New York State Department of Environmental Conservation

Site Characterization Work Plan

South End Place
Freeport, Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
NYSDEC Work Assignment No. D003970-28

October, 2000

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

SITE CHARACTERIZATION WORK PLAN

South End Place
Freeport
Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
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October, 2005

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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1.0 INTRODUCTION

Environmental Resources Management (ERM) is pleased to submit this Site Characterization (SC) Work Plan (WP) for South End Place Investigation Area in Freeport, Township of Hempstead, Nassau County, New York (the Site). This WP has been prepared in accordance with the:

- Specifications set forth in the 21 October 2003 New York State Department of Environmental Conservation (NYSDEC) State Superfund Engineering Services Standby Contract, Work Assignment #: D003970-28;

Task 1 of the Work Assignment (WA) was the preparation of this comprehensive WP and Health and Safety Plan (HASP), which defines all necessary operating parameters, procedures and protocols for performance of the SC. The WP is intended to:

- Identifies the overall objectives of the SC;
- Identifies and describes both the technical approach and Scope of Work of the SC;
- Defines procedures and protocols for sampling and analysis, quality assurance (QA)/quality control (QC), and health and safety that will be used in field operations associated with the SC;
- Establishes data management and presentation guidelines;
- Establishes progress and final reporting guidelines;
- Presents the overall anticipated project schedule;
- Identifies key project team members and their corresponding responsibilities and management/QA/QC roles on the project;
- Identifies subcontractor needs in concert with the minority business/women-owned business usage requirements; and
- Presents the detailed budget for this WA.

This document is intended to be followed by all personnel working on the SC to ensure the generation of reliable data and measurement activities such that the resultant data and evaluations are scientifically valid, defensible, comparable, and of known precision and accuracy.

1.1 PURPOSE AND OBJECTIVES

The purpose of this Work Assignment is to conduct a Site Characterization (SC) study of the South End Place Investigation Area (SEPIA). A Remedial Investigation/Feasibility Study (RI/FS) was

previously conducted at the Metal Etching Company Site (a Class 2 Site listed on the NYSDEC Registry of Inactive Hazardous Waste Sites [No. 1-30-110], located at 435 South Main Street in Freeport, Nassau County, adjacent to Freeport Creek). Soil vapor sampling conducted during the Metal Etching RI/FS revealed the presence of subsurface vapors contaminated with off-site 1,1,1-trichloroethane (TCA) at several soil gas-sampling points along South End Place. TCA was not identified as a contaminant of concern during the Metal Etching RI/FS. The SC is designed to determine the nature and extent of groundwater, soil vapor and indoor air TCA contamination, and identify and investigate facilities with past operations and/or disposal practices within the investigation area.

1.1.1 *Site Setting*

The South End Place investigation encompasses an area that includes several occupied residences and businesses in Freeport. The investigation area includes both commercial and residential properties. See Figure 1-1 for Site Area Location Map.

The investigation area is approximately 4 acres, bounded by South Main Street to the west, Atlantic Avenue to the north, Freeport Creek to the east, and Ray Street to the south. The approximate coordinates of the central portion of the Investigation area are 040° 38′ 46.40″ N and 073 °.34′ 30.22″ W. See Figure 1-2 for Investigation Area Site Plan.

1.1.2 *Site History*

At this time, there is no specific property identified as the source of the TCA subsurface vapor plume at this time. The TCA appears to be from a source unrelated to the former Metal Etching Company.

1.2 SITE HYDROGEOLOGY

The SEPIA is located adjacent to Freeport Creek at an elevation of five (5) feet above mean sea level (msl). Local hydrogeology is influenced by this surface water body. Consequently, groundwater in the area is shallow, approximately four (4) feet below ground surface (bgs). The topography of the area generally dips gently southward towards the Atlantic Ocean.

The Site is underlain by glacial outwash deposits that generally consist of varying amounts of sand, silt, and clay. The "twenty-foot clay" is presumably present beneath the SEPIA at a depth of 30 to 35 feet below ground surface. The glacial outwash deposits are more than 100 feet thick in the area. The glacial outwash is underlain by the Magothy formation, also called the Magothy Aquifer. The Magothy Aquifer is made up of

sand and gravel with intermittent beds of clayey sands and is considered a sole source aquifer. In many areas along the south shore of Long Island the Gardiners Clay formation lies between the Magothy and the upper glacial outwash deposits. However, it is generally understood that the upper glacial deposits are hydraulically connected to the Magothy Aquifer and most of the recharge to the aquifer is through infiltration. Water supply wells (Nassau County Water Authority Well Field) are located within a mile northwest (upgradient) of the Site.

Previous studies conducted in Nassau County indicate that the hydraulic conductivity of the shallow soils in the area is on the order of 250 feet/day and groundwater flow is toward the southeast under a regional gradient of 0.00125 feet/feet.

2.0 SITE CHARACTERIZATION SCOPE OF WORK

The SC Scope of Work, is based on the tasks identified in the WA.

2.1 TASK 1: SITE CHARACTERIZATION WORK PLAN PREPARATION

Task 1 of the WA was the preparation of this WP. The purpose, objectives and intent of this WP were discussed in Section 1.0.

2.2 TASK 2: PRIMARY SITE CHARACTERIZATION

The Scope of Work contemplated by the WA involves an investigation that includes:

Data and Records Search: Available historic information (documents, maps, aerial photos, building permits, reports, etc.) will be located and reviewed. ERM will review all available background information in accordance with Appendix 3A of the Draft DER-10 "Technical Guidance for Site Investigation and Remediation" to identify local users of TCA. This review will include NYSDEC Region 1, NYSDEC Central office and local/county files. A review of County, State and Federal environmental databases will be conducted to identify users or handlers of TCA in and around the Site Characterization Area

Base Map Development: An aerial image generated from the New York State/GIS Data/Orthoimagery Site will be utilized for the site investigation area base map. Before initiation of field activities, a base map of the immediate vicinity will be developed. All geo-spatial data will be referenced to the North American Datum 1983 (NAD83) and UTM projection. The horizontal grid will be correctly oriented and displayed on the base map. The base map will be used to accurately plot all sample locations, groundwater flow directions, and other items of significance.

Shallow Subsurface Soil Vapor Points: Using direct-push sampling methodologies, seven- (7) soil vapor samples will be collected. Soil vapor samples will be collected along two (2) transects within the 4-acre SEPIA. The first transect will be installed along the west side of South Main Street between Ray Street and Atlantic Avenue. The second transect will be performed along Atlantic Ave from its intersection with South Main Street east toward Freeport Creek.

Each sample will be submitted to a NYSDOH ELAP-certified laboratory for Volatile Organic Compound (VOC) analyses using United States Environmental Protection Agency (USEPA) Method TO-15.

Shallow Groundwater Samples: Using direct-push methodologies, seven- (7) temporary one (1)-inch monitoring wells/peizometers will be installed along the same two (2) transects described above within the 4-acre SEPIA. Shallow groundwater samples will be collected from each of the newly installed temporary wells by USEPA purge and sampling techniques. Each sample will be submitted to a NYSDOH ELAP-certified laboratory for VOC analyses using United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) Statement of Work (SOW) Organic Low Concentration (OLC) 03.2.

Indoor Air Samples: Indoor air samples will be collected from the basements and first floors of three (3) occupied residential structures at the north end of South End Place; see Figure 2-1 for sample locations. The samples will be collected over a 24-hour period. Each sample will be submitted to a NYSDOH ELAP-certified laboratory for VOC analyses using United States Environmental Protection Agency (USEPA) Method TO-15.

Survey: At the completion of field sampling activities a New York State licensed surveyor will establish the location and elevation of each newly installed soil vapor sampling location. Elevations of all temporary well casings and ground surface elevation of each groundwater sample location and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, based on North American Datum 1983 (NAD83) and UTM projection. Each sample location or relevant feature will be plotted on the aerial image base map.

Data Usability Summary Report(DUSR): All air and groundwater 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.

Supplemental/Contingency Sampling: Upon completion of the primary SC field activities, the analytical data will be evaluated and recommendations for additional investigative activities to fill identified data gaps recommended. Supplemental subsurface investigations may include soil vapor, groundwater, indoor air, basement air and sub-slab vapor samples.

The core field investigative activities of the SC are discussed in Subtasks 2A through 2I 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).

Strict 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.) will be located and reviewed. Information sources may include NYSDEC's Region 1 and Central Office (Albany) files, the Town of Hempstead, Village of Freeport, and Nassau County Health Department (NCHD) files. Additional potential sources and areas of contamination will be identified, if possible.

Additionally, ERM will subcontract Environmental Data Resources, Inc. (EDR) to search for agency records. The report will define and summarize the American Society of Testing Materials (ASTM) databases reviewed in the EDR report and note if any sites were identified in the specified radius. Historical aerial photographs, historic topographic maps will be summarized.

2.2.2 *Subtask 2B: Underground Utility Markouts*

Underground utility markouts will 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 Hempstead, Village of Freeport, 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.

2.2.4 *Subtask 2D: Soil Gas Sampling*

To assess the potential for migration of VOCs, emanating from impacted groundwater at the water table surface or nearby soil sources, soil gas samples will be collected at each of the designated sample locations using geoprobe temporary soil gas implants, see Figure 2-1 for sample locations. The soil gas implants will be installed via geoprobe rods to a depth of approximately three (3) to four (4) feet below ground surface. Once the temporary soil gas implant has been installed soil gas sampling will commence. 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.1	SOP 1 Soil Gas Sampling Using Summa Canisters

2.2.5 *Subtask 2E: Temporary Monitoring Well Installations and Shallow Groundwater Sampling*

Shallow groundwater samples will be collected at each of the designated temporary well locations, see Figure 2-1 for sample locations. Using direct-push methodologies, seven- (7) temporary one (1)-inch monitoring wells/peizometers will be installed along the same two (2) transects of the soil vapor samples within the 4-acre Investigation area.

Once the temporary monitoring wells have been installed, shallow groundwater samples will be collected from each of the newly installed temporary wells using USEPA purge and sampling methods. Each groundwater sample will be analyzed for VOCs using CLP Method OLC03.2.

