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11 June 2004

VIA FEDERAL EXPRESS

Jeffrey L. Dyber, P.E.
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remedation
Remedial Bureau A
625 Broadway, 11th Floor
Albany, New York 12233-7015

RE: Utility Manufacturing (Site No. 1-30-043H)
Work Assignment D003970-13

Dear Mr. Dyber:

Environmental Resources Management (ERM) is pleased to submit 3 copies of the Final Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the Utility Manufacturing (Site No. 1-30-043H). The Work Plan was prepared in accordance with the Scope of Work detailed in the 21 October 2003 Work Assignment (WA), comments regarding the initial Project Scoping Plan (PSP) set forth in the NYSDEC's 27 February 2004 letter, and revised according to the comments provided in your 28 May 2004 letter (Dyber Letter). Excluding the exceptions discussed below, all changes to the RI/FS specified in the Dyber Letter were made as indicated.

The following exceptions to the Dyber Letter comments are noted:

- Schedule 2.11(b): The five 2.11(b) forms, representing each year of the project were left as separate pages. Discussions with the Contracts Section (Antoinette Norfleet) indicated that it is acceptable to prepare the 2.11(b)s as separate pages and combining the pages would have required extensive revisions to the formulae contained in the spreadsheet, which would have increased costs. As we discussed and indicated in the Dyber Letter, the costs for Task 1 – Work Plan Preparation, were adjusted to reflect the changes to the scope of the project.
- Schedules 2.11(c) and 2.11(d)2: Budget for both mileage and the field van have been included. Both vehicles will be used during the project. The field geologist will generally get to the site to oversee, for example drilling activities, using his/her personal vehicle. However, when sampling is carried out and equipment is needed, the field van will be used.

- Schedule 2.11(d)5: The cost for distilled water has been changed to $11.96 for 5-gallons plus a $10 deposit for the bottle (Home Depot).
- Schedule 2.11(f): The 1.5 factor has been used for the Walsh Engineering budget to account for the change in project scope. Walsh's cost estimate was based on the project scope detailed in the WA. The scope of the project was revised after surveyor bids were received and consequently the 1.5 factor was applied to account for the increased area to be surveyed.

We look forward to working with you on this project. If you have any question or need clarification please call the undersigned at your earliest convenience.

Sincerely,

Chris W. Wenczel
Senior Project Manager

Gregory K. Shkuda, PhD
Project Director

OFF-SITE REMEDIAL INVESTIGATION & FEASIBILITY STUDY WORK PLAN

Utility Manufacturing
700-712 Main Street
Town of North Hempstead, Nassau County, NY
NYSDEC Site No. 1-30-043H
NYSDEC Work Assignment No. D003970-13

June 2004

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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NYSDEC/0011500.2526

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1.0 *INTRODUCTION*

Environmental Resources Management (ERM) is pleased to submit this Final Remedial Investigation/Feasibility Study (RI/FS) Work Plan (WP) for the Utility Manufacturing Site located in the New Cassel Industrial Area, Town of North 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 #: D003970-13;
- Comments regarding the initial Project Scoping Plan (PSP) set forth in the NYSDEC's 27 February 2004 letter; and
- Comments regarding the March 2004 Draft RI/FS WP set forth in the NYSDEC's 28 May 2004 letter.

Task 1 of the Work Assignment (WA) was the preparation of the PSP and this WP, which defines all necessary operating parameters, procedures and protocols for performance of the RI/FS in one, comprehensive document. It is intended to:

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

This document is intended to be taken in the field, and will be read, understood, and followed by all personnel working on the RI/FS 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*

1.1.1 *Purpose and Objectives*

The purpose of this Engineering Services Standby Contract WA is to conduct an off-site RI/FS. The RI will focus on identifying off-site groundwater impacts that pose a threat to public health or the environment. The specific objectives of the RI are to:

- Characterize the nature and extent of off-site impacts resulting from historic on-site releases. This includes defining pathways and methods of migration of hazardous waste or constituents, including the:
  - Media affected,
  - Extent, direction and speed of constituent migration,
  - Complicating factors influencing movement,
  - Concentration profiles, etc.;
- Determine actual and potential threats of releases from the Site to human health and/or the environment, if any, in both the short and long term; and
- Gather necessary data to support an FS.

The objective of the FS will be to support an informed decision regarding which remedial option is the most appropriate, cost effective, and protective of public health and the environment based on the findings of the RI.

1.2 *SITE DESCRIPTION AND BACKGROUND INFORMATION*

The Site is located between Bond Street and Frost Street in the New Cassel Industrial Area (NCIA) at 700-712 Main Street, Town of North Hempstead, Nassau County, New York. The property is currently owned by Nest Equities. A Site Location Map is presented in Figure 1.

Utility Manufacturing is an active facility that stores, blends and repackages tetrachloroethylene (PCE). The facility uses over 20,000 pounds of PCE per year. Utility Manufacturing has operated at the Site since 1976 and was the tenant at the property in 1988 when there was a documented release of PCE and trichloroethane (TCA) to on-site cesspools and dry wells. Utility Manufacturing subsequently remediated these drainage structures under the supervision of the Nassau County Health Department (NCHD). However, PCE was found in on-site groundwater as part of a larger investigation of the NCIA by the NYSDEC.

The NYSDEC added the Site to its Registry of Inactive Hazardous Waste Disposal Sites In New York State as a Class 2 site in May 1996 naming Utility Manufacturing as a Potentially Responsible Party (PRP). Utility Manufacturing filed petitions to delist the Site in 1996 and 1997. The NYSDEC denied both petitions.

In September 1997, Utility Manufacturing entered into a Consent Order to perform an RI/FS. The investigation included the installation of groundwater monitoring wells, and the collection of both soil and groundwater samples.

The Draft RI Report resulting from these activities was received in October 1998. The NYSDEC required Utility Manufacturing to perform additional groundwater sampling to fully define the extent of on-site

groundwater contamination. The additional sampling was completed in the fall of 2000.

The results of the RI sampling revealed elevated levels of PCE in groundwater beneath the Site. An Interim Remedial Measure (IRM) consisting of air sparging/soil vapor extraction (AS/SVE) was installed to remediate on-site soil and groundwater contamination.

In 2002, the NYSDEC ordered Utility Manufacturing to perform off-site (down gradient) groundwater sampling to Old Country Road. Utility Manufacturing refused to perform this work in accordance with the NYSDEC's requirements. As such, NYSDEC has elected to perform the work and the WA was subsequently issued to ERM.

1.3 SITE HYDROGEOLOGY

The Site is relatively flat and situated upon the glacial outwash soil deposits of Long Island (the Upper Glacial Formation) at an elevation of approximately 120 feet above mean sea level. The Upper Glacial Formation at the Site includes a layer of clay that occurs at a depth of approximately 38 to 40 feet below ground surface (bgs). Based on previous work performed at the Site, perched groundwater is known to occur upon this clay layer. The underlying water table occurs within the Upper Glacial Formation at a depth of approximately 50 to 55 feet bgs. Regional groundwater flow direction is to the southwest. At a depth of approximately 100 feet bgs, the Upper Glacial Formation is underlain by the Magothy Formation, which is the principal water supply aquifer for most of Nassau County. The Magothy Formation is approximately 500 feet thick beneath the Site.

