes.

Directed the remedial investigation at a closed aircraft manufacturing facility on Long Island including negotiations with the NYSDEC regarding the scope of the investigation, evaluation of the monitoring data, supervision of Resource Conservation Recovery Act (RCRA) closure activities and coordination of cleanup activities.

Directed an environmental study at a chemical plant in New Jersey, which included determination of the impacts to both ground and surface water of releases from the plant, detection and mitigation of the impacts of non-aqueous phase liquids (NAPL) and assessment of the risk to local residences presented by the NAPL via volatilization and intrusion of the vapors into homes.

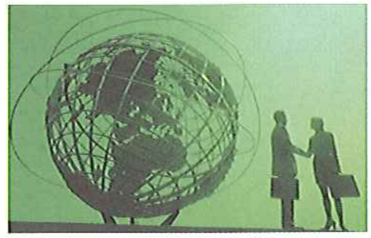
Directed an RI/FS at two municipal landfills on Long Island. Was responsible for; negotiating the scopes of the work plans including assessment of risks to both human health and the environment with the New York State Department of Environmental Conservation (NYSDEC), implementing the studies, coordination of activities with the regulatory agencies (state, federal and local), obtaining access for off-site activities with municipalities and residents. Presented the results of the RI/FS including communication of the risk assessment results at the CERCLA required public meeting.

Collected ambient air monitoring data determining the concentrations of vinyl chloride being emitted from a municipal landfill and potentially impacting an adjacent elementary school.

Provided expert testimony for a major petroleum company regarding the identity, age, and origin of petroleum hydrocarbons detected in the subsurface at a bulk terminal facility in Texas. Gas chromatographic fingerprinting and component ratio analyses were used to demonstrate that the client was not the source of the contamination impacting a nearby park.

Provided litigation support for a petroleum company at a refinery site in California. The expert analysis involved fingerprinting of free product detected below the area of the refinery where finished gasoline was produced to determine origin, type, and age of product so that it could be distinguished from the product detected off-site. Various techniques were applied including high-resolution gas chromatography, biomarker and PIANO analyses and the occurrence and nature of organic lead species.

Michael F. Mendes



Mr. Mendes has 7 years of varied hydrogeologic experience including investigations, oversight, and management for NYSDEC inactive hazardous waste sites and petroleum spill sites as well as private industries. He has diverse experience in site investigations for petroleum spill sites and has been directly responsible for the management and site supervision of remedial investigations, remediation system installations, tank removal, and soil excavations, in-place closure of USTs, and the use of surface geophysical methods such as ground penetrating radar and natural gamma logging. Mr. Mendes has been responsible for implementing and conducting required monitoring for site specific Health & Safety Plans.

Mr. Mendes has extensive knowledge in the evaluation, closure, and remediation of underground petroleum storage tanks at gas stations and petroleum bulk storage/distribution terminals. He has participated in EPA National Priority Listed Superfund Site Investigations where his roles included site supervision as well as Site Safety Officer.

Registrations & Professional Affiliations

- State of New Jersey, UST Investigator License No. 0021905
- National Ground Water Association

Education

- B.A. Geology, State University of New York at Buffalo, 1997
- The Groundwater Pollution and Hydrology Control Course, Princeton Groundwater, Inc., March 2005
- Computer Aided Drafting, 50 hour, November 2003
- Brookhaven National Laboratory: Contractor/ Vendor Orientation, Radworker I course, Radworker II Contamination/High Contamination & Airborne Area course, and Radworker II High Radiation Area course, August 2001
- 40 hour OSHA 1910.120 Health & Safety Training, 1997

Fields of Competence

- Management of soil and ground water pollution investigations utilizing the Triad Approach
- Geologic and hydrogeologic analyses and interpretation
- Installation of monitoring well networks
- Stratigraphic analysis, correlation and interpretation
- Subsurface water quality monitoring
- Air Quality Monitoring
- Soil Vapor Extraction
- Air Sparging
- Tank removals and in-place closures
- Soil assessment and excavation
- Applied geophysics
- Multi-media sampling
- Aquifer Testing, Tidal Studies and Analysis

Key Projects

Managed a New York State Superfund, Remedial Investigation/Feasibility Study at an Inactive Hazardous Waste Site. The investigation was performed utilizing the Triad Approach to streamline project planning, site assessment, and cleanup activities. The Triad Approach was carried out by the collection samples at high frequency, rapid laboratory analyses and real time data analysis to minimize data gaps, minimize supplemental field activities, as well as minimize costly field mobilizations. Interim remedial measures included installation of sub-slab venting systems and an offsite soil vapor intrusion survey.