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.2	SOP 2 Temporary Monitoring Well Installation for Groundwater Sampling
A.4	SOP 4 Water Level Measurement Procedure
A.5	SOP 5 Groundwater Sampling
A.6	SOP 6 Groundwater pH And Temperature
A.7	SOP 7 Measurement Of Groundwater Specific Conductance
A.8	SOP 8 Measurement Of Groundwater Turbidity
A.9	SOP 9 Measurement Of Groundwater Dissolved Oxygen

2.2.6 *Subtask 2F: Air Sampling*

To assess the potential for migration of VOCs, emanating from impacted groundwater at the water table surface or nearby soil sources, indoor air samples will be collected from the first floor and basement of the three (3) occupied residential structures on South End Place; see Figure 2-1 for sample locations. A total of two (2) outside ambient air samples will be collected from outside the residential structures. In addition sub-slab samples will also be collected from each of the occupied residential structures (based on investigation performed in the area, the water table is expected to be shallow and therefore sub-slab samples would not be possible). All first floor air/basement air samples and sub-slab samples will be collected using summa canisters equipped with timed sample acquisition regulators set for 24-hour collection. All ambient air 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.3	SOP 3 New York State Department of Health Indoor Air Sampling & Analysis Guidance, December 8, 2004

2.2.7 *Subtask 2G: Site Survey*

At the conclusion of SC field activities, a New York State-licensed surveyor will survey the Investigation area to locate all sampling points including soil gas and shallow groundwater samples. The elevations of all temporary well casings will be established to within +/- 0.01 feet based on the NGVD 86 datum.

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

2.2.8 *Subtask 2H: 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 SC (if any). Waste generated during the investigation is expected to consist of trash (boxes, paper, etc.), decontamination wash water, groundwater 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:

Liquids generated from equipment decontamination, temporary groundwater well purging will be discharged to the ground at the point of generation.

- 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.
- Non-contaminated trash, debris and protective clothing will be placed in an ERM trash dumpster and disposed of by a local garbage hauler.

2.2.9 *Subtask 2I: 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. ERM's QA/QC Officer will conduct a Usability Analysis. A Data Usability Report will be submitted to the NYSDEC along "Category B Deliverables" for all laboratory analytical work.

2.3 TASK 3: SITE CHARACTERIZATION SUPPLEMENTAL INVESTIGATION

Based upon the findings of the Primary SC, Supplemental activities may be implemented at the discretion of the DEC. The Supplemental SC investigation will continue to evaluate the nature and extent of contamination in the SEPIA and its threat to human health or the environment. During the Supplemental Investigation ERM may be asked to complete the following subtasks:

Soil Gas Sampling: To further assess the potential for migration of VOCs, emanating from impacted groundwater at the water table surface, additional soil gas samples may be required at locations to be determined based on the results of the primary SC activities.

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.1	SOP 1 Soil Gas Sampling Using Summa Canisters

Shallow Groundwater Sampling: To further define shallow groundwater impacts, shallow groundwater samples may be required at additional locations by installing additional temporary monitoring wells. Using direct-push methodologies, temporary one (1)-inch monitoring wells/peizometers may be installed at locations to be determined based on results of the Primary SC. Shallow groundwater samples may be collected from each of the newly installed temporary wells by USEPA purge and sampling methods. Each groundwater sample will be analyzed for TCL VOCs using CLP Method OLC03.2.

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.2	SOP 2 Temporary Monitoring Well Installation for Groundwater Sampling
A.4	SOP 4 Water Level Measurement Procedure
A.5	SOP 5 Groundwater Sampling
A.6	SOP 6 Groundwater pH And Temperature
A.7	SOP 7 Measurement Of Groundwater Specific Conductance
A.8	SOP 8 Measurement Of Groundwater Turbidity

Sub-Slab Basement Sampling: To assess the potential for migration of VOCs, emanating from impacted groundwater at the water table surface, sub-slab basement soil gas samples may be required from the three occupied residential structures (if sample collection is possible beneath the slab based on depth to groundwater and structure construction details). All basement sub-slab soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators set for 24-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.1	SOP 1 Soil Gas Sampling Using Summa Canisters
A.3	SOP 3 New York State Department of Health Indoor Air Sampling & Analysis Guidance, December 8, 2004

Survey: At the conclusion of all SC field activities, a New York State-licensed surveyor will survey the Investigation area to locate all sampling points including soil gas and shallow groundwater samples. The elevations of all temporary well casings will be established to within +/- 0.01 feet based on the NGVD 86 datum.

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

Data Validation/Usability Report: All air and groundwater 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.

2.4 TASK 4: SITE CHARACTERIZATION REPORT PREPARATION

The SC Report will be prepared following completion of all 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 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 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.
- Exposure Assessment: An exposure assessment will be completed in accordance with NYSDEC and NYSDOH guidance. This is a qualitative assessment of the possible exposure routes for contaminants and potentially affected receptors based VOC contaminants found in sample media.
- 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.

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.

4.0 DETAILED WORK ASSIGNMENT SCHEDULE

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

The schedule contemplates a 31 October 2005 start for field activities assuming the Notice-To-Proceed is issued by NYSDEC on or before 24 October 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 Hempstead;
- 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.

5.0 PROJECT STAFFING PLAN

Staffing for the South End Place SC will be from ERM's Melville New York, and New York City Offices. Figure 5-1 presents the SEPIA personnel organizational chart

While all personnel involved in an investigation and in the generation of data are implicitly a part of the overall project management and QA program, certain members of the Project Team have specifically designated responsibilities. Project Team members with specific management and QA roles in the SC are the Remediation Project Manager (RPM), the ERM Project Director (PD), the ERM Project Manager (PM), the ERM Field Team Leader (FTL) and the ERM QA/QC Officer. In the following sections, the roles and responsibilities of key personnel are identified.

5.1 NYSDEC REMEDIATION PROJECT MANAGER

The RPM, Mr. Kevin Carpenter is the lead technical representative of the NYSDEC.

5.2 ERM PROJECT DIRECTOR

The ERM PD, Dr. Gregory Shkuda, Ph. D., will report to the RPM. Dr. Shkuda will oversee the ERM PM, and be responsible for all technical aspects of the project including the overall quality of the project and project deliverables for ERM. Dr. Shkuda has extensive experience with the management and coordination of multi-disciplinary RI/FS and remedial projects in New York State.

5.3 ERM PROJECT MANAGER

The ERM PM, Mr. Michael Mendes, will report to the ERM PD and the RPM. Mr. Mendes will oversee the ERM QA/QC Officer and the ERM FTL, field investigation staff, and any subcontractors. Mr. Mendes will also be responsible for all technical aspects of the project for ERM. This includes scheduling, communicating to the RPM and the ERM PD, technical development and review of all field activities, subcontracting, and the overall quality of the project and project deliverables for ERM. Mr. Mendes will be the primary contact between ERM and NYSDEC, as directed by the RPM. Mr. Mendes has extensive experience in the

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.

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 South End Place Site Characterization Investigation Area 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)

- ***Land Surveying Services***
  - Donald G. DeKenipp L.S., P.C.

- ***Laboratory Services***
  - Severn Trent Laboratories (STL)

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.

7.0 DETAILED WORK ASSIGNMENT BUDGET

The Detailed Work Assignment Budget is presented using NYSDEC 2.11 Forms. The Budget is broken down by tasks and subtasks that detail the anticipated labor, expenses and subcontractor charges for each task and/or subtask.

Schedule 2.11 (a)

Summary of Work Assignment Price

Work Assignment Number D003970-28

1)	Direct Salary Costs (Schedules 2.10(a) and 2.11 (b))	$16,072
2)	Indirect Costs (Schedule 2.10(g))	$26,037
3)	Direct Non-Salary Costs (Schedules 2.10 (b)(c)(d) and 2.11(c)(d))	$4,916
4)	Subcontractor Costs	

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

Name of Subcontractor	Services To Be Performed	Subcontract Price
i) N/A		
ii)		
iii)		

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 Performed	Subcontract Price
i) Delta Well & Pump Co., Inc.	Drilling Services	$ 11,750.00
ii) Donald G. DeKennip L.S., P.C.	Surveying	$ 3,900.00
iii) STL - Conneticut	Analytical Services	$ 9,210.00
iv) EDR	Database Research	$ 400.00

B) Total Unit Price Subcontracts $25,260

5)	SubcontractManagement Fee (Only for Unit Price Subcontracts >$10,000)	$588
6)	Total Subcontract Costs (lines 4A + 4B + 5)	$25,848
7)	Fixed Fee (Schedule 2.10(h))	$2,948
8)	Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)	$75,821

Engineer/Contract #: C003970

Date Prepared: 08 August 2005

Project Name; South End Place

Work Assignment No. DD003970-28

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 2002)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1 Work Plan Preperation				22		44	20			23	109
Task 2 Site Characterization Field Work				12		40	140				192
Task 3 Site Characterization Report			16	16		104	50				186
Task 1 Work Plan Preperation	$0.00	$0.00	$0.00	$1,041.26	$0.00	$1,505.68	$480.40	$0.00	$0.00	$369.84	$3,397.18
Task 2 Site Characterization Field Work	$0.00	$0.00	$0.00	$567.96	$0.00	$1,368.80	$3,362.80	$0.00	$0.00	$0.00	$5,299.56
Task 3 Site Characterization Report	$0.00	$0.00	$817.92	$757.28	$0.00	$3,558.88	$1,201.00	$0.00	$0.00	$0.00	$6,335.08
Total Hours	0	0	16	50	0	188	210	0	0	23	**487**
Total Direct Labor Cost ($)	$0.00	$0.00	$817.92	$2,366.50	$0.00	$6,433.36	$5,044.20	$0.00	$0.00	$369.84	**$15,031.82**

Engineer/Contract #: C003970 Date Prepared:
Project Name; South End Place
Work Assignment No. DD003970-28

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 2002)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1				2		4				3	9
Task 2				2		8				4	14
Task 3				2		4				6	12
Task 1	$0.00	$0.00	$0.00	$94.66	$0.00	$136.88	$0.00	$0.00	$0.00	$48.24	$279.78
Task 2	$0.00	$0.00	$0.00	$94.66	$0.00	$273.76	$0.00	$0.00	$0.00	$64.32	$432.74
Task 3	$0.00	$0.00	$0.00	$94.66	$0.00	$136.88	$0.00	$0.00	$0.00	$96.48	$328.02
Total Hours	0	0	0	6	0	16	0	0	0	13	**35**
Total Direct Labor Cost ($)	$0.00	$0.00	$0.00	$283.98	$0.00	$547.52	$0.00	$0.00	$0.00	$209.04	**$1,040.54**

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: D003970-28

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	$0.41	mile	50	$20.25
Task 2				
Shipping	$25.000	each	6	$150.00
Field Phone	$15.00	day	20	$300.00
Computer CADD	$7.00	hr	10	$70.00
Mileage	$0.49	mile	1500	$727.50
Computer Admin	$1.00	hr	20	$20.00
Low Value Equipment	$0.80	field hour	120	$96.00
Task 3				
Copies	$0.020	copy	2000	$40.00
Computer Admin	$1.00	hr	100	$100.00
Computer CADD	$7.00	hr	20	$140.00

Total Direct Non-Salary Costs $1,853.75

Work Assignment No. D003970-28

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])
				$ -
N/A				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			TOTAL	$ -

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

Work Assignment No. D003970-28

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)
N/A		$ -				$ -
Field Van	$ 17,000.00	$ 67.00	$ 22.00	$ 45.00	12	$ 804.00
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
					TOTAL	$ 804.00

*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.