2.0 *REMEDIAL INVESTIGATION/FEASIBILITY STUDY SCOPE OF WORK*

The RI/FS Scope of Work presented herein is based on the tasks initially identified in the WA, detailed in the PSP and subsequently modified and/or expanded in accordance NYSDEC's 27 February 2004 and 28 May 2004 letters. The tasks required to execute the WA are identified and described in detail below.

2.1 *TASK 1: RI/FS WORK PLAN PREPARATION*

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

2.2 *TASK 2: REMEDIAL INVESTIGATION*

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

- Installation of soil borings to collect both lithologic samples to characterize off-site stratigraphic conditions, and groundwater samples using a Hydropunch to characterize off-site groundwater quality/impacts (i.e. determine if site-related contaminants have migrated off-site).
- Installation of groundwater monitoring wells to confirm the results of the Hydropunch sampling.
- Collection of soil gas samples.

The core field investigative activities of the RI are discussed in Subtasks 2A through 2I below, which comprise the Detailed Field Activities Plan (FAP). In order 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.) shall be located and reviewed. Information sources may include NYSDEC's Region 1 and Central Office (Albany) files, the Town of North Hempstead, and Nassau County Health Department (NCHD) files. ERM will also review the on-site RI reports and data. Potential sources and areas of contamination will be identified, if possible.

2.2.2 *Subtask 2B: Underground Utility Markouts*

ERM recommends that underground utility markouts be performed at the off-site areas to be investigated prior to the site survey, 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 markouts 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: Off-Site Access*

ERM anticipates performing all off-site investigative activities in the public street right-of-way (ROW). ERM's drilling subcontractor will be tasked with obtaining the necessary road opening permits and/or other authorizations as required by the Town of North Hempstead, 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.

As discussed during the 18 November 2003 site visit, ERM has secured access to the nearby Bowling Green Water District supply well property located at the end of Iris Place (south of Old Country Road) to temporarily stage:

- Well construction materials;
- Subcontractor vehicles (i.e. weekend parking of the drill rig);
- A self-contained decontamination area; and
- Drums of investigative derived waste (IDW) such as drill cuttings, decontamination water, and groundwater monitoring well development/purge water.

ERM will finalize access arrangements with Bowling Green Water District once the schedule for the field investigation is confirmed following issuance of a Notice-To-Proceed by NYSDEC.

2.2.4 *Subtask 2D: Site Survey*

Before initiation of on-site field activities, a New York State-licensed surveyor will survey the study area to develop a detailed topographic base map with one-foot contours. Relevant features and adjacent areas will be plotted at a scale of 1-inch = 50 feet. Relevant features include, but are not limited to, foundations, structures, fences, property lines, existing wells, underground utilities, sumps, power lines, and fire hydrants. Based on the site visit, it is not anticipated that previous sampling locations other than the existing monitoring wells will be identifiable. The vertical datum for the map will be NGVD 86 or a datum relatable to NGVD 86. The base-map will be used to accurately plot all soil/Hydropunch borings, monitoring wells, cesspools, storm drains, groundwater flow directions and any other significant features.

A second survey will be conducted at the completion of RI field activities in order to plot all sampling locations including soil/Hydropunch borings, monitoring wells, and soil gas sample locations. The elevations of all monitoring well casings will be established to within +/- 0.01 feet based on the NGVD 86 datum. A notch will be placed in all interior casings to provide the reference point from which to collect future groundwater elevation measurements.

In addition to any paper figures supplied for reporting purposes, a copy of the base map and all overlying layers will be provided in electronic format on computer medium acceptable to the NYSDEC in a format compatible with AutoCAD Lite release 97.

2.2.5 *Subtask 2E: Soil Borings With Hydropunch Groundwater Sampling*

Soil borings with collection of lithologic soil samples and Hydropunch groundwater sampling will be installed at 11 locations to characterize the off-site stratigraphic conditions and characterize off-site groundwater quality/impacts (i.e. determine if site-related contaminants have migrated off site). Approximate locations of the 11 borings are shown in Figure 2-1.

The groundwater samples obtained from these locations will be analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory for Target Compound List (TCL) volatile organic compounds (VOCs) using Contract Laboratory Program (CLP) Method OLM04.2.

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

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

2.2.6 *Subtask 2F Soil Gas Sampling*

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 11 soil boring locations identified in Section 2.2.5. The soil gas samples will be collected at each location prior to performance of the soil boring. The soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators. 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. Specific details are presented below.

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

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

2.2.7 *Subtask 2G: Monitoring Well Installation*

Based on the results of the Hydropunch groundwater sampling, up to five groundwater monitoring wells will be installed at the discretion of the NYSDEC during a second mobilization. For budgeting purposes, it has been assumed that the wells will be screened at 115 to 125 feet bgs. A diagram showing a typical groundwater monitoring well construction is

presented as Figure 2-2. After the wells are developed, one groundwater sample will be collected from each well. The groundwater samples will be submitted to a NYSDOH ELAP-certified laboratory for TCL VOC analysis using CLP Method OLC03.2.

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

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

2.2.8 *Subtask 2H: Groundwater Sampling*

Approximately two weeks following well development activities, groundwater samples will be collected from the newly installed wells and analyzed for TCL VOCs using CLP Method OLC03.2. It is anticipated that USEPA low-flow well sampling techniques will be utilized. Well purging will continue until the turbidity of the recovered well water is less than 50 Nephelometric Turbidity Units (NTUs), and the pH, conductivity and temperature measurements of the purge water have stabilized within 10% for a minimum of three consecutive measurements. ERM's Hydrogeologist shall be responsible for collection of turbidity, pH, conductivity and temperature measurements.

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

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

2.2.9 *Subtask 2I: Management of Investigative Derived Wastes*

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

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

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

Accordingly, handling and disposal will be as follows:

- Cuttings from soil borings and the tailings from the unused portion of the samples will be placed back down the borehole. The remainder of the borehole will be grouted by hand or with a tremie pipe. If necessary, the borehole will also be sealed at or near the water table with a non-shrinking impermeable material to prevent the hole from acting as a conduit for surface runoff.
- Cuttings from monitoring well installations will be collected on plastic sheeting and stored in reconditioned 55-gallon, New York State Department of Transportation (DOT) open-top drums to be provided by the ERM's drilling subcontractor.
- Liquids generated from equipment decontamination, temporary and permanent groundwater monitoring well development/purging will be collected in drums at the point of generation. The collected water will be transported and temporarily stored in a frac tank that will be staged on the property owned by the Bowling Green Water District. The water will be sampled for VOCs and then discharged to the adjacent Nassau County sanitary sewer manhole in accordance with the authorization set forth in the 10 March 2004 letter from the Nassau County Department of Public Works presented in Appendix D.
- Used protective clothing and equipment that is suspected to be contaminated with hazardous waste will be placed in plastic bags, and packed in 55-gallon ring-top drums.
- All drums will be labeled according to the borehole/well number. The drilling subcontractor shall move the drums on a daily basis at the direction of ERM's Hydrogeologist to the staging area.
- ERM will procure waste transport and disposal subcontractor services to properly dispose of all IDW in accordance with all local, State and Federal regulations.
- Non-contaminated trash, debris and protective clothing will be placed in a trash dumpster and disposed of by a local garbage hauler.

2.2.10 *Subtask 2J: Analytical Data Quality Evaluation*

Data quality objectives and analytical requirements are detailed in the QAPP. All laboratory data will be reviewed, validated and qualified as necessary to assess data usability by direct comparison to the specified data quality objectives and/or procedures set forth in the QAPP. A third party that is independent of the laboratory that did the analysis, and independent of ERM will perform data validation. ERM's QA/QC Officer

will conduct a Usability Analysis. A Data Usability Report with attached Data Validation Reports from the third party reviewer will be submitted to the NYSDEC along "Category B Deliverables" for all laboratory analytical work.