Managed remedial investigations for private industry client. Investigation results indicated significant methyl-tertiary butyl ether contamination in soil and ground water. Additional investigation and remediation are pending NYSDEC review. Chosen remedial methods are in situ stabilization/reduction.

Participated and managed several remedial projects at Brookhaven National Laboratory. Projects included: plume delineation of radiological and carbon tetrachloride contaminated ground water. Roles included field management supervision and project Safety Officer.

Field management of a RI/FS at a NYSDEC Inactive Hazardous Waste site in Buffalo, NY. Investigation included soil/water contamination investigations for volatile organic compounds, semi-volatile organic compounds, inorganics, PCBs, and installation of a well network.

Participated at Brookhaven National Laboratory Waste Management Divisions WAP sampling program. Responsibilities included handling of various hazardous and non-hazardous wastes for classification purposes. The quarterly sampling events were conducted in accordance with BNL waste sampling requirements.

Project Geologist responsible for the field oversight of an extensive Remedial Investigation (RI) and Soil IRM at the Fulton Avenue Superfund site located in Garden City Park, NY. Past discharges of chlorinated solvents (tetrachloroethene) have caused extensive ground water contamination in the Upper Glacial and Magothy aquifers. The RI focused on an extensive ground water vertical profiling task using temporary wells to further define the extent of ground water contamination within the Upper Glacial aquifer and the Magothy aquifer, and to select permanent ground water monitoring well locations and screen settings. The permanent ground water monitoring wells are part of a permanent monitoring and/or compliance point network within the Upper Glacial aquifer and the Magothy aquifer. The RI also included a the collection of synoptic ground water level data and ground water samples from over 60 ground water monitoring wells. The Soil IRM oversight included monitor the performance of a soil vapor extraction (SVE) and air sparging (AS) system to remove contaminants from the vadose zone soils and the shallow ground water table in the source area. Since the SVE/AS system went online in October 1998, approximately 10,000 pounds of tetrachloroethene has been removed from the ground.

Responsible for health and safety heat stress monitoring during the HFBR Monitored Natural Attenuation Project at Brookhaven National Laboratory. H&S oversight responsibilities included obtaining worker heart rate, blood pressure and temperature readings as dictated by wet bulb globe temperature (WBGT) index. Monitored worker fluid intake, and provided recommendations for modification of work/rest cycles, stop work, or other actions based on observations.

Responsible for writing and QA/QC for bi-annual and quarterly status reports and subsurface investigation reports for various clients.

Conducted subsurface investigation, evaluated hydrogeologic, geologic, and laboratory data to determine ground water and soil contamination. Recommended and sized remediation system options based on data evaluation.

Managed long-term operations, including scheduling of sampling and fieldwork. Evaluated effectiveness and performance of ground water & soil remediation systems.

Maintained direct communication with project managers from the NYSDEC and with private clients regarding status and performance of sites.

Conducted subsurface investigation with Geoprobe and various drill rigs. Performed various field testing air sparge pilot tests, vapor extraction pilot tests, pump tests, and slug tests.

Paulina Gravier

Ms. Gravier has over 6 years of Environmental Health and Safety (EHS) management and consulting experience. She has diverse experience in projects involving industrial hygiene, regulatory analysis, product stewardship, EHS compliance audits, human health risk assessment, EHS training, worker compensation management, EHS program development, environmental management information systems, mergers and acquisitions advisory services, integrated contingency plans, and site investigation and remediation. She has worked with a variety of private and public sectors, including telecommunications, biotechnology, printing and publishing, manufacturing, legal, entertainment, and consumer products, and retail industries.