Work Assignment No. D003970-28

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	$ 168.00	week	2	1	$ 336.00
PID Minirae 2000	$ 122.50	week	2	1	$ 245.00
YSI 600XL Groundwater Sampler	$ 192.50	week	1	1	$ 192.50
Lamotte 2020 Turbidity Meter	$ 52.50	week	1	1	$ 52.50
Waterra Pump	$ 210.00	week	1	1	$ 210.00
Solinst Interfact	$ 105.00	week	2	1	$ 210.00
Sensidyne GilAir 5	$ 52.50	week	2	1	$ 105.00
MARK Helium Detector	$ 300.00	week	1	1	$ 300.00
		TOTAL	12		$ 1,651.00

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

Work Assignment No. D003970-28

Schedule 2.11(d) 4

Site-Dedicated Equipment

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

Work Assignment No. D003970-28

Schedule 2.11(d) 5

Consumable Supplies

Item	Estimated Quantity	Unit Cost ($)	Total Budged Cost ($) (Col. 2 x 3)
Gloves	300	$ 0.30	$ 90.00
Ear Plugs	20	$ 0.30	$ 6.00
Distilled Water (5 gallon)	10	$ 35.36	$ 353.60
Alcanox	1	$ 2.50	$ 2.50
Survey flags	15	$ 0.40	$ 6.00
Paper towels	2	$ 1.30	$ 2.60
Plastic Bags (heavy duty)	10	$ 1.75	$ 17.50
Packing tape	2	$ 2.50	$ 5.00
Sampling tubing	200	$ 0.33	$ 66.00
VOC Sampler	15	$ 0.90	$ 13.50
Isobutylene	1	$ 45.00	$ 45.00
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
		TOTAL	$ 607.70

Schedule 2.11 (e)
Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D003970-28

Name of Subcontractor	**Services to be Performed**	**Subcontract Price**
N/A		

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 D003970-28

Name of Subcontractor	**Services to be Perormed**	**Subcontract Price**	**Management Fee**
Delta Well & Pump Co., Inc.	Drilling Services	$11,750.00	$ 587.50

Item	Max. Reimbursement Rate	Units	Est. No. of Units	Total Est. Cost
Geoprobe Day Rate	1,100.00	total	7	$7,700.00
Utility Mark Out (One Call Center-County/Village/Sewer/Water)	150.00	total	1	$150.00
Sidewalk/Road Opening Permits in Freeport, New York	175.00	total	3	$525.00
Shallow Soil Gas Temporary Implant Points (Less than 4 foot in depth)	25.00	total	12	$300.00
One inch ID Screened PVC for Temp wells/Peizometers	4.00	feet	150	$600.00
Monitoring/Micro Well Surface Completions (if necessary)	125.00	total	15	$1,875.00
Concrete/Asphalt Coring (if Necessary)	150.00	total	4	$600.00
55 Gallon DOT Drums (if Necessary)	50.00	total	0	$0.00
Standby Time	120.00	total	0	$0.00

Subtotal Subcontract Price	$11,750.00
Subcontract Management Fee	$ 587.50
TOTAL	$ 12,337.50

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-28

Name of Subcontractor	**Services to be Perormed**	**Subcontract Price**	**Management Fee**
Donald G. DeKennipp L.S., P.C.	Surveying	$3,900.00	$ -

Item	Max. Reimbursement Rate	Units	Est. No. of Units	Total Est. Cost
Survey Horizontal and Vertical to .01 ft Acc. Primary SC Activities	$ 1,950.00	each	1	$ 1,950.00
Survey Horizontal and Vertical to .01 ft Acc. Supplemental Activities	$ 1,950.00	each	1	$ 1,950.00

Subtotal Subcontract Price	$3,900.00
Subcontract Management Fee	$ -
TOTAL	$ 3,900.00

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-28

Name of Subcontractor	**Services to be Perormed**	**Subcontract Price**	**Management Fee**
Severn Trent Laboratory - Conneticut	Analytical	$ 9,210.00	$ -

Item	Max. Reimbursement Rate	Units	Est. No. of Units	Total Est. Cost
Primary SC Activities				
2-hour Soil Gas Samples (7 locations plus Duplicate) TO-15 (including Summa Canisters and Flow controllers)	$250.00	Air	10	$ 2,500.00
Groundwater Samples from Temp Wells (7 locations, DUP, MS/MSD, FBs,TBs) analyzed for TCL VOCs by CLP SOW OLC03.2	$70.00	Aqueous	14	$ 980.00
24-hour Indoor /Basement Air Sampling from 3 occupied residences TO-15 (including Summa Canisters and Flow controllers)	$250.00	Air	9	$ 2,250.00
Supplemental/Contingency SC Activites				
Supplemental Soil Gas Sample points/Sub Slab vapor samples from three (3) occupied residences (if necessary) analyzed for TO-15 (including Summa Canisters and Flow controllers)	$250.00	Air	10	$ 2,500.00
Supplemental Groundwater Samples with QA/QC analyzed for TCL VOCs by CLP SOW OLC03.2	$70.00	Aqueous	14	$ 980.00
Subtotal Subcontract Price				$ 9,210.00
Subcontract Management Fee				$ -
TOTAL				$ 9,210.00

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-28

Name of Subcontractor	**Services to be Perormed**	**Subcontract Price**	**Management Fee**
Environmental Data Resources Inc. (EDR)	Database Research	$400.00	$ -

Item	Max. Reimbursement Rate	Units	Est. No. of Units	Total Est. Cost
EDR Report (including	$ 400.00	each	1	$ 400.00

Subtotal Subcontract Price	$400.00
Subcontract Management Fee	$ -
TOTAL	$ 400.00

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

Page _____ of _____

Engineer	ERM	Date Prepared	
Contract Number	C003970	Billing Period	
Project Name	South End Place	Invoice No.	
Work Assignment No.	D003970-28		
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				$ -		$ -	$ 16,072.36	$ 16,072.36
2. Indirect Costs 1.62%	$ -			$ -		$ -	$ 26,037.22	$ 26,037.22
3. Subtotal Direct Salary Costs and Indirect Costs	$ -			$ -		$ -	$ 42,109.58	$ 42,109.58
4. Travel	$ -			$ -		$ -	$ 747.75	$ 747.75
5. Other Non-Salary Costs	$ -			$ -		$ -	$ 4,168.70	$ 4,168.70
6. Subtotal Direct Non-Salary Costs	$ -			$ -		$ -	$ 4,916.45	$ 4,916.45
7. Subcontractors	$ -			$ -		$ -	$ 25,847.50	$ 25,847.50
8. Total WA Costs	$ -			$ -		$ -	$ 72,873.53	$ 72,873.53
9. Fixed Fee	$ -			$ -		$ -	$ 2,947.67	$ 2,947.67
10. Total WA Price	$ -			$ -		$ -	$ 75,821.20	$ 75,821.20

Project Manager (Engineer) _____ Date _____

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

Page _____ of _____

Engineer ERM
Contract Number C003970
Project Name South End Place
Work Assignment No. D003970-28
Task No./Name Task 1 - Work Plan
Complete %

Date Prepared _____
Billing Period _____
Invoice No. _____

	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				$ -		$ -	$ 3,676.96	$ 3,676.96
2. Indirect Costs 1.62%				$ -		$ -	$ 5,956.68	$ 5,956.68
3. Subtotal Direct Salary Costs and Indirect Costs	$ -			$ -		$ -	$ 9,633.64	$ 9,633.64
4. Travel	$ -			$ -		$ -	$ 20.25	$ 20.25
5. Other Non-Salary Costs	$ -			$ -		$ -	$ 190.00	$ 190.00
6. Subtotal Direct Non-Salary Costs	$ -			$ -		$ -	$ 210.25	$ 210.25
7. Subcontractors	$ -			$ -		$ -	$ -	$ -
8. Total WA Costs	$ -			$ -		$ -	$ 9,843.89	$ 9,843.89
9. Fixed Fee	$ -			$ -		$ -	$ 674.35	$ 674.35
10. Total WA Price	$ -			$ -		$ -	$ 10,518.24	$ 10,518.24

Project Manager (Engineer) _____ Date _____

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

Page _____ of _____

Engineer	ERM	Date Prepared	
Contract Number	C003970	Billing Period	
Project Name	South End Place	Invoice No.	
Work Assignment No.	D003970-28		
Task No./Name	Task 2 - Site Characterization		
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				$ -		$ -	$ 5,732.30	$ 5,732.30
2. Indirect Costs 1.62%				$ -		$ -	$ 9,286.33	$ 9,286.33
3. Subtotal Direct Salary Costs and Indirect Costs	$ -			$ -		$ -	$ 15,018.63	$ 15,018.63
4. Travel	$ -			$ -		$ -	$ 727.50	$ 727.50
5. Other Non-Salary Costs	$ -			$ -		$ -	$ 3,698.70	$ 3,698.70
6. Subtotal Direct Non-Salary Costs	$ -			$ -		$ -	$ 4,426.20	$ 4,426.20
7. Subcontractors	$ -			$ -		$ -	$ 25,847.50	$ 25,847.50
8. Total WA Costs	$ -			$ -		$ -	$ 45,292.33	$ 45,292.33
9. Fixed Fee	$ -			$ -		$ -	$ 1,051.30	$ 1,051.30
10. Total WA Price	$ -			$ -		$ -	$ 46,343.63	$ 46,343.63

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

Page _____ of _____

Engineer	ERM	Date Prepared	
Contract Number	C003970	Billing Period	
Project Name	South End Place	Invoice No.	
Work Assignment No.	D003970-28		
Task No./Name	Task 3 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				$ -		$ -	$ 6,663.10	$ 6,663.10
2. Indirect Costs 1.62%				$ -		$ -	$ 10,794.22	$ 10,794.22
3. Subtotal Direct Salary Costs and Indirect Costs	$ -			$ -		$ -	$ 17,457.32	$ 17,457.32
4. Travel				$ -		$ -	$ -	$ -
5. Other Non-Salary Costs				$ -		$ -	$ 280.00	$ 280.00
6. Subtotal Direct Non-Salary Costs	$ -			$ -		$ -	$ 280.00	$ 280.00
7. Subcontractors	$ -			$ -		$ -	$ -	$ -
8. Total WA Costs	$ -			$ -		$ -	$ 17,737.32	$ 17,737.32
9. Fixed Fee	$ -			$ -		$ -	$ 1,222.01	$ 1,222.01
10. Total WA Price	$ -			$ -		$ -	$ 18,959.33	$ 18,959.33

Schedule 2.11(g) - Supplemental

Cost Control Report for Subcontracts

Page _____ of _____

Engineer ERM
Contract Number C003970
Project Name South End Place
Work Assignment No. D003970-28

Date Prepared _____
Billing Period _____
Invoice No. _____

	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			$ -	$ 11,750.00	$ 587.50		$ -
DeKenniopp L.S., P.C.			$ -	$ 3,900.00	$ -		$ -
Severn Trent			$ -	$ 9,210.00	$ -		$ -
EDR			$ -	$ 400.00	$ -		$ -
5			$ -				$ -
6			$ -				$ -
7			$ -				$ -
8			$ -				$ -
9			$ -				$ -
10			$ -				$ -
11. TOTALS	$ -	$ -	$ -	$ 25,260.00	$ 587.50	$ -	$ -

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. ERM/C003970
Project Name: South End Place
Work Assignment No.D003970-28

Date Prepared _____
Billing Period _____
Invoice No. _____

Subcontract 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		24		0		48		20		0		0		26	0	118
Task 2		0		0		0		14		0		48		140		0		0		4	0	206
Task 3		0		0		16		18		0		108		50		0		0		6	0	198
Task 4																						
Task 5																						
Task 6																						
Task 7																						
Task 8																						
Task 9																						
Task 10																						
Task 11																						
Task 12																						
Total Hours	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**56**	**0**	**0**	**0**	**204**	**0**	**210**	**0**	**0**	**0**	**0**	**0**	**36**	**0**	**522**

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.