2.2.11 *Subtask 2K: Citizen Participation/Pre-RI Public Meeting*

ERM will assist the NYSDEC with the preparation and presentation of any CP activities, as necessary. Prior to initiation of the RI fieldwork, the NYSDEC may hold a public information meeting near the Site. The NYSDEC will run the meeting with assistance from ERM. ERM will provide the following services as part of this task:

- Develop a list of interested citizens and public officials;
- Place additional copies of reports in the local repositories; and
- Mail public meeting notices.

If requested, ERM will provide additional support as directed by the NYSDEC that could include the preparation visual aids such as large site maps on poster boards, data summary sheets, photographs and/or a slide presentation of site activities. If additional support is requested by NYSDEC, ERM and NYSDEC will define the expanded Scope of Work and ERM will develop an associated budget adder for NYSDEC approval. ERM will not commence any work outside of the current Scope of Work discussed above until authorized by NYSDEC.

2.2.12 *Subtask 2L: Health and Environmental Risk Assessment*

ERM will perform a Health and Environmental Risk Assessment (HRA). The HRA will address the possible exposure routes for contaminants and identify the potentially affected receptors. The Scope of Work will identify these exposure routes and the potential receptors, which will most likely be limited to public and private wells near the Site. As part of

the HRA, ERM will prepare a map depicting all public and private wells within one-mile of the Site.

2.2.13 *Potential Supplemental Activities*

Three potential supplemental activities to the RI/FS are identified and discussed below. It should be noted that no level of effort is anticipated at this time and no considerations for these potential supplemental activities have been factored into the schedule and budget developed for the project. If the need for one or more of these activities is identified, ERM will prepare and submit a Scope of Work, schedule and budget to NYSDEC for approval. ERM will not commence any work outside of the current Scope of Work discussed above until authorized by NYSDEC.

2.2.13.1 *Supplemental RI (Optional)*

In the event that characterization data collected during the RI are found incomplete, a Supplemental RI will be scoped and implemented. Scoping will be conducted concurrently with the start of the Feasibility Study.

2.2.13.2 *Interim Remedial Measure (Optional)*

If an IRM is needed to mitigate unacceptable conditions discovered during the RI, the scoping and implementation of the IRM shall be done concurrently with the start of the Feasibility Study.

2.3 *TASK 3: REMEDIAL INVESTIGATION REPORT PREPARATION*

The RI Report will be prepared following completion of the RI field activities, and the reduction, validation and interpretation of the data. The RI Report will provide a summary of the Scope of Work, methods, results, conclusions and recommendations from the RI. It will present a conceptual model of the Site including any available waste disposal history, the environmental setting, contamination assessment, and hydrogeologic model. The RI Report will also identify any data gaps that require further investigation and recommend any IRMs, if required.

Further details concerning essential components to the RI Report are discussed below.

- Reporting: The Task 2 deliverables such as the historic records will be appended to the Draft RI Report.
- Summary of Site History and Conditions: The report will include all of the information collected during the historic records and file search and a section detailing the geologic and hydrogeologic conditions.
- Summary of Field Work: The report will include a detailed summary of investigative and analytical methods related to the fieldwork performed during the RI. 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 RI 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 RI Report will identify SCGs and remediation goals that will be used for comparison with off-site conditions to form a basis for selection of remedial measures as a prelude to the FS. 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 off-site impacts. Any additional Applicable or Relevant and Appropriate Requirements (ARARs) will also be identified.
- Evaluation of Data Collected: The completeness of the data collected during the RI 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 RI 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 RI 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 QuattroPro 8 formats, respectively.

2.4 *TASK 4: FEASIBILITY STUDY REPORT PREPARATION*

The objective of the FS will be to support an informed decision regarding which remedial option is the most appropriate, cost effective and protective of public health and the environment based on the findings of the RI. The FS will be conducted using TAGM 4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites.

2.4.1 *Subtask 4A: Development of Remedial Action Objectives*

Upon commencement of the FS, ERM will review the results of the RI with NYSDEC as they pertain to the development and screening of remedial alternatives. The goal of this activity will be to:

- Identify the remedial action objectives (RAOs) for all exposure routes of concern and effected media;
- Determine the direction of the FS; and
- Focus the development of appropriate remedial alternatives in consideration of the RAOs and SCGs.

The appropriate guidance will be researched and an evaluation of background analytical results will be performed to determine the RAOs. Guidance used to evaluate RAOs will include, but not be limited to, NYSDEC TOGS No. 1.1.1 "Ambient Water Quality Standards and Guidance Values" (6/98).

2.4.2 *Subtask 4B: Development of Remedial Alternatives*

Using the information generated in Tasks 1-3, ERM will develop a list of potential alternatives that may be used to remediate the off site groundwater. The potential alternatives will consider technical feasibility, cost, and the anticipated future usage of the affected media (e.g. off-site groundwater). Only those alternatives that are technically feasible and cost-effective will be included. If appropriate, "presumptive remedy," alternatives will be considered and a screening analysis of the alternatives may not required.

2.4.3 *Subtask 4C: Detailed Analysis of the Alternatives*

A more detailed analysis of the alternatives will include refinement and/or modification of the identified remedial alternatives based on further engineering analysis, the results of any Site-specific treatability studies, and the findings of the RI. The detailed analysis will consider each potential alternative in terms of the following factors:

- Overall protection of human health and the environment;
- Compliance with SCGs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility and volume;
- Short term effectiveness;
- Implementability; and
- Cost.

2.4.4 *Subtask 4D: Feasibility Report Preparation*

The FS Report will include limited site background and site characterization discussions, since this information will be available in the RI Report. The report will be focused on the information necessary to justify the findings of the FS. Accordingly, the FS report will identify and summarize the RAOs and SCGs, include discussions of the development of the potential remedial alternatives, and present the detailed analysis of each potential alternative relative to each of the seven evaluation criteria listed in Section 2.4.3. A summary, including a comparative analysis, will also be included in the report.

ERM will prepare a conceptual plan for implementing each alternative, and will verify its feasibility. ERM will include calculations for each design parameter in the conceptual plan. The FS Report will include a detailed engineer's cost estimate and will be stamped by a professional engineer licensed to practice in the State of New York.

2.4.5 *Proposed Remedial Action Plan And Public Meeting*

At the completion of the RI/FS, the NYSDEC will prepare the Proposed Remedial Action Plan (PRAP), which describes the preferred remedy and hold a public information meeting near the Site to present the remedial actions chosen in the PRAP. ERM will provide tables and figures from the RI/FS reports to support the PRAP document.

It is understood that the NYSDEC will schedule and lead a public meeting to discuss the findings of the FS. As with the previous public meetings discussed above, ERM will assist NYSDEC in preparation of visual aids, attend the meeting, and assist NYSDEC with questions and public discussion. ERM will place additional copies of reports in the local repositories, mail fact sheets and public notices before and after the public meeting, and provide additional help, as directed by NYSDEC.

If additional support is requested by NYSDEC, ERM and NYSDEC will define the expanded Scope of Work and ERM will develop an associated budget adder for NYSDEC approval. ERM will not commence any work outside of the current Scope of Work discussed above until authorized by NYSDEC.