Ms. Gravier's compliance expertise includes Phase I site assessments, Spill Prevention Control and Countermeasure plans (SPCCs), air emission inventories, and global regulatory reviews. In addition, Ms. Gravier has conducted human health risk assessments, in accordance with the *USEPA Risk Assessment Guidance for Superfund* (RAGS), *Volume I, Human Health Evaluation Manual*, to evaluate potential receptors at Superfund sites, where the main contaminants of concern were PCBs, tetrachloroethylene, and trichloroethylene. Local and state regulators were involved, as well as multiple consulting firms.

Ms. Gravier has extensive experience in managing and conducting comprehensive industrial hygiene investigations and developing corporate-wide health and safety programs compliant with OSHA regulations, such as respiratory protection, emergency response, and hearing conservation programs, as well as program implementation and training. She has assessed chemical, biological, and physical agents of concern at hazardous waste sites and industrial, commercial, and educational facilities. Extensive communication with corporate management, EHS managers, employees, insurers, brokers, consultants, laboratories, attorneys and underwriters, provides Ms. Gravier with a broad management view of various business sectors.

Registrations & Professional Affiliations

- American Industrial Hygiene Association (AIHA)
- American Association for Aerosol Research (AAAR)
- Certified Arkansas and Texas Workers' Compensation Field and Safety Representative (FSR)
- Pursuing Certification as a Chartered Property and Casualty Underwriter (CPCU 2, 3, and 5 passed) and as Certified Industrial Hygienist

Fields of Competence

- Industrial hygiene surveys and management
- Occupational health and safety program development
- Employee work task hazard evaluations
- Indoor microbial investigations
- Ventilation investigations related to IAQ issues
- Compliance and liability auditing
- HAZWOPER and emergency/spill response training
- Asbestos operations and management plans
- Human health risk assessment
- Environmental management information systems
- Phase I site assessments
- SARA reporting
- SPCC Plans
- Integrated Contingency Plans
- Product stewardship

Education

- M.S. Industrial Hygiene, New York University, 1999
- B.S. Chemistry/Biology, Providence College, 1996
- Professional Development Classes for the following: Indoor Air Quality, Metalworking Fluids, Industrial Hygiene Calculations, Ergonomics, Stack Emissions, and Advanced Design of Ventilation Systems

Key Projects

Managed and participated in a million dollar plus environmental compliance project for a large domestic based confidential client. As the state lead for Nevada, my key responsibilities included quality assurance and control of deliverable documents, such as permit applications, environmental discovery phase reports, and audit exception reports. The management role also involved direct communication with other environmental consultants, local and state agencies, and attorneys. Communicating key findings on a tight timeline was an essential component of this project, and these findings were discussed and resolved expeditiously to facilitate the corporate environmental compliance objectives of the client.

Developed Hazardous Materials Business Closure plans for industries specializing in high technology. These plans incorporate the requirements of the local fire departments, which have jurisdiction over the property transfers in counties of California. The management role involved project oversight during hazardous materials removal and/or decontamination activities performed by subcontractors, post decontamination verification sampling, and final closure plan submittals.

Conducted a quantitative human health risk assessment, in accordance with the USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual, to evaluate potential receptors at a California site, where the main contaminants of concern were trichloroethylene and vinyl chloride. Quantitative risk assessment was used to define pathways and actual risks posed to identify receptors and to assess and advise on the extent of corrective measures that may need to be applied. Being that the key route of exposure at the site was inhalation via indoor air, the Johnson & Ettinger Vapor Intrusion Model was used as part of the assessment. In managing the risk assessment work, direct communication and concurrence was required of toxicologists at the Cal-EPA Department of Toxic Substance Control (DTSC) as well as other risk assessors and project management.

Managed a partial risk assessment project for a California client with potential Proposition 65 notification concerns related to indoor air exposures of trichloroethylene. The trichloroethylene present in site groundwater as well as soil gas was quantitatively measured and assessed via the Johnson & Ettinger Vapor Intrusion Model. Model results were then converted and qualitatively compared to the Proposition 65 No Significant Risk Level (NSRL) value for trichloroethylene to determine posting needs.