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

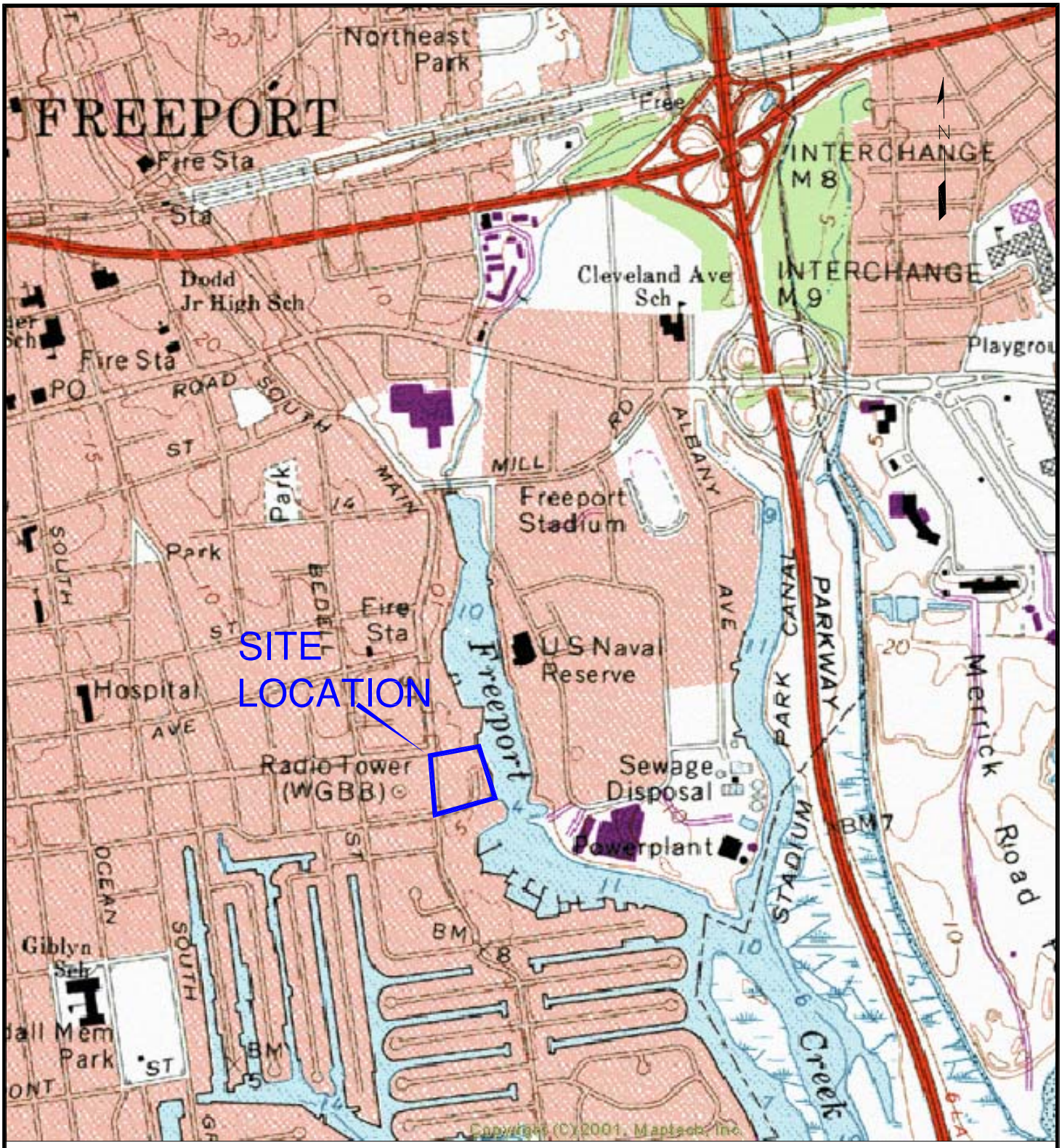
NYSDEC, 1992. Division Technical and Administrative Guidance Memorandum (TAGM): "Contained-In" Criteria For Environmental Media. Division of Hazardous Substance Regulation. HWR-92-3028. 30 November 1992.

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).

NYSDOH, 2004. New York State Department of Health (NYSDOH), Division of Environmental Health Assessment, Center for Environmental Health, Indoor Air Sampling and Analysis Guidance.

FIGURES



0 1000 2000

GRAPHIC SCALE IN FEET

SOURCE: USGS QUADRANGLE MAP, FREEPORT, NY, 1979

TITLE

SITE AREA LOCATION MAP
SOUTH END PLACE
FREEPORT, NEW YORK

PREPARED FOR

NYSDEC

Environmental Resources Management

ERM

SCALE	FIGURE
GRAPHIC	1 – 1

DRAWN:	JOB NO.:	FILE NAME:	DATE
MFM	0036713	0036713.003	08/30/05

TITLE

SITE PLAN
SOUTH END PLACE
INVESTIGATION AREA
SITE NO: 1-30-028

PREPARED FOR

NYSDEC

Environmental Resources Management

DRAWN:	JOB NO.:	FILE NAME:	SCALE	DATE	FIGURE
MFM/EMF	0036713	0036713-00-001	GRAPHIC	8/23/05	1-2

ATLANTIC AVENUE

FREEPORT CREEK

N

SOUTH MAIN STREET

SOUTH END PLACE

EAST RAY STREET

FRISBY AEROSPACE

KAYSEE MARINE

FRISBY AEROSPACE

METAL ETCHING SITE NO. 1-30-110

SOUTH END PLACE INVESTIGATION AREA

1

2

3

4

5

6

7

LEGEND

- SHALLOW SOIL GAS/ SHALLOW GROUNDWATER MONITORING WELLS
- FIRST FLOOR/BASEMENT/SUB-SLAB AIR SAMPLES
- AMBIENT AIR SAMPLES

0 60' 120'