3.0 *MONTHLY PROGRESS REPORTING*

ERM will begin to 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 drawing and tables will be submitted in AutoCAD LT 2000 and QuattroPro 8 formats, respectively.

4.0 *DETAILED WORK ASSIGNMENT SCHEDULE*

The Utility Manufacturing Detailed Work Assignment Implementation Schedule, including milestones and deliverables for the RI/FS is presented in Figure 4-1.

The schedule contemplates a 13 August 2004 start for field activities assuming the Notice-To-Proceed is issued by NYSDEC on or before 15 July 2004. ERM will endeavor to adhere to the schedule at all times, but there are several critical path items related to execution of the RI 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 RI/FS progresses because of:

- Potential new requirements or activities that may be requested by the NYSDEC, NYSDOH and/or the Town of North 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 Utility Manufacturing RI/FS will be from ERM's Melville New York, and New York City Offices. Only those staff that have been deemed acceptable by the NYSDEC, and who appear on the NYSDEC approved list of employees will be utilized.

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 RI/FS 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, Jeffrey Dyber 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. Chris Wenczel, will report to the ERM PD and the RPM. Mr. Wenczel will oversee the ERM QA/QC Officer and the ERM FTL, field investigation staff, and any subcontractors. Mr. Wenczel 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. Wenczel will be the primary contact between ERM and NYSDEC, as directed by the RPM. Mr. Wenczel 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*

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

5.7 *FEASIBILITY STUDY KEY STAFF*

Implementation of the FS and preparation of the FS Report will be overseen by Mr. Edward Wong, P. E. Mr. Wong is a New York State-licensed Professional Engineer. Other key technical staff the will contribute to the FS effort will be Ms. Carla Weinpahl. Both Mr. Wong and Ms. Weinpahl have extensive RI/FS experience in New York State.

Professional profiles for the aforementioned key project staff are presented in Appendix E. A project staffing organization chart illustrating the same is present as Figure 5-1.

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 Utility Manufacturing Off-Site RI/FS 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***
  - Welsh Engineering & Land Surveying, P.C.
- ***Laboratory Services***
  - Mitkem (MBE)
- ***Data Validation***
  - L.A.B. Validation Corp (WBE)
- ***IDW Disposal***
  - American Environmental Assessments, Inc.

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)

Date Prepared:
June 11, 2004

Summary of Work Assignment Price

Work Assignment Number

1)	Direct Salary Costs (Schedules 2.10(a) and 2.11 (b))	$38,493
2)	Indirect Costs (Schedule 2.10(g))	$62,359
3)	Direct Non-Salary Costs (Schedules 2.10 (b)(c)(d) and 2.11(c)(d))	$15,143
4)	Subcontractor Costs	

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

Name of Subcontractor	Services To Be Preformed	Subcontract Price
i)		
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 Preformed	Subcontract Price
i) Welsh Engineering	Surveying	$ 8,925.00
ii) Delta Well & Pump	Drilling Services	$ 83,075.00
iii) MITKEM	Analytical Services	$ 15,070.00
iv) L.A.B. Validation	Data Validation	$ 4,600.00
v) AEAC	IDW Disposal	$ 11,020.00

B)	**Total Unit Price Subcontracts**	$122,690	
5)	SubcontractManagement Fee (Only for Unit Price Subcontracts >$10,000)	$5,458	
6)	Total Subcontract Costs (lines 4A + 4B + 5)		$128,148
7)	Fixed Fee (Schedule 2.10(h))		$7,060
8)	Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)		$251,203

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

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 2003)	$67.70	$59.11	$47.72	$44.18	$36.63	$31.95	$22.42	$19.43	$18.78	$15.01	
Task 1 Work Plan Development		8		38	10	16		8		16	96
Task 2 - RI											0
Task 3 RI Report											0
Task 4 FS Report											0
Task 1 Work Plan Development	$0.00	$472.88	$0.00	$1,678.84	$366.30	$511.20	$0.00	$155.44	$0.00	$240.16	$3,424.82
Task 2 - RI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 3 RI Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 4 FS Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Hours	0	8	0	38	10	16	0	8	0	16	**96**
Total Direct Labor Cost ($)	$0.00	$472.88	$0.00	$1,678.84	$366.30	$511.20	$0.00	$155.44	$0.00	$240.16	**$3,424.82**

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

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 2004)	$70.07	$61.18	$49.39	$45.73	$37.91	$33.07	$23.21	$20.11	$19.43	$15.54	
Task 1 Work Plan Development		8				40					48
Task 2 - RI		16			80			396			492
Task 3 RI Report		26	40		100		56	56		40	318
Task 4 FS Report		8			75		38			32	153
Task 1 Work Plan Development	$0.00	$489.44	$0.00	$0.00	$0.00	$1,322.80	$0.00	$0.00	$0.00	$0.00	$1,812.24
Task 2 - RI	$0.00	$978.88	$0.00	$0.00	$3,032.80	$0.00	$0.00	$7,963.56	$0.00	$0.00	$11,975.24
Task 3 RI Report	$0.00	$1,590.68	$1,975.60	$0.00	$3,791.00	$0.00	$1,299.76	$1,126.16	$0.00	$621.60	$10,404.80
Task 4 FS Report	$0.00	$489.44	$0.00	$0.00	$2,843.25	$0.00	$881.98	$0.00	$0.00	$497.28	$4,711.95
Total Hours	0	58	40	0	255	40	94	452	0	72	**1011**
Total Direct Labor Cost ($)	$0.00	$3,548.44	$1,975.60	$0.00	$9,667.05	$1,322.80	$2,181.74	$9,089.72	$0.00	$1,118.88	**$28,904.23**

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

Schedule 2.11 (b)
Direct Labor Hours Budgeted

Labor Classification	*IX*	*VIII*	*VII*	*VI*	*V*	*IV*	*III*	*II*	*I*	*Admin.*	*Total Direct Labor Hrs.*
Av. Salary Rate ($) (Year 2005)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1 Work Plan Development											0
Task 2 - RI											0
Task 3 RI Report											0
Task 4 FS Report		4			32		32			16	84
Task 1 Work Plan Development	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 2 - RI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 3 RI Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 4 FS Report	$0.00	$253.28	$0.00	$0.00	$1,255.68	$0.00	$768.64	$0.00	$0.00	$257.28	$2,534.88
Total Hours	0	4	0	0	32	0	32	0	0	16	**84**
Total Direct Labor Cost ($)	$0.00	$253.28	$0.00	$0.00	$1,255.68	$0.00	$768.64	$0.00	$0.00	$257.28	**$2,534.88**

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

Schedule 2.11 (b)
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 2003)	$67.70	$59.11	$47.72	$44.18	$36.63	$31.95	$22.42	$19.43	$18.78	$15.01	
Task 1 Work Plan Development		8								8	16
Task 2 - RI											0
Task 3 RI Report											0
Task 4 FS Report											0
Task 1 Work Plan Development	$541.60	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.24	$240.16	$932.00
Task 2 - RI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 3 RI Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 4 FS Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Hours	0	8	0	0	0	0	0	0	0	8	**16**
Total Direct Labor Cost ($)	$0.00	$472.88	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$120.08	**$592.96**

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

1) Work Plan Budget Development
Conflict of Interest check
Budget schedules &
supporting documentation
2) Review work 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** include:
1) QA/QC reviews
2) Technical oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