Managed and participated in the annual updates of a Global Regulatory Matrix developed for a California-based biotech firm. The matrix was provided to the client via a web based environmental management information system (EMIS) specifically created by ERM and known as Dot Right®. Key global regulatory update issues were related to Commerce-Related Laws and Regulations Applicable to the International Transfer of Sensitive Technologies, exemptions and regulatory definitions related to Research & Development, and the Globally Harmonized System.

Conducted quantitative human health risk assessments, in accordance with the USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual, to evaluate potential receptors at two New York Superfund sites, where the main contaminants of concern were PCBs, tetrachloroethylene, and trichloroethylene. Quantitative risk assessment was used to define pathways and actual risks posed to identify receptors and to assess and advise on the extent of corrective measures that need to be applied. Extensive use and manipulation of the Johnson & Ettinger Vapor Intrusion Model was used as part of the assessments. Local and state regulators were involved as well as multiple consulting firms and attorneys.

Contributed to the strategic development of the corporate product stewardship program for an electronics manufacturer serving the telecommunications industry. Specific evaluations related to the proposed European regulations, the RoHS and WEEE Directives, which are soon to be implemented and are expected to have a major impact on the entire electronics industry supply chain during the next several years.

Managed and developed a baseline air monitoring survey for a California-based winery to determine OSHA compliance and to evaluate the need for engineering controls, interim respiratory protection, additional air monitoring, and administrative controls. Ongoing work with this client includes: the development and implementation of an OSHA compliant respiratory protection plan, collecting direct reading measurements for airborne carbon monoxide, performing a ventilation assessment within the barrel room, and establishing a worse case monitoring strategy for harvest time, such that potential contaminants, such as crystalline silica and sulfur dioxide, may be assessed when the largest quantities of these products are used at the facility.

Conducted quantitative human health risk assessments, in accordance with the USEPA Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual, to evaluate potential receptors at two New York Superfund sites, where the main contaminants of concern were PCBs, tetrachloroethylene, and trichloroethylene. Quantitative risk assessment was used to define pathways and actual risks posed to identify receptors and to assess and advise on the extent of corrective measures that need to be applied. Extensive use and manipulation of the Johnson & Ettinger Vapor Intrusion Model was used as part of the assessments. Local and state regulators were involved as well as multiple consulting firms and attorneys.

Contributed to the development of the Remedial Investigation (RI) report and Feasibility Study for a New York State Superfund site formerly occupied by a Cables Manufacturing Company and currently occupied by an entertainment production company. These reports were submitted to the New York State Department of Environmental Conservation. Items addressed in the comprehensive reports include, but are not limited to, ecological and human health risk assessments, surface and subsurface investigation results for contaminants such as PCBs, toxic metals, petroleum products, indoor lead assessments due to current facility occupancy, research related to historical fill and development of the site (Sanborn Maps and Aerial Photographs) and alternative PCB treatment and disposal technologies.

Managed and performed dozens of indoor air quality (IAQ) investigations for hospitals, office buildings, and apartment complexes. Some specific projects include the following: a remediation project at an apartment complex in New Jersey, which involved over 25 apartment units and the local health department; a newspaper publishing company contracted with ERM to determine the potential relationship between indoor air pollutants and the onset of cancer amongst the maintenance workers as well as perform a ventilation assessment within the potentially affected areas. After the reports were shared with employees, a two-hour question/answer session was conducted with ERM on behalf of the employer to discuss the findings in detail and provide verbal assurance.

Conducted dozens of Phase I site assessments as part of ERM's mergers and acquisitions advisory services. In addition, managed over 20 Phase I site assessments across the United States for a merger and acquisition project involving a wholesale grocer. Extensive communication with all transaction partners, such as corporate EHS management and lawyers.