GRAPHIC SCALE

TITLE

PROPOSED SAMPLE LOCATIONS
SOUTH END PLACE AREA
SITE NO: 1-30-162

PREPARED FOR

NYSDEC

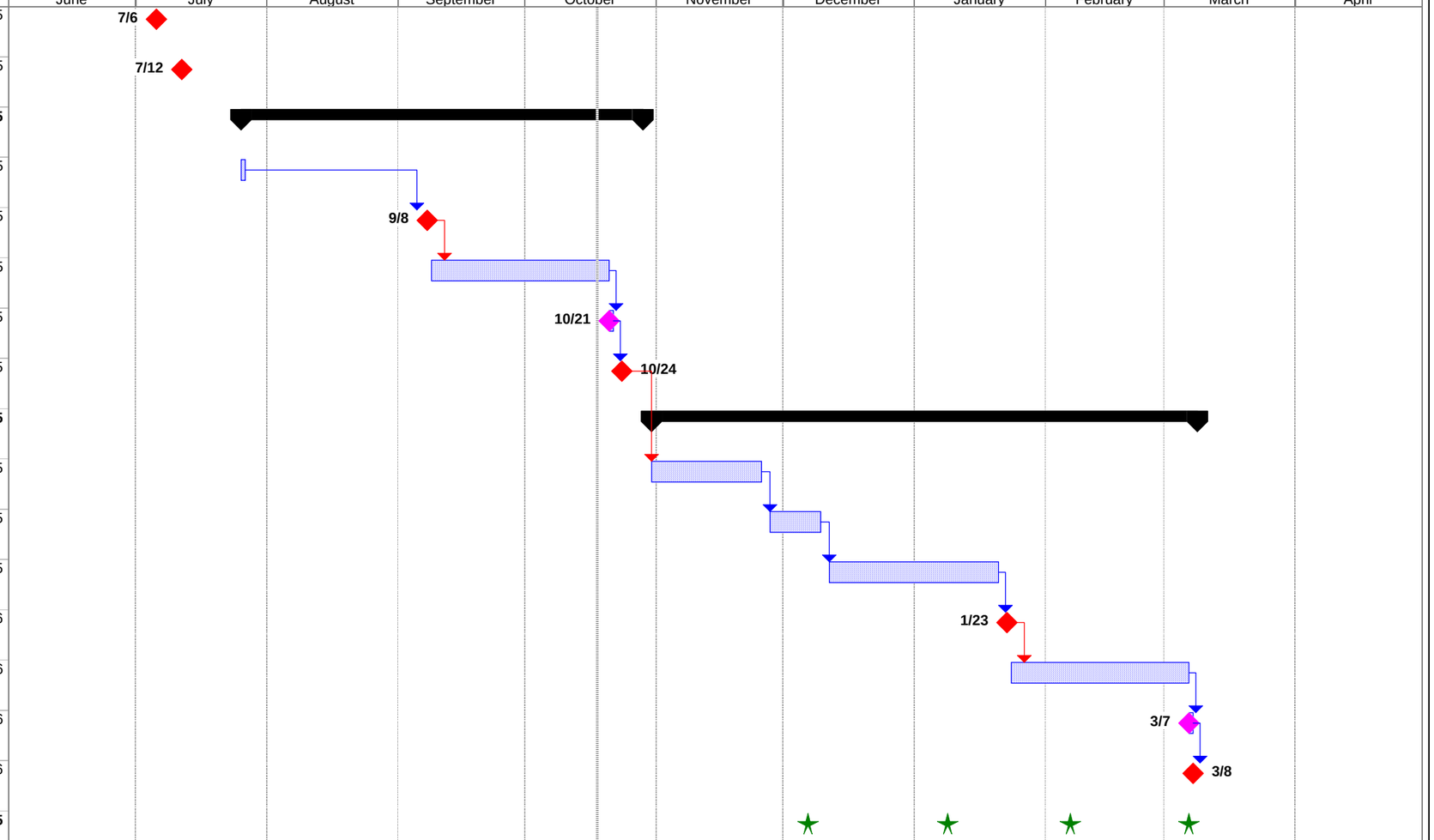
ERM Environmental Resources Management

SCALE	FIGURE
GRAPHIC	2-1

DRAWN:	JOB NO.:	FILE NAME:	DATE
MFM/EMF	0036713	0036713-00-002	8/23/05

FIGURE 4-1
SITE CHARACTERIZATION WORKPLAN SCHEDULE
SOUTH END PLACE - FREEPORT, NEW YORK
NYSDEC SITE CODE #1-30-162

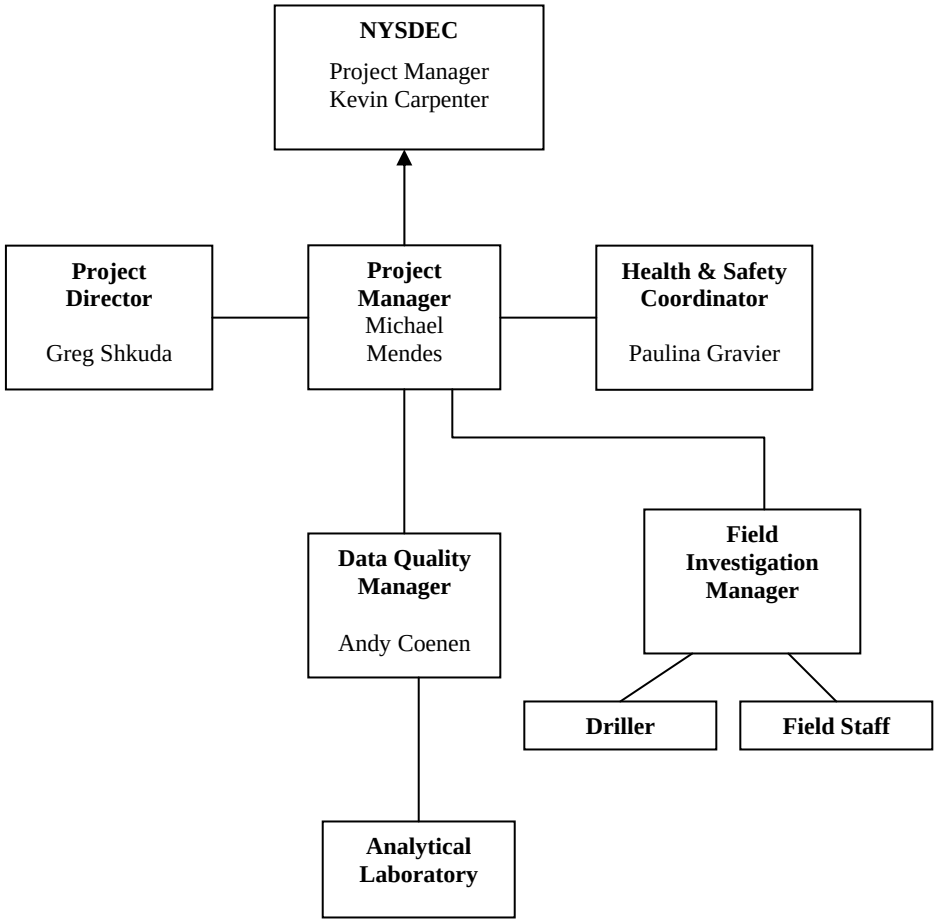
ID	Task Name	Duration	Start
1	**Issue Work Assignment (WA)**	1 day	Wed 7/6/05
2	**Acceptance of Work Assignment**	1 day	Tue 7/12/05
3	**Task 1 - Work Plan Development**	**69 days**	**Tue 7/26/05**
4	Site Inspection/scoping	1 day	Tue 7/26/05
5	Submit Draft Site Characterization (SC) Work Plan	1 day	Thu 9/8/05
6	NYSDEC/NYSDOH Comments on Draft SC Work Plan	30 days	Fri 9/9/05
7	Submit Final SC Work Plan	1 day	Fri 10/21/05
8	Issuance Notice to Proceed (NTP)	5 days	Mon 10/24/05
9	**Task 2 - Site Characterization**	**93 days**	**Mon 10/31/05**
10	SC Field Work	20 days	Mon 10/31/05
11	Supplemental Field Activities	10 days	Mon 11/28/05
12	Prepare Draft SC Report	30 days	Mon 12/12/05
13	Submit Draft SC Report	1 day	Mon 1/23/06
14	NYSDEC Comments on Report	30 days	Tue 1/24/06
15	Submit Final SC Report	1 day	Tue 3/7/06
16	Approval of SC Report	1 day	Wed 3/8/06
17	**Monthly Progress Reports**	**65 days**	**Wed 12/7/05**



Date: Tue 10/18/05 | Task | Milestone (M) | Recurring Activity | Summary | M - Prfmnce Eval.

FIGURE 5-1

SOUTH END PLACE SITE CHARACTERIZATION INVESTIGATION AREA ORGANIZATIONAL CHART



APPENDIX A
STANDARD OPERATING PROCEDURES (SOPS)

South End Place
Freeport
Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
NYSDEC Work Assignment No. D003970-28

October, 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 A

STANDARD OPERATING PROCEDURES (SOPS)

Section	Standard Operating Procedure
A.1	SOP 1 Soil Gas Sampling Using Summa Canisters
A.2	SOP 2 Temporary Monitoring Well Installation for Groundwater Sampling
A3	SOP 3 New York State Department of Health Indoor Air Sampling & Analysis Guidance December 8, 2004
A.4	SOP 4 Water Level Measurement Procedure
A.5	SOP 5 Groundwater Sampling (Conventional & Low-Flow)
A.6	SOP 6 Groundwater pH And Temperature
A.7	SOP 7 Measurement Of Groundwater Specific Conductance
A.8	SOP 8 Measurement Of Groundwater Turbidity
A.9	SOP 9 Measurement Of Groundwater Dissolved Oxygen

TABLE OF CONTENTS – APPENDIX A

A.0 STANDARD OPERATING PROCEDURES

A.1 SOP 1: 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 designated sample locations, see Figure 2-1 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. For the sampling of temporary shallow soil gas samples begin at step 1. Please refer to SOP 3, New York State Department Of Health, Draft Indoor Air Sampling & Analysis Guidance, December 8, 2004

Certified clean SUMMA canisters will be provided by an ELAP certified analytical laboratory. The sampling rate will be controlled by a calibrated, flow controller preset by the laboratory to collect the samples in a 24-hour period and 2-hour period at a flow of 0.1 liters per minute or less.

Detailed sample collection procedures are presented below.

(1) A dedicated length of new Teflon tubing will be threaded onto the soil gas implant, which is then threaded onto the lead geoprobe drill rod. The Geoprobe temporary soil gas implant will be drilled to a total depth of three (3) to four (4) feet below ground surface at each soil vapor sampling location. 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. Potential sources of VOCs will be removed from the sampling area before sampling. Photoionization detection (PID) will be used to identify VOCs sources.

(2) After the installation of the temporary soil gas implant is completed, an initial VOC measurement will be made using a PID immediately following installation. The initial reading will be recorded in the field logbook and/or on a soil gas sampling log form. The tubing will then be inserted in the hole and sealed by pouring/placing a non-VOC emitting surface sealing material (modeling clay/beeswax) around the annular space.

(3) The tubing will be connected to a Teflon-lined calibrated air-sampling pump with Teflon discharge tubing. Initially, the pump will be connected to the discharge tube and approximately one volume of gas from the soil gas implant will be purged from the hole at no greater than 100 ml/min.

(4) Once the purging is complete, a PID reading will be taken directly from the tubing.

(5) To determine that ambient air does not infiltrate the soil gas sample, the ground surface around the temporary sample location will be covered with plastic sheeting, and helium will be injected under the sheeting during sample purging. A sample of the purge air will be collected in a Tedlar bag, and a portable helium indicator will be used to monitor for the presence of helium in the sample. Once it is confirmed that helium (and subsequently ambient air) is not infiltrating the sample, collection of the soil gas sample with a SUMMA canister will commence.

(6) A tubing pinch valve will be used to seal the tubing prior to connection to the SUMMA canister.

(7) Immediately following the PID reading, a Summa canister will be attached to the Teflon inlet tubing and the sampling regulator set to collect a soil vapor sample at no greater than 100 ml/minute. ERM anticipates collecting each of the soil vapor samples over a 2-hour period. The SUMMA canister and flow controller will be kept out of direct sunlight by being covered with a light colored cloth or umbrella. A slight vacuum will be left on the canister at the end of the sampling to document that the canister does not leak during transit to the laboratory. After each sample is collected, all Teflon tubing/corks will be removed and disposed of as general refuse. All penetrations of concrete pads will be sealed with cement patch.

(8) At each soil vapor sampling location 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 and time of Teflon tubing insertion and pilot hole sealing;
- Date, time and PID reading;
- Date and time of purge start and stop;
- Date and time of sample start and stop;
- Summa canister serial number;
- Survey location number, and descriptive location of the sampling area;
- Sample identification for corresponding indoor air samples
- 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.

Each sample will be logged and shipped under standard Chain of Custody protocols to the selected laboratory and analyzed for VOCs via US EPA Compendium Method TO-15. A detection limit of 1 ppbv for each analyte will be maintained. The time-period from shipment of the canisters from the laboratory to sample analysis will not exceed thirty (30) days.

A.2 SOP 2: TEMPORARY MONITORING WELL INSTALLATION FOR GROUNDWATER SAMPLING

Temporary monitoring wells will be installed at seven (7) locations to characterize groundwater quality/impacts, approximate locations are shown in Figure 2-1.

A NYSDOH ELAP-certified laboratory will analyze the groundwater samples obtained from these locations for TCL VOCs using CLP Method OLC03.2.

A.2.1 Drilling Methods

All boreholes (for temporary groundwater monitoring wells) will be advanced using direct push technology (Geoprobe®). 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 temporary groundwater monitoring wells.

A.2.2 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.2.3 Drilling Equipment Decontamination

All drilling equipment shall be decontaminated by steam cleaning prior to performance of the first well installation and between all subsequent well installations. This shall include all hand tools, casing, 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^{o} degrees Fahrenheit. The equipment shall be cleaned to the satisfaction of the ERM's Hydrogeologist.

A.2.4 Well Construction Materials

All temporary monitoring wells shall be constructed of one-inch inside diameter, threaded flush joint, schedule 40 PVC casing and screens ten (10) feet in length, of slotted 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 pre-cleaned, wrapped in clean polyethylene sheeting and stored until the time of well construction.

A.2.5 Monitoring Well Construction Procedures

Well Assembly and Screen Placement

When the well screens are properly positioned in the geoprobe drill rods the drilling rods 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. At the completion of pulling up the drill rods the screen will be backfilled with number one (1) morrie well gravel.