Schedule 2.11 (b)
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 2004)	$70.07	$61.18	$49.39	$45.73	$37.91	$33.07	$23.21	$20.11	$19.43	$15.54	
Task 1 Work Plan Development											0
Task 2 - RI					20					10	30
Task 3 RI Report											0
Task 4 FS Report					16					8	24
Task 1 Work Plan Development	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 2 - RI	$0.00	$0.00	$0.00	$0.00	$758.20	$0.00	$0.00	$0.00	$0.00	$155.40	$913.60
Task 3 RI Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 4 FS Report	$0.00	$0.00	$0.00	$0.00	$606.56	$0.00	$0.00	$0.00	$0.00	$124.32	$730.88
Total Hours	0	0	0	0	36	0	0	0	0	18	**54**
Total Direct Labor Cost ($)	$0.00	$0.00	$0.00	$0.00	$1,364.76	$0.00	$0.00	$0.00	$0.00	$279.72	**$1,644.48**

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

1) Work Plan Budget Development
Conflict of Interest check
Budget schedules &
supporting documentation
2) Review work 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** include:
1) QA/QC reviews
2) Technical oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Engineer/Contract #: C003970
Project Name Utility Manufacturing
Work Assignment No.D003970-13

Date Prepared: June 11, 2004

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

Labor Classification	*IX*	*VIII*	*VII*	*VI*	*V*	*IV*	*III*	*II*	*I*	*Admin.*	*Total Direct Labor Hrs.*
Av. Salary Rate ($) (Year 2005)	$72.52	$63.32	$51.12	$47.33	$39.24	$34.22	$24.02	$20.81	$20.11	$16.08	
Task 1 Work Plan Development											0
Task 2 - RI											0
Task 3 RI Report											0
Task 4 FS Report		8			16					16	40
Task 1 Work Plan Development	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 2 - RI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 3 RI Report	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Task 4 FS Report	$0.00	$506.56	$0.00	$0.00	$627.84	$0.00	$0.00	$0.00	$0.00	$257.28	$1,391.68
Total Hours	0	8	0	0	16	0	0	0	0	16	**40**
Total Direct Labor Cost ($)	$0.00	$506.56	$0.00	$0.00	$627.84	$0.00	$0.00	$0.00	$0.00	$257.28	**$1,391.68**

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

1) Work Plan Budget Development
Conflict of Interest check
Budget schedules &
supporting documentation
2) Review work 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** include:
1) QA/QC reviews
2) Technical oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Schedule 2.11 (c)

Date Prepared:
June 11, 2004

Direct Non-Salary Costs

Work Assignment Number D003970-13

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. Units	Total Estimated Cost ($)
Task 1 Work Plan Development			
Copies	$0.020 copy	2000	$40.00
Computer Admin	$1.00 hr	24	$24.00
Computer CADD	$7.00	10	$70.00
Shipping	$25.00 package	2	$50.00
Milage	$0.38 mile	25	$9.38
Task 2 Remedial Investigation			
Milage	$0.38 mile	1625	$609.38
Low Value Equipment	0.8 field hour	400	$320.00
Task 3 Remedial Investigation Report			
Trains	$110.00 trip	2	$220.00
Ground Trans	10 trip	4	$40.00
Copies	$0.020 copy	2000	$40.00
Computer Admin	$1.00 hr	24	$24.00
Computer CADD	$7.00 hr	56	$392.00
Shipping	$25.00 package	2	$50.00
Task 4 Feasibility Study			
Trains	$110.00 trip	2	$220.00
Ground Trans	10 trip	4	$40.00
Copies	$0.020 copy	2000	$40.00
Computer Admin	$1.00 hr	24	$24.00
Computer CADD	$7.00 hr	32	$224.00
Shipping	$25.00 package	2	$50.00

Total Direct Non-Salary Costs $2,486.75

Work Assignment No. **D003970-13**

Schedule 2.11(d) 1

Equipment Purchased 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. **D003970-13**

Schedule 2.11(d) 2

Maximum Reimbursement Rates for Consultant Owned Equipment

Item	Purchase Price ($) x 85%	Usage Rate* ($/Unit of Time)	Capital Recovery** Rate ($/Unit of Time)	O&M Rate ($/Unit of Time)	Est. Usage (Unit of Time)	Est. Usage Cost ($) (Col. 3 x 6)
Field Phone (1)	$ 84.15	$ 70.00	$ 60.00	$ 10.00	2	$ 140.00
Field Van	$ 17,000.00	$ 67.00	$ 22.00	$ 45.00	55	$ 3,685.00
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
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		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
		$ -				$ -
					TOTAL	$ 3,825.00

*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.

Phone Ugase Rate is per month
Van Usage Rate is per day

Work Assignment No. **D003970-13**

Schedule 2.11(d) 3

Maximum Reimbursement Rate for Vendor Rented Equipment

Item	Max. Reimbursement Rate ($)*	Unit	Est. Usage (unit of time)	Number Of Units Neded	Est. Rental Cost ($) (Co. 2 x 3)
Dust Thermo pDR	$ 350.00	month	2	4	$ 2,800.00
PID Miniras 2000	$ 450.00	month	1	2	$ 900.00
Lamotte 2020 Turbidity Meter	$ 158.00	month	1	1	$ 158.00
Grundfos Pump	$ 105.00	day	5	1	$ 525.00
Solinst Interface Probe	$ 315.00	month	1	1	$ 315.00
Horiba U-22	$ 315.00	month	1	1	$ 315.00
Generator	$ 200.00	week	1	1	$ 200.00
Frac Tank	$ 728.00	month	2	1	$ 1,456.00
Frac Tank Delivery	$ 80.00	hr	6.5	1	$ 520.00
Frac tTank Pick Up	$ 80.00	hr	6.5	1	$ 520.00
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
			TOTAL		$ 7,709.00

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

Work Assignment No. **D003970-13**

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. **D003970-13**

Schedule 2.11(d) 5

Consumable Supplies

Item	Estimated Quantity	Unit Cost ($)		Total Budged Cost ($) (Col. 2 x 3)	
Gloves	600	$	0.30	$	180.00
Ear Plugs	60	$	0.30	$	18.00
Distilled Water (5 gallon)	5	$	11.96	$	59.81
Distilled Water Bottle Deposit	5	$	10.00	$	50.00
Alcanox	1	$	2.50	$	2.50
Padlocks	5	$	12.42	$	62.10
Aluminum foil	2	$	3.45	$	6.90
Survey flags	100	$	0.40	$	40.00
Paper towels	10	$	1.30	$	13.00
Plastic Bags (heavy duty)	30	$	1.75	$	52.50
S/S teaspons	100	$	0.60	$	60.00
Packing tape	5	$	2.50	$	12.50
Sampling tubing	500	$	0.33	$	165.00
VOC Sampler	5	$	0.90	$	4.50
Waste material label	45	$	1.00	$	45.00
Zip Lock bags	400	$	0.20	$	80.00
Isobutylene	3	$	45.00	$	135.00
Teflon Tubing	100	$	1.00	$	100.00
Bailers (Disposable)	5	$	7.15	$	35.75
				$	-
				$	-
				$	-
				$	-
				$	-
				$	-
			TOTAL	$	1,122.56

Schedule 2.11 (e)
Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D003970-13

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

A) Direct Salary Costs

Professional Responsibility Level	Labor Classification	Ave. Reimbursement Rate ($/Hr)	Max. Reimbursement Rate ($/Hr)	Est. No. of Hours	Total Est. Direct Salary Cost (Co. 3 x 5)
n/a					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
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
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 D003970-13