Managed and evaluated the extent of pigeon contamination within the ventilation system of a newly renovated building in downtown Manhattan. The construction management company overseeing the project renovation contracted ERM. This assessment involved collecting microbial samples as well as performing cleaning and sanitizing activities for the affected ductwork. Due to the potential sensitive receptors, immuno-compromised individuals in the building, meetings were held with management to clearly address employee concerns.

Managed and conducted numerous OSHA compliance monitoring surveys that involved evaluating chemical, biological, and physical agents of concern, such as welding fumes, metalworking fluids, silica, styrene, methyl ethyl ketone, asbestos, fiberglass, lead, methylene chloride, PAHs, noise, toxigenic mold, radon, heat stress, ergonomics, etc.

Provided technical support and training for the field Health and Safety Coordinator at a demolition project in Utica, NY. The training involved the use of direct reading instruments, such as the MiniRam and Photoionization Detectors, for performing the required air monitoring at the site. Developed the site specific Health and Safety Plan (HASP), which provided details regarding key items such as the contaminants of concern, exclusion zone air action levels, and community air monitoring plan. Also developed dozens of other site specific HASPs.

Assisted in the development of a Spill Prevention Control and Countermeasures Plan (SPCC) for an asphalt manufacturing plant. This comprehensive plan addressed items such as secondary containment for above ground storage tanks and emergency response procedures.

Developed, managed, and implemented a written hazard communication and respiratory protection program for the facilities engineering department at a printing & publishing company. In addition, an interactive training seminar and respirator fit testing session were held to comply with OSHA requirements and clearly communicate the elements of these programs to the affected employees. Items addressed during the presentation include spill response procedures, personal protective equipment, Material Safety Data Sheets, and labeling. A mock spill was used to facilitate the training process.

Reviewed numerous industrial hygiene reports in regards to a preacquisition project for a confidential client. Key items addressed during the review were OSHA violations and worker compensation claims related to employment at the client site.

Managed and assisted in the development of an Integrated Contingency Plan (ICP) for a New York Newspaper Publishing Company. The ICP provides a single guidance document for emergency preparedness and response. Regulations addressed in the ICP include, but are not limited to, USEPA's Oil Pollution Prevention Regulation (SPCC only) - 40 CFR 112.7; USEPA's Resource Conservation and Recovery Act (RCRA) Contingency Planning Requirements - 40 CFR 264, 265, and 279.52;OSHA's Emergency Action Plan Regulation - 29 CFR 1910.38; and OSHA's HAZWOPER Regulation - 29 CFR 1010.120.The ICP addressed potential emergency situations; procedures to minimize hazards to human health and the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous materials to air, soil or surface water; and protocols for familiarizing local emergency response personnel (i.e., police, fire and rescue departments, hospital, and local government agencies) with the types of materials handled and initial emergency response procedures at the facility.

Andrew Coenen

Mr. Coenen has 13 years of general analytical chemistry experience, 6 years of analytical laboratory experience, and 7 years of environmental consulting experience, including analytical data validation, sampling and analysis programs, quality assurance programs, technical support, and QA oversight for fixed laboratory and field analysis. Mr. Coenen has knowledge of numerous analytical methodologies and experience in data validation of analytical data package deliverables for adherence to USEPA CLP and non-CLP, NYSDEC ASP, and NJDEP protocols. He is proficient with GIS/Key environmental management software and has operated a mobile gas chromatograph laboratory used to test soil and water samples for quick-turn volatile analysis.

Fields of Competence

- Analytical data review and validation
- Environmental database management (GIS/Key)
- Laboratory Subcontractor Management
- Analytical protocols for pollutants by USEPA methodologies
- Methods of analysis of organic and inorganic parameters
- Review and preparation of QA/QC plans
- Field analytical techniques
- Multi-Media Sampling

Education

- 8-Hour OSHA Annual Refresher Training, 1999 - current
- Rutgers University / Cook College - NJDEP Using GIS for Environmental Evaluations, October 1999
- 40-Hour OSHA [29 CFR 1910.120 (e) (2)] Health and Safety Training, 1998
- Computer Aided Drafting, 50-Hour Course, Island Drafting and Technical Institute, 1998
- Immunoassay Testing Training Program, Strategic Diagnostics Inc., 1998
- B.S. Chemistry, University of Michigan, 1991

Key Projects

Data validation for numerous projects located in New York, New Jersey, Pennsylvania, Illinois, Massachusetts, Indiana, and Wisconsin, involving evaluation of aqueous, soil, sediment, leachate and air samples analyzed by USEPA Contract Laboratory Protocols, New York State DEC Contract Laboratory and Analytical Services Protocols and SW-846 methodologies for organic, inorganic, wet chemistry parameters, TPH and various other analyses.