A.2.6 Well Completions At Grade

A mark will be made at the top of the well casing to provide a reference point from which to make future water level measurements.

If necessary, 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.

If necessary, 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.2.7 Borehole Abandonment

At some time to be determined by the NYSDEC the temporary monitoring wells will be abandoned according to NYSDEC requirements. The well casing 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.2.8 Work Site Restoration

Upon completion of all field activities, 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.3 SOP 3: NEW YORK STATE DEPARTMENT OF HEALTH, DRAFT INDOOR AIR SAMPLING & ANALYSIS GUIDANCE, DECEMBER 8, 2004

Air testing for specific chemical compounds is an investigative tool used to characterize the nature and extent of contaminants in air and to determine whether contaminant sources affect indoor air quality. The purpose of this document is to outline the recommended procedure for testing indoor air for volatile contaminants (VCs). The nature of indoor air is dynamic and can change. Air samples are collected for a given set of circumstances (parameters and conditions) including location, time, ventilation, occupancy, etc. It is the responsibility of the investigator to define the objective of the sampling within the framework of these circumstances in order to collect useful and reliable information.

This document provides guidance for preparing sampling locations and collecting samples for laboratory analysis to ensure the integrity of the test results and allow for meaningful interpretation of the data. The steps discussed include; pre-sampling inspection and preparation of buildings, product inventories, and the collection and analysis of samples.

Forms (attached) - Indoor Air Quality Questionnaire and Building Characteristics Form Product Inventory Form

GUIDANCE:

1. Pre-sampling inspection:

A pre-sampling inspection should be performed 2 or 3 days prior to testing to identify conditions that may affect or interfere with the proposed testing. The inspection should evaluate the type of structure, floor layout and physical conditions of the building(s) being studied. The inspection information should be identified on the attached Indoor Air Quality Questionnaire and Building Characteristics form. In addition, potential sources of the chemicals of concern should be evaluated within the building. The objective is to provide a profile of the indoor air environment by characterizing the occurrence and use of chemicals and products throughout the building. This profile should focus on the chemicals of concern but also include all chemicals that are part of the analytical parameter list. The primary objective of the product inventory is to identify potential air sampling interference and discretion can be used in some cases, keeping in mind the goal of the investigation and site specific contaminants of concern. For example, it is not necessary to provide detailed information for each individual container of like items. However it is necessary to indicate that "20 bottles of perfume" or 12 cans of latex were present with containers in good condition to help formulate

the indoor environment profile. Each room on the floor of the building being tested and on lower floors if possible should be inspected and an inventory provided. This is important because even products stored in another area of a building can affect the air of the room being tested.

For example, when testing for a petroleum spill, all indoor sources of petroleum hydrocarbons should be scrutinized. These can include household and commercial products containing volatile organic compounds (VOCs) and petroleum distillates, petroleum products including gasoline-operated equipment, unvented kerosene heaters and heating oil tanks, storage and/or recent use of petroleum-based finishes and paints or products containing petroleum distillates. This information should be detailed on the Product Inventory page.

The presence and description of odors and portable vapor monitoring equipment readings (e.g. solvent-type odors and photoionization detectors (PIDs) for VOCs, Jerome Mercury Vapor Analyzer for mercury) should be used to help evaluate potential sources, including near products stored or used in the building. Products in buildings should be inventoried every time air is tested to provide an accurate assessment of the potential contribution of VCs. If available, VC ingredients of interest should be recorded for each product. If the ingredients are not listed on the label, record the product's exact and full name, manufacturer's name, address and phone number, if available. In some cases, Material Safety Data Sheets may be useful for identifying confounding sources of VCs in air. Digital photographs adequately depicting products and their ingredients are an adequate substitute for individual itemization of products.

2. Preparation of Building

Potential interference from products or activities releasing VCs may need to be corrected and it may be possible to make these corrections during the pre-sampling inspection. Removing the source from the indoor environment prior to testing is the most effective means of reducing the interference. Ensuring that containers are tightly sealed may be acceptable. For example, when testing for VOCs, containers should be tested with a PID to determine whether VOCs are leaking. The inability to eliminate potential interference may be justification for not testing, especially when testing for low levels of the same or similar compounds.

In some cases the goal of the testing is to evaluate the impact from products used or stored in the building (e.g. pesticide misapplications, school renovation projects). If the goal of testing is to determine whether

products are an indoor VC contaminant source, then removing these sources does not apply.

Once interfering conditions are corrected (if applicable), ventilation may be needed prior to testing to eliminate residual contamination in the indoor air. If ventilation is appropriate, it should be completed 24 hours or more prior to the scheduled sampling time. Ventilation can be accomplished by operating the building's heating ventilation and air conditioning system (HVAC) to maximize fresh air intake, opening windows and doors and operating exhaust fans.

Air samples are sometimes designed to represent typical exposure in a mechanically ventilated building and the operation of HVAC systems during sampling should be noted (see HVAC section on the attached indoor air quality questionnaire). In general, the building's HVAC system should be operating under normal conditions. Unnecessary building ventilation should be avoided within the 24 hours prior to and during testing. During colder months, heating systems should be operating to maintain normal indoor temperatures of 65°-75° F for at least 24 hours prior to and during the scheduled sampling time.

Depending on the goal of the indoor air sampling, some situations may warrant deviation from the above protocol regarding building ventilation. In such instances, building conditions and sampling efforts should be understood and noted within the framework and scope of the investigation.

<u>For 24 hours prior to sampling, all reasonable measures should be taken to avoid;</u>

- Opening any windows, fireplace dampers, openings or vents
- Operating ventilation fans unless special arrangements are made
- Smoking in the house
- Painting
- Using wood stoves, fireplaces or other auxiliary heating equipment, (e.g. kerosene heaters)
- Operating or storing automobiles in an attached garage
- Allowing containers of gasoline or oil to remain within the house, except for fuel oil tanks
- Cleaning, waxing or polishing furniture or floors with petroleum or oil-based products
- Using air fresheners or odor eliminators
- Engaging in any hobbies which use materials containing volatile organic chemicals
- Using cosmetics: including hairspray, nail polish, nail polish removers, perfume/cologne, etc.
- Applying pesticides

3. Collection of Samples

To characterize contaminant concentration trends and potential exposures, air samples should be collected from the basement, first floor living space, and from outdoors. In settings with diurnal occupancy patterns such as schools and office buildings, samples should be collected during normally occupied periods to be representative of typical exposure. Sample collection intakes should be located to approximate the breathing zone for building occupants, e.g. three feet above the floor level where occupants are normally seated or sleep. To ensure that air is representative of the locations sampled and to avoid undue influence from sampling personnel, samples should be collected for at least a one-hour period, and personnel should avoid lingering in the immediate area of the sampling device while samples are being collected. If the goal of the sampling is to represent average concentrations over longer time periods then longer duration sampling periods may be appropriate. Sample collection techniques vary depending on the analytical method(s) being used, and sample flow rates must conform to the specifications in the sample collection method. Some methods require collecting samples in duplicate (e.g. Passive Sampling Devices for tetrachloroethene). Sampling personnel should be completely familiar with the sampling protocol for the particular method being used.

a. Quality Assurance/Quality Control

Extreme care should be taken during all aspects of sample collection to ensure that high quality data are obtained. The sampling team members should avoid actions (i.e. fueling vehicles, using permanent marking pens) that can cause sample interference in the field. Appropriate QA/QC protocols must be followed for sample collection and laboratory analysis. Some examples include; certified clean sample devices, sample holding times and temperatures, sample accession, chain of custody, field and laboratory duplicates, etc. Samples should be delivered to the analytical laboratory as soon as possible.

b. Sampling Information

Detailed information must be gathered at the time of sampling to document conditions prior to and during sampling to aid in interpretation of the test results. The information should be recorded on the building inventory form along with the date and the investigator initials. Floor plan sketches (section 9) should be drawn for each floor and should include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps, HVAC systems including air supplies and returns and any other pertinent information including compass orientation (north). In addition, any

pertinent observations such as odors, PID readings, and airflow patterns should be recorded on the building inventory form. The NYSDOH lab requires that information on odors and PID readings be recorded on the associated sample accession forms for VOC analyses. Smoke tubes or other devices are helpful and should be used to confirm pressure relationships and air flow patterns, especially between floor levels and between suspected contaminant sources and other areas. Outdoor plot sketches (section 10) should include the building site, area streets, outdoor sample location, the location of potential interference (such as gas stations, factories, lawn mowers), wind direction and compass orientation (north).

Sample Analysis

New York State Law requires laboratories analyzing environmental samples from New York State to have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte/matrix combinations. Samples must be analyzed by methods that can achieve minimum reporting limits to allow for comparison to background levels (typically, 1 microgram per cubic meter ($\mu g/m^3$) or less). The laboratory should verify that they are capable of detecting the appropriate target compounds (see below) and can report them at the appropriate reporting limit (typically, 1 $\mu g/m^3$ or less). You should check with an ELAP representative at 518-485-5570 or by email at elap@health.state.ny.us if you have questions on this issue.

Indoor air sampling to evaluate potential impacts from chemical contaminant sources (i.e. spills, soil vapor, groundwater) must include the contaminant(s) of concern and potential breakdown products (e.g. for tetrachloroethene also include trichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, cis-dichloroethene, trans-dichloroethene and vinyl chloride).

Petroleum is a mixture of many individual compounds. Specific aromatic and aliphatic compounds can be good indicators for individual petroleum products (i.e. gasoline, diesel, fuel oil, and kerosene). Analytical methods using a mass spectrometer detector allow for the identification and quantitation of aromatic and aliphatic hydrocarbons, and oxygenated compounds such as ethanol, acetone and methyl tertiary butyl ether (MTBE). Identifying specific petroleum vapor sources may require including additional indicator compounds as suggested below.

Indicator compounds for gasoline may include; benzene, toluene, ethylbenzene, xylenes, (BTEX) trimethylbenzene isomers, and the appropriate oxygenate additives (e.g. MTBE, ethanol, etc.). The individual C-4 to C-8 straight and branched aliphatics: e.g. hexane, cyclohexane,

dimethylpentane, and 2,2,4-trimethylpentane (iso-octane) should also be reported.

Indicator compounds for middle distillate fuels (#2 fuel oil, diesel, and kerosene) may include n-nonane, n-decane, n-undecane, n-dodecane, trimethylbenzene isomers, tetramethylbenzene isomers, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

Indicator compounds for manufactured gas plant (MGP) wastes may include trimethylbenzene isomers, tetramethylbenzene isomers, thiopenes, indane, indene and naphthalene.

Indicator compounds for natural gas may include propane, propene, butane, iso-butane, methylbutane and n-pentane. Because natural gas is a mixture of many processes, there will also be higher molecular weight aliphatic, olefinic, and some aromatic compounds present, but at levels much lower than the listed indicator compounds.