Welsh Engineering & Land Surveying, PC	**Surveying Services**		**Subcontract Price**	**Management Fee**
			$ 8,925.00	**$ -**

Item	Max. Reimbursement Rate	Unit	Est. No. of Units	Total Est. Cost
Title/Boundary Survey/ Drawings		$0.00 each	1	$ -
Locate 11 Soil Borings/11 Soil Gas and 5 Monitoring Wells		$5,950.00 Lump Sum	1.5	$ 8,925.00

Subtotal Subcontract Price	**$**	**8,925.00**
Subcontract Management Fee	$	-
TOTAL	**$**	**8,925.00**

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-13

Delta Well & Pump Co., Inc. | **Drilling Services**

	Subcontract Price	**Management Fee**
	$ 83,075.00	**$ 4,153.75**

Item	Max. Reimbursement Rate	Unit	Est. No. of Units	Total Est. Cost
Mobilization/Demobilization	$1,500.00	Lump Sum	1	$ 1,500.00
Drilling of Boreholes (Soil Boring/Hydropunch)	$15.00	foot	1375	$ 20,625.00
Split Spoon Soil Samples 0' to 50'	$30.00	sample	275	$ 8,250.00
Split Spoon Soil Samples 50' - 125'	$35.00	sample	90	$ 3,150.00
Hydropunch Samples	$150.00	sample	90	$ 13,500.00
Drilling of Monitoring Well Boreholes	$15.00	foot	640	$ 9,600.00
Monitoring Well Materials 2" PVC	$8.00	foot	625	$ 5,000.00
Monitoring Well/Micro Well Surface Completions	$150.00	each	5	$ 750.00
Monitoring Well Development	$140.00	hour	24	$ 3,360.00
Cutting/Fluids Handling	$140.00	hour	32	$ 4,480.00
Decontamination	$140.00	hour	24	$ 3,360.00
Hydrant Fees	$150.00	each	5	$ 750.00
Road Opening Permits	$300.00	each	16	$ 4,800.00
Concrete/Asphanlt Coring	$140.00	each	16	$ 2,240.00
55 Gallon DOT Drums	$38.00	each	45	$ 1,710.00

Subtotal Subcontract Price	**$ 83,075.00**
Subcontract Management Fee	**$ 4,153.75**
TOTAL	**$ 87,228.75**

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-13

MITKEM, Inc.	**Analytical Services**		**Subcontract Price**	**Management Fee**
			$ 15,070.00	**$ 753.50**

Item	Max. Reimbursement Rate	Unit	Est. No. of Units	Total Est. Cost
OLM04.2		$73.00 each	150	$ 10,950.00
OLC03.2		$73.00 each	15	$ 1,095.00
T0-15		$275.00 each	11	$ 3,025.00
Summa Canisters		$0.00 each		$ -
Preservative		$0.00 each	150	$ -
Data Packages		$0.00 each	8	$ -

Subtotal Subcontract Price	**$ 15,070.00**
Subcontract Management Fee	**$ 753.50**
TOTAL	**$ 15,823.50**

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-13

L.A.B. Validation Corp. Data Validation

	Subcontract Price	**Management Fee**
	$ 4,600.00	**$ -**

Item	Max. Reimbursement Rate	Unit	Est. No. of Units	Total Est. Cost
OLM04.2		$450.00 Sample Delivery Group	8	$ 3,600.00
OLC032.		$250.00 Sample Delivery Group	2	$ 500.00
TO-15		$250.00 Sample Delivery Group	2	$ 500.00

Subtotal Subcontract Price	**$**	**4,600.00**
Subcontract Management Fee	**$**	**-**
TOTAL	**$**	**4,600.00**

Schedule 2.11(f)
Unit Price Subcontracts
Work Assignment Number D003970-13

American Environmental Assessment	**IDW Disposal**		**Subcontract Price**	**Management Fee**
Waste			**$ 11,020.00**	**$ 551.00**

Item	Max. Reimbursement Rate	Unit	Est. No. of Units	Total Est. Cost
Hazardous Soil		$240.00 drum	45	$ 10,800.00
Transportatoion		$110.00 load	2	$ 220.00

Subtotal Subcontract Price	**$**	**11,020.00**
Subcontract Management Fee	**$**	**551.00**
TOTAL	**$**	**11,571.00**

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

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		
Task No./Name	Project Summary		
Complete	%		

	A	B		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				$ -		$ -	$ 38,493.05	$ 38,493.05
2. Indirect Costs 162%				$ -		$ -	$ 62,358.74	$ 62,358.74
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 100,851.79	$ 100,851.79
4. Travel				$ -		$ -	$ 1,138.75	$ 1,138.75
5. Other Non-Salary Costs				$ -		$ -	$ 14,004.56	$ 14,004.56
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 15,143.31	$ 15,143.31
7. Subcontractors				$ -		$ -	$ 128,148.25	$ 128,148.25
8. Total WA Costs				$ -		$ -	$ 244,143.35	$ 244,143.35
9. Fixed Fee				$ -		$ -	$ 7,059.63	$ 7,059.63
10. Total WA Price				$ -		$ -	$ 251,202.98	$ 251,202.98

Project Manager (Engineer) _____ Date _____

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

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		
Task No./Name	Task 1 Work Plan Preparation		
Complete	%		

	A	B		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				$ -		$ -	$ 6,169.06	$ 6,169.06
2. Indirect Costs 162%				$ -		$ -	$ 9,993.88	$ 9,993.88
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 16,162.94	$ 16,162.94
4. Travel				$ -		$ -	$ 9.38	$ 9.38
5. Other Non-Salary Costs				$ -		$ -	$ 184.00	$ 184.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 193.38	$ 193.38
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 16,356.31	$ 16,356.31
9. Fixed Fee				$ -		$ -	$ 1,131.41	$ 1,131.41
10. Total WA Price				$ -		$ -	$ 17,487.72	$ 17,487.72

$5,080.34

Project Manager (Engineer) _____ Date _____

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

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		
Task No./Name	Task 2 - Remedial Investigation		
Complete	%		

	A	B		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				$ -		$ -	$ 12,888.84	$ 12,888.84
2. Indirect Costs 162%				$ -		$ -	$ 20,879.92	$ 20,879.92
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 33,768.76	$ 33,768.76
4. Travel				$ -		$ -	$ 609.38	$ 609.38
5. Other Non-Salary Costs				$ -		$ -	$ 12,976.56	$ 12,976.56
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 13,585.94	$ 13,585.94
7. Subcontractors				$ -		$ -	$ 128,148.25	$ 128,148.25
8. Total WA Costs				$ -		$ -	$ 175,502.95	$ 175,502.95
9. Fixed Fee				$ -		$ -	$ 2,363.81	$ 2,363.81
10. Total WA Price				$ -		$ -	$ 177,866.76	$ 177,866.76

Project Manager (Engineer) _____ Date _____

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

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		
Task No./Name	Task 3 - Remedial Investigation Report		
Complete	%		

	A	B		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				$ -		$ -	$ 10,404.80	$ 10,404.80
2. Indirect Costs 162%				$ -		$ -	$ 16,855.78	$ 16,855.78
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 27,260.58	$ 27,260.58
4. Travel				$ -		$ -	$ 260.00	$ 260.00
5. Other Non-Salary Costs				$ -		$ -	$ 506.00	$ 506.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 766.00	$ 766.00
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 28,026.58	$ 28,026.58
9. Fixed Fee				$ -		$ -	$ 1,908.24	$ 1,908.24
10. Total WA Price				$ -		$ -	$ 29,934.82	$ 29,934.82