Reviewed sampling and laboratory chemical data for adherence to New Jersey Department of Environmental Protection protocols on numerous projects. Also constructed electronic deliverables for submission to NJDEP in required haz-deliverable format.

Database construction & management for numerous investigations utilizing GIS/Key software. Compiled field and laboratory data and generated result summary tables, contours, isopleths, contaminant plume maps, cross-sections and boring logs.

Prepared numerous Sampling and Analysis Plans (SAPs) and Quality Assurance Project Plans (QAPPs) for adherence to state and federal guidelines.

Project management and technical support for Special Analytical Services required to delineate low-level PAH contamination at a Superfund Site. This included method development and validation of a Selected Ion Monitoring (SIM) GC/MS technique.

Utilized Immunoassay test kits for field measurement of PCB contamination at the former Brooklyn Navy Yard, Brooklyn, New York. Performed data validation of all field analytical samples and off-site laboratory samples and compared off-site results to test kits.

Conducted subsurface investigations with a Geoprobe. Performed various field tests.

Supervision of tank removal and subsequent soils evaluation for contamination.

Michael B. Mattern

Environmental Scientist

Mr. Mattern has more than 4 years of diversified experience in the environmental field specializing in hydrogeology, waste and potable water treatment, nutrient management, hazardous waste management/ remediation and water supply. Diverse project experience including oxidizer injections, monitoring well installation and site remediation. Strong background in wastewater and industrial regulations.

Certifications & Training

- 40-Hour OSHA 1910.120 Health and Safety Training, 2000
- 8-Hour OSHA Supervisory Training For Level A Activities, 2000
- 8-Hour OSHA Annual Refresher Training, current
- 10-Hour OSHA General Industry Health and Safety Training, 2000
- Exxon Mobile Certified, 2003
- Confined spaced trained, 2000 - current
- Level IV Waste Water Certification, 2000
- Level III Potable Water Certification, 2000
- CPR Certification

Fields of Competence

- IBM, Windows, Microsoft, Internet, some AutoCAD)
- Field sampling and recording
- Selective chemical testing
- First Aid, Child and Adult CPR, Life Saving
- Forensic photographer
- Chemical handling
- Emergency Response
- Well versed in Environmental Regulations
- Nutrient management
- Potable water testing
- Well head protection
- Fork lift license
- Health and Safety Officer of Site Investigations
- Air Quality Investigations and Monitoring

Education

- Currently pursuing M.S. Environmental Science, Adelphi University, New York
- B.A. Environmental Studies and Anthropology, Adelphi University, New York, 2003

Key Projects

Participated in a Sodium Permanganate injection to aid in the remediation of a site laden with Mercury, Chromium, and TCE contaminated soils and ground water.

Preformed an injection of the Oxidizer Perm-Ox to aid in the aerobic digestion of Fuel oil #2 at residential location. Also acted as the site Manager and the health and safety officer.

Field Manager and site health and safety officer during instillation of multi-level Waterloo System wells. Included soil logging, monitoring well installation, oversight and ground water sampling.

Conducted several investigations of nutrient uptake of crops in an investigation and feasibility studies of pelletized chicken litter being used as a fertilizer.

Participated in a study to assess the feasibility of powering a Co-Generation plant using chicken litter and sludge generated in a DAF (Dissolved Air Floatation Unit). After test showed positive, I results aided in the engineering of the blue prints of a 5 mega-watt Co-generation plant.

Figures

FIGURE 5-1

GLEN HEAD GROUNDWATER PLUME SC ORGANIZATIONAL CHART