In some cases, a more comprehensive list of compounds may be necessary to include indicator compounds of different petroleum mixtures to help identify sources and potential interferences. For additional information on sampling and appropriate target compounds, contact the Indoor Health Assessment Section of the Bureau of Toxic Substance Assessment (BTSA) at (518) 402-7810 or the appropriate Bureau of Environmental Exposure (BEEI) project manager (518) 402-7850.

OSR – 3

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

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

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

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

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

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

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

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

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

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

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

Other characteristics:

Number of floors_____ Building age_____

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

4. AIRFLOW

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

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

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

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

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

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

_____

_____

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

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

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

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other _____
Air Conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

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

_____

_____

_____

_____

7. OCCUPANCY

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

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

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

If yes, what types of solvents are used? _____

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

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

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

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

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

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

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

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

11. FLOOR PLANS

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

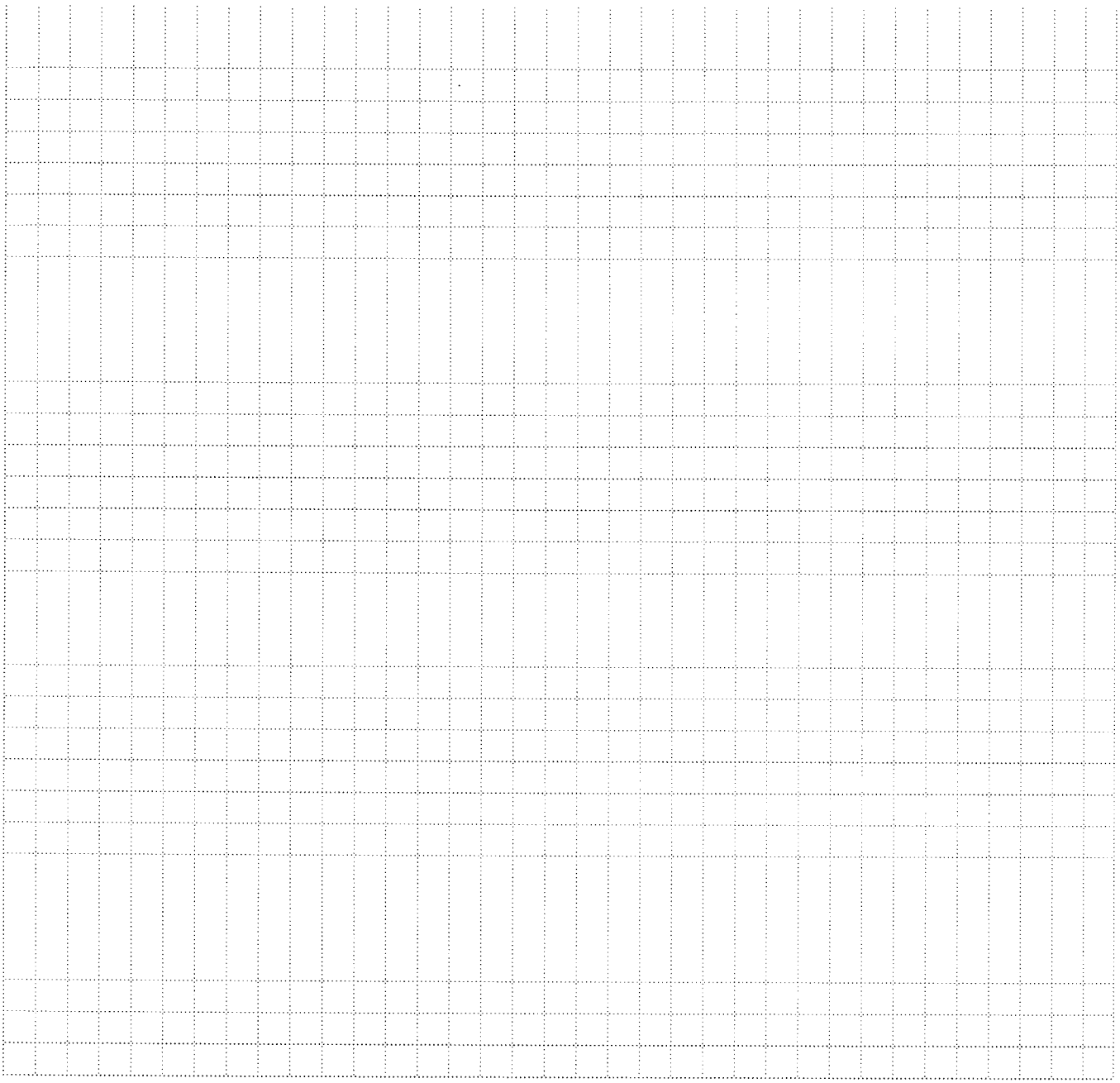
Basement:

First Floor:

12. OUTDOOR PLOT

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

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



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

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

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

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

A.4 SOP 4: 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.5 SOP 5: GROUNDWATER SAMPLING

Groundwater sampling will be performed using USEPA low-flow well purging/sample collection techniques based on historic records that indicated that existing area 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 6, 7, 8 and 9 are presented to describe operating procedures for the measurement of pH, temperature, specific conductivity and dissolved oxygen using standard hand-held meters.

A.5.1 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) with the use of an interface probe.

- If LNAPL is encountered on the top of the water table or DNAPL is encountered at the bottom of the well 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.5.2 Low-Flow Sampling

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

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.

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.5.3 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.

(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.7 SOP 7: 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.

(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.9 SOP 9: 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.

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN (QAPP)

South End Place
Freeport
Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
NYSDEC Work Assignment No. D003970-28

October 2005

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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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-6.

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:

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

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

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

- ***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 groundwater and air samples are PARCC.

B.1.3.2 Field Investigation Quality Objectives

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

In order to permit calculation of precision and accuracy for the 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 air sample representativeness, all sample collection will be performed in strict accordance with the procedures set forth in this WP.

In order to permit calculation of precision and accuracy for the air samples, duplicates 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 air 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). Table B-6 presents 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), 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-1. 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 aqueous VOCs only.

Field Blanks

Field blanks will be collected to evaluate the cleanliness of 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/air samples.

Temporary Monitoring Well Groundwater 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 air samples will be collected and analyzed to check laboratory reproducibility of analytical data.

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
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 interval for groundwater 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., 080105 would represent 1 August 2005). 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 Location Type	NN-NN Specific Type	AANNNNNN 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 = Sub Slab Vapor
TB = Trip Blank	SG = Soil Gas
FB = Field Blank	SE = Sediment
HY = Hydrant	IA = Indoor Air
XF = Transformer	BA = Basement Air
SB = Soil Boring	WP = Wipe
GP = Geoprobe Boring	GP = Geoprobe Boring

B.2.5.3 Sample Preservation

Groundwater 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/air 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
Temporary Monitoring Well Groundwater	TCL VOCs	CLP Method OLC03.2
Soil Vapor	VOCs	TO-15
Indoor Air/Basement Air/Sub-Slab	VOCs	TO-15

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 groundwater or soil vapor.
- Delineation of horizontal and vertical constituent concentrations, identifying clean areas, delineating the extent and/or volume of impacted groundwater and soil vapor.
- 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 temporary monitoring well installation and development, and ambient air monitoring. 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 groundwater and air 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, 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-1
SAMPLE TOTAL SUMMARY

Subtask	*Analytical Parameters*	*Matrix*	*Number of Samples*	*Blind Field Duplicates*	*MS/MSD Pairs* [2]	*Field Blanks*	*Trip Blanks*	*Sample Totals*
2-hour Soil Gas Samples (7 locations) and two ambient air samples including Summa Canisters and Flow controllers.	TO-15 (Summa Canisters + Flow Controllers)	Air	9	1	0	0	0	10
Groundwater Samples from Temp Wells (7 locations, DUP, MS/MSD, FBs,TBs)	TCL VOCs by OLC03.2	Aqueous	7	1	1	2	2	14
24-hour First Floor/Basement/Sub-Slab Air Sampling from 3 occupied residences	TO-15 (Summa Canisters + Flow Controllers)	Air	9	0[5]	0	0	0	9
Supplemental Soil Gas Sample points/Sub Slab vapor samples from three (3) occupied residences (if necessary)	TO-15 (Summa Canisters + Flow Controllers)	Air	5	1	0	0	0	10
Supplemental Groundwater Samples from contingency temporary wells	TCL VOCs by OLC03.2	Aqueous	7	1	1	2	2	14

Notes:

1. Duplicates are generally collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
2. MS/MSD Pairs (two samples) will be collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
3. Field Blanks will be collected at a minimum frequency of one per day for aqueous samples. More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader
4. Trip Blanks will be collected at the rate of one per aqueous sample shipment when VOCs are collected.
5. Associated blind field duplicate will be collected with the soil gas samples.

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]*	*Sample Totals*
TCL VOCs	CLP SOW OLC03.2	Cool 4°C, pH<2 (HCl)	14 days	3 – 40 ml glass Teflon-lined cap	28

Notes:
1. VOC holding times are days after collection until analysis.
2. As specified by Severn Trent Laboratories (STL) Shelton, Connecticut.

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

Analytical Method Reference	*Analytical Method* Reference	*Sample Preservation*	*Holding Time* [1]	*Container*	*Sample Totals*
VOCs	USEPA Method TO-15A	Cool, 4°C	14 days	1 – Summa Canister	29

Notes:
1. Holding times are days after collection until analysis.

TABLE B-4
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-4 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 OLC03.2.

TABLE B-5
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-5 (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

Notes:
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-6
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 OLC03.2
   QC = Quality Control; % Rec. = Percent Recovery; % RPD = Relative Percent Difference; LCS = Lab Check Sample; RL = Reporting Limit

FIGURES

FIGURE B-1
EXAMPLE CHAIN-OF-CUSTODY

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

STANDARD ☐ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER _____

TURNAROUND

☐ NORMAL _____
☐ QUICK _____
☐ VERBAL _____

REPORT # (Lab Use Only)

SAMPLE TEMP. _____ C
SAMPLE REC'D ON ICE Y ____ N ____
pH CHECK Y ____ N ____
CHLORINE (RESIDUAL) Y ____ N ____
REVIEWED BY: _____

NY PUBLIC WATER SUPPLIES

SOURCE ID ____ ____ ____
ELRP TYPE ____ ____ ____
FEDERAL ID ____ ____ ____ ____ ____ ____ ____

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

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

STL #	SAMPLING DATE	SAMPLING 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. Orange	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 _____

FIGURE B-2
EXAMPLE CUSTODY SEAL

APPENDIX C
SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

South End Place Site
Freeport
Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
NYSDEC Work Assignment No. D003970-28

October 2005

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
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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

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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): Michael 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:

Data and Records Search: Available historic information (documents, maps, aerial photos, building permits, reports, etc.) shall be located and reviewed. ERM will review all available background information in accordance with Appendix 3A of the Draft DER-10 "Technical Guidance for Site Investigation and Remediation" to identify local users of TCA. This review will include NYSDEC Region 1, NYSDEC Central office and local/county files. A review of County, State and Federal environmental databases will be conducted to identify users or handlers of TCA in and around the Site Characterization Area

Base Map Development: An aerial image generated from the New York State/GIS Data/Orthoimagery Site will be utilized for the site investigation area base map. Before initiation of field activities, a base map of the immediate vicinity will be developed. All geo-spatial data will be referenced to the North American Datum 1983 (NAD83) and UTM projection. The horizontal grid will be correctly oriented and displayed on the base map. The base map will be used to accurately plot all sample locations, groundwater flow directions, and other items of significance.