Project Manager (Engineer) _____ Date _____

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

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		
Task No./Name	Task - 4 Feasibility Study		
Complete	%		

	A	B		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				$ -		$ -	$ 9,369.39	$ 9,369.39
2. Indirect Costs 162%				$ -		$ -	$ 15,178.41	$ 15,178.41
3. Subtotal Direct Salary Costs and Indirect Costs				$ -		$ -	$ 24,547.80	$ 24,547.80
4. Travel				$ -		$ -	$ 260.00	$ 260.00
5. Other Non-Salary Costs				$ -		$ -	$ 338.00	$ 338.00
6. Subtotal Direct Non-Salary Costs				$ -		$ -	$ 598.00	$ 598.00
7. Subcontractors				$ -		$ -	$ -	$ -
8. Total WA Costs				$ -		$ -	$ 25,145.80	$ 25,145.80
9. Fixed Fee				$ -		$ -	$ 1,718.35	$ 1,718.35
10. Total WA Price				$ -		$ -	$ 26,864.15	$ 26,864.15

Project Manager (Engineer) _____ Date _____

Schedule 2.11(g) - Supplemental

Cost Control Report for Subcontracts

Page of

Engineer	C003970	Date Prepared	
Contract Number	D003970	Billing Period	
Project Name	Utility Manufacturing	Invoice No.	
Work Assignment No.	D003970-13		

	A	B		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)*
Welsh Engineering			$ -	$ 8,925.00	$ -		$ -
Delta Well & Pump			$ -	$ 83,075.00	$ 4,153.75		$ -
MITKEM			$ -	$ 15,070.00	$ 753.50		$ -
L.A.B. Validation			$ -	$ 4,600.00	$ -		$ -
American Envionmental			$ -	$ 11,020.00	$ 551.00		$ -
6			$ -				$ -
7			$ -				$ -
8			$ -				$ -
9			$ -				$ -
10			$ -				$ -
11. TOTALS	$ -	$ -	$ -	$ 122,690.00	$ 5,458.25	$ -	$ -

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. C003970/D003970
Project Name Utility Manufacturing
Work Assignment No. D003970-13

Date Prepared
Billing Period
Invoice No.

Task Name	*IX*				*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 Work Plan		0		24		0		38		10		56		0		8		0		24		160
Task 2 RI		0		16		0		0		100		0		0		396		0		10		522
Task 3 RI Report		0		26		40		0		100		0		56		56		0		40		318
Task 4 FS		0		20		0		0		139		0		70		0		0		72		301
Task 5																						
Task 6																						
Task 7																						
Task 8																						
Task 9																						
Task 10																						
Task 11																						
Task 12																						
Total Hours		0		86		40		38		349		56		126		460		0		146		1301

*Expended/Estimated

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

Engineer _____ *Contract No.* _____

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

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

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

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

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

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).

TABLES

TABLE B-1
SUMMARY OF OFF-SITE RI/FS SAMPLING PROGRAM
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Task	*Locations*	*Initial Number of Samples at Each Location*	*Sample Type*	*Location*	*Sampling Protocol*	*Depth*	*Analysis*
Soil Borings with Hydropunch Groundwater Profile Sampling	11	8	Aqueous	Soil Boring Locations HP-01 through HP-11	Hydropunch Groundwater Sampling	Approximate Depths Below Grade: 53', 63', 73', 83', 93', 103', 113', & 123'	Target Compound List (TCL) Volatile Organic Compounds (VOCs)
Soil Gas Sampling	11	1	Air	Soil Boring Locations HP-01 through HP-11	Summa Canister	~4' Below Grade	Full List Volatile Organic Compounds
New Groundwater Monitoring Well Sampling	5	1	Aqueous	New Well Locations To Be Determined Based On Hydropunch Groundwater Sampling Results & Soil Gas Sampling Results	USEPA Low-Flow Groundwater Sampling Procedures	115' - 125'	Target Compound List (TCL) Volatile Organic Compounds (VOCs)

TABLE B-2
SUMMARY OF RI/FS SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Matrix	*Number of Samples* [1]	*Analytical Parameters*	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [2]	*Container* [3]
Groundwater (Hydropunch)	147 (88+5+5+5+22+22)	Target Compound List Volatile Organic Compounds (TCL VOCs) [4]	USEPA CLP Method OLM04.2	pH<2 using Hydrochloric Acid (HCl), Cool 4°C	10 days	3 - 40ml glass vials with Teflon-lined cap
Groundwater (Monitoring Wells)	14 (5+1+1+1+3+3)	Target Compound List Volatile Organic Compounds (TCL VOCs) [4]	USEPA CLP Method OLC03.2	pH<2 using Hydrochloric Acid (HCl), Cool 4°C	10 days	3 - 40ml glass vials with Teflon-lined cap
Soil Vapor	11 (11+0+0+0+0+0)	Full List Volatile Organic Compounds [4]	USEPA Method TO-15	Keep Cool	10 days	Summa Canister

Notes:

1. Total analytical samples + QA/QC samples (Blind Field Duplicate + Matrix Spike + Matrix Spike Duplicate + Field Blanks + Trip Blanks).
2. Technical holding times vary.
3. As per Mitkem Corporation.
4. See Tables B-4A through B-4C for full compound lists.

TABLE B-3
OFF-SITE RI/FS SAMPLING PROGRAM QUALITY ASSURANCE
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Matrix	*Analytical Parameters*	*Number of Samples* [1]	*Blind Field Duplicates* [2]	*MS/MSD Pairs* [3]	*Field Blanks* [4]	*Trip Blanks* [5]
Groundwater (Hydropunch)	Target Compound List Volatile Organic Compounds [6]	88	5	5	22	22
Groundwater (Monitoring Wells)	Target Compound List Volatile Organic Compounds [6]	5	1	1	3	3
Soil Vapor	Full List Volatile Organic Compounds [6]	11	0	0	0	0

Notes:

1. This number is the actual number of planned environmental samples.
2. Blind Field Duplicates 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 Leader.
3. 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 Leader.
4. Field Blanks will be collected at a minimum frequency of one per day. More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Leader. Every effort will be made to collect as many samples on the same day as possible to reduce the number of Field Blanks required. Additional days will require additional Field Blanks.
5. Trip Blanks will be collected at a minimum frequency of one per day for each day aqueous samples are collected.
6. See Tables B-4A through B-4C for full compound lists

TABLE B-4A
OFF-SITE RI/FS SAMPLING PROGRAM
GROUNDWATER (HYDROPUNCH) SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Analyte	CAS Number [1]	Reporting Levels (µg/l) [2]	NYSDEC AGWS (µg/l) [3,4]
Dichlorodifluoromethane	75-71-8	10	5*
Chloromethane	74-87-3	10	5 *
Vinyl Chloride	75-01-4	10	2
Bromomethane	74-83-9	10	5 *
Chloroethane	75-00-3	10	5 *
Trichlorofluoromethane	75-69-4	10	5*
1,1-Dichloroethene	75-35-4	10	5 *
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	10	5*
Acetone	67-64-1	10	50
Carbon Disulfide	75-15-0	10	60
Methyl Acetate	79-20-9	10	NL
Methylene Chloride	75-09-2	10	5 *
trans-1,2-Dichloroethene	156-60-5	10	5 *
Methyl tert-Butyl Ether (MTBE)	1634-04-4	10	10
1,1-Dichloroethane	75-34-3	10	5 *
cis-1,2-Dichloroethene	156-59-2	10	5 *
2-Butanone	78-93-3	10	50
Chloroform	67-66-3	10	7
1,1,1-Trichloroethane	71-55-6	10	5 *
Cyclohexane	110-82-7	10	NL
Carbon Tetrachloride	56-23-5	10	5
Benzene	71-43-2	10	1
1,2-Dichloroethane	107-06-2	10	0.6
Trichloroethene	79-01-6	10	5 *
Methylcyclohexane	108-87-2	10	NL
1,2-Dichloropropane	78-87-5	10	1
Bromodichloromethane	75-27-4	10	50
cis-1,3-Dichloropropene	10061-01-5	10	0.4**
4-Methyl-2-pentanone	108-10-1	10	NL
Toluene	108-88-3	10	5 *
trans-1,3-Dichloropropene	10061-02-6	10	0.4**
1,1,2-Trichloroethane	79-00-5	10	1
Tetrachloroethene	127-18-4	10	5 *
2-Hexanone	591-78-6	10	50
Dibromochloromethane	124-48-1	10	50
1,2-Dibromoethane	106-93-4	10	0.0006
Chlorobenzene	108-90-7	10	5 *
Ethylbenzene	100-41-4	10	5 *
Xylenes (total)	1330-20-7	10	5
Styrene	100-42-5	10	5 *
Bromoform	75-25-2	10	50
Isopropylbenzene	98-82-8	10	5*
1,1,2,2-Tetrachloroethane	79-34-5	10	5 *
1,3-Dichlorobenzene	541-73-1	10	3
1,4-Dichlorobenzene	106-46-7	10	3
1,2-Dichlorobenzene	95-50-1	10	3
1,2-Dibromo-3-chloropropane	96-12-8	10	0.04
1,2,4-Trichlorobenzene	120-82-1	10	5*

TABLE B-4A (continued)
OFF-SITE RI/FS SAMPLING PROGRAM
GROUNDWATER (HYDROPUNCH) SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Notes:

1. Chemical Abstracts Service (CAS) Registry Number.
2. Reporting Levels (RL) as per USEPA CLP Method OLM04.2 Exhibit C.
3. NYSDEC NYS Ambient Ground Water Quality Standards and Guidance Values (AWGS) as listed in TOGS 1.1.1 (June 1998) and in 6 NYCRR 703.5.
4. NL- Indicates that no regulatory standard or guidance value is listed in TOGS 1.1.1 (June 1998) and in 6 NYCRR 703.5.

* The principle organic contaminant standard for groundwater of 5 ug/l applies to this standard.

** Standard applies to the sum of cis-1,3-Dichloropropene (CAS# 10061-01-5) and trans-1,3-Dichloropropene (CAS # (10061-02-6).

TABLE B-4B
OFF-SITE RI/FS SAMPLING PROGRAM
GROUNDWATER (MONITORING WELLS) SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Analyte	CAS Number [1]	Reporting Levels (µg/l) [2]	NYSDEC AGWS (µg/l) [3,4]
Dichlorodifluoromethane	75-71-8	0.50	5 *
Chloromethane	74-87-3	0.50	5 *
Vinyl Chloride	75-01-4	0.50	2
Bromomethane	74-83-9	0.50	5 *
Chloroethane	75-00-3	0.50	5 *
Trichlorofluoromethane	75-69-4	0.50	5 *
1,1-Dichloroethene	75-35-4	0.50	5 *
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.50	5 *
Acetone	67-64-1	5.0	50
Carbon Disulfide	75-15-0	0.50	60
Methyl Acetate	79-20-9	0.50	NL
Methylene Chloride	75-09-2	0.50	5 *
trans-1,2-Dichloroethene	156-60-5	0.50	5 *
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.50	10
1,1-Dichloroethane	75-34-3	0.50	5 *
cis-1,2-Dichloroethene	156-59-2	0.50	5 *
2-Butanone	78-93-3	5.0	50
Bromochloromethane	74-97-5	0.50	5 *
Chloroform	67-66-3	0.50	7
1,1,1-Trichloroethane	71-55-6	0.50	5 *
Cyclohexane	110-82-7	0.50	NL
Carbon Tetrachloride	56-23-5	0.50	5
Benzene	71-43-2	0.50	1
1,2-Dichloroethane	107-06-2	0.50	0.6
Trichloroethene	79-01-6	0.50	5 *
Methylcyclohexane	108-87-2	0.50	NL
1,2-Dichloropropane	78-87-5	0.50	1
Bromodichloromethane	75-27-4	0.50	50
cis-1,3-Dichloropropene	10061-01-5	0.50	0.4**
4-Methyl-2-pentanone	108-10-1	5.0	NL
Toluene	108-88-3	0.50	5 *
trans-1,3-Dichloropropene	10061-02-6	0.50	0.4**
1,1,2-Trichloroethane	79-00-5	0.50	1
Tetrachloroethene	127-18-4	0.50	5 *
2-Hexanone	591-78-6	5.0	50
Dibromochloromethane	124-48-1	0.50	50
1,2-Dibromoethane	106-93-4	0.50	.0006
Chlorobenzene	108-90-7	0.50	5 *
Ethylbenzene	100-41-4	0.50	5 *
Xylenes (total)	1330-20-7	0.50	5
Styrene	100-42-5	0.50	5 *
Bromoform	75-25-2	0.50	50
Isopropylbenzene	98-82-8	0.50	5*
1,1,2,2-Tetrachloroethane	79-34-5	0.50	5 *
1,3-Dichlorobenzene	541-73-1	0.50	3
1,4-Dichlorobenzene	106-46-7	0.50	3
1,2-Dichlorobenzene	95-50-1	0.50	3
1,2-Dibromo-3-chloropropane	96-12-8	0.50	.04
1,2,4-Trichlorobenzene	120-82-1	0.50	5*
1,2,3-Trichlorobenzene	87-61-6	0.50	5*

TABLE B-4B (continued)
OFF-SITE RI/FS SAMPLING PROGRAM
GROUNDWATER (MONITORING WELLS) SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Notes:

1. Chemical Abstracts Service (CAS) Registry Number.
2. Reporting Levels (RL) as per USEPA CLP Method OLC03.2 Exhibit C.
3. NYSDEC NYS Ambient Ground Water Quality Standards and Guidance Values (AWGS) as listed in TOGS 1.1.1 (June 1998) and in 6 NYCRR 703.5.
4. NL- Indicates that no regulatory standard or guidance value is listed in TOGS 1.1.1 (June 1998) and in 6 NYCRR 703.5.

* The principle organic contaminant standard for groundwater of 5 ug/l applies to this standard.

** Standard applies to the sum of cis-1,3-Dichloropropene (CAS# 10061-01-5) and trans-1,3-Dichloropropene (CAS # (10061-02-6).

TABLE B-4C
OFF-SITE RI/FS SAMPLING PROGRAM
SOIL VAPOR SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Analyte	CAS Number [1]	Reporting Levels (µg/l) [2]
Dichlorodifluoromethane	75-71-8	0.50
Chloromethane	74-87-3	0.50
Vinyl Chloride	75-01-4	0.50
Bromomethane	74-83-9	0.50
Chloroethane	75-00-3	0.50
Trichlorofluoromethane	75-69-4	0.50
Freon TF	76-13-1	0.50
1,1-Dichloroethene	75-35-4	0.50
Methylene Chloride