Shallow Subsurface Soil Vapor Points: Using direct-push sampling methodologies, seven- (7) soil vapor samples will be collected. Soil vapor samples will be collected along two (2) transects within the 4-acre Investigation area. The first transect will be installed along the west side of South Main Street between Ray Street and Atlantic Avenue. The second transect will be along Atlantic Avenue east from South Main Street toward the Freeport Creek.

Each sample will be submitted to a NYSDOH ELAP-certified laboratory for Full List VOC analyses using United States Environmental Protection Agency (USEPA) Method TO-15.

Shallow Groundwater Samples: Using direct-push methodologies, seven- (7) temporary one (1)-inch monitoring wells/peizometers will be installed along the same two (2) transects of the soil vapor samples within the 4-acre Investigation area. Shallow groundwater samples will be collected from each of the newly installed temporary wells by USEPA purge and sampling methods. Each sample will be submitted to a NYSDOH ELAP-

certified laboratory for Full List VOC analyses using United States Environmental Protection Agency (USEPA) Method 8260.

Indoor Air Samples: Indoor air samples will be collected from the basements and first floors of three (3) occupied residential structures at the north end of South End Place; see Figure 2-1 for sample locations. The samples will be collected over a 24-hour period. Each sample will be submitted to a NYSDOH ELAP-certified laboratory for Full List VOC analyses using United States Environmental Protection Agency (USEPA) Method TO-15.

Survey: At the completion of field sampling activities a New York State licensed surveyor will establish the location and elevation of each newly installed soil vapor sample location and shallow groundwater sample collected. Elevations of all temporary well casings and ground surface elevation of each sample location and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, based on North American Datum 1983 (NAD83) and UTM projection. Each sample location or relevant feature will be plotted on the aerial image base map.

Data Usability Summary Report(DUSR): All air and groundwater 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.

Supplemental Contingency Sampling: Upon completion of the primary SC field activities, the analytical data will be evaluated and recommendations for additional investigative activities to fill existing data gaps may be required. Supplemental subsurface investigations include but are not limited to soil vapor, groundwater, indoor air, basement air and sub-slab vapor samples.

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. Kevin Carpenter. 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 lamp 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. Verification will consist of reviewing written training documentation such as copies of training certificates or cards. 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^{o} 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. Kevin Carpenter NYSDEC	Work: 518-402-9693
Local Emergency Responders – all services	Phone: 911
Hospital: Mercy Medical Center 1000 North Village Avenue Rockville Center, NY 11570	Phone: (516) 705-2525
Police: Nassau County	Phone: 911 or 516-573-6100
Police: Freeport Village	Phone: (516) 378-0700

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 *Mercy Medical Center.* A map to the medical facility is located in Attachment 6.

Mercy Medical Center
1000 North Village Avenue
Rockville Center, NY 11570
(516) 705-2525

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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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: **tetrachloroethylene** CAS: 127-18-4 Vapor Pressure: 14 mmHg Ionization Potential: 9.32 eV	100 ppm (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, respiratory system, nausea, dizziness Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **trichloroethene** CAS: 79-01-6 Vapor Pressure: 58 mmHg Ionization Potential: 9.45 eV	100 ppm (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, headache, visual disturbance, weakness, exhaustion, nausea, dizziness, vomiting Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **1,1,1-trichloroethane** CAS: 71-55-6 Vapor Pressure: 100 mmHg Ionization Potential:	350 ppm (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, headache, weakness, exhaustion, CNS depression, poor equilibrium, dermatitis, and cardiac arrhythmia. Chronic: liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention

TABLE C-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
Chemical Name: **Benzene** CAS: 71-43-2 Vapor Pressure: 75 mmHg Ionization Potential: 9.24 Ev	0.1 ppm (OSHA PEL)	Irritation eyes, skin, nose, respiratory system, dizziness, headache, nausea, staggered.	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Acute: Irritation eyes, skin, nose, respiratory system, dizziness, headache, nausea, and staggered gait. Chronic: anorexia, lassitude, dermatitis, bone marrow depression.	Eye: Irrigate Skin: Soap/Flush promptly Breathing: Respiratory Support Ingestion: Medical attention immediately
Chemical Name: **Ethyl Benzene** CAS: 100-41-4 Vapor Pressure: 7 mmHg Ionization Potential: 8.76 eV	100 ppm (OSHA PEL)	Inhilation, ingestion, skin and/or eye contact.	Eyes, skin, respiratory system, central nervous system	Acute: Irritation eyes, skin, mucous membrane, dermatitis, headache, narcosis, coma	Eye: Irrigate Immediately Skin: Soap/Flush promptly Breathing: Respiratory Support Ingestion: Medical attention immediately

TABLE C-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, NEW YORK

Chemical Name: **Toluene** CAS: 108-88-3 Vapor Pressure: 21 mmHg Ionization Potential: 8.82 Ev	200 ppm (OSHA PEL)	Inhalation Skin adsorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, liver, kidneys, central nervous system.	Acute: Irritation eyes, nose; lassitude (weakness, exhaustion), confusion,euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.	Eye: Irrigate immediately Skin: Soap wash promptly B Breathing: Respiratory support If ingested seek medical attention immediately
Chemical Name: **Vinyl Chloride** CAS: 75-01-4 Vapor Pressure: 3.3 atm Ionization Potential: 9.99 eV	1 ppm (OSHA PEL)	Inhalation, Skin and/or eye contact liquid	Liver, central nervous system, blood, respiratory system, lymphatic system Cancer Site: Liver Cancer	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; Potential occupational carcinogen.	Eye: Frostbite Skin: Frostbite Breathing: Respiratory Support
Chemical Name: **Xylenes** CAS: 108-38-3 Vapor Pressure: 9 mmHg Ionization Potential: 8.56 eV	100 ppm (OSHA PEL)	Inhalation Skin adsorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Acute: Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support If ingested seek medical attention immediately

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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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
SOUTH END PLACE SITE CHARACTERIZATION, FREEPORT, 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

Job Hazard Analysis

Attachment 1

Site No. 1-30-162

Work Assignment No. D003970-28

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. 1-30-162

Work Assignment No. D003970-28

New York State Department of Health
Generic Community Air Monitoring Plan

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

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

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

Community Air Monitoring Plan

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

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

Daily Safety Meeting Form

Attachment 3

Site No. 1-30-162

Work Assignment No. D003970-28

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. 1-30-162

Work Assignment No. D003970-28

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. 1-30-162

Work Assignment No. D003970-28

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. 1-30-162

Work Assignment No. D003970-28

MAPQUEST

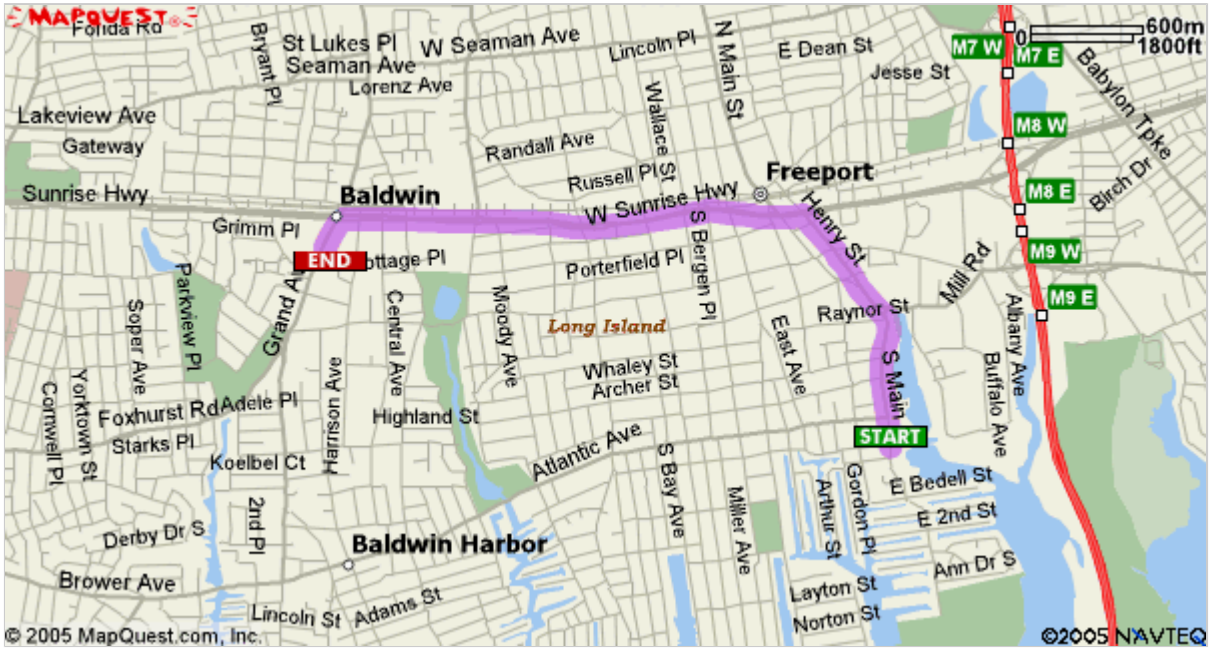
Start: **435 S Main St**
Freeport, NY 11520-5116, US

End: **2277 Grand Ave**
Baldwin, NY 11510-3148, US

Notes:

Directions	Distance
START **1:** Start out going NORTH on S MAIN ST toward E RAY ST.	0.6 miles
2: Stay STRAIGHT to go onto HENRY ST.	0.2 miles
WEST 27 **3:** Turn LEFT onto E SUNRISE HWY / POW / MIA MEMORIAL HWY / NY-27 W.	1.5 miles
4: Turn LEFT onto GRAND AVE.	0.1 miles
END **5:** End at **2277 Grand Ave** Baldwin, NY 11510-3148, US	

Total Est. Time: **7 minutes** **Total Est. Distance:** **2.50 miles**



Start:
435 S Main St
Freeport, NY 11520-5116, US

End:
2277 Grand Ave
Baldwin, NY 11510-3148, US

APPENDIX D
KEY PROJECT STAFF PROFESSIONAL PROFILES

South End Place Site Characterization
Investigation Area Site
Freeport
Township of Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-162
NYSDEC Work Assignment No. D003970-28

October 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

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.

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.

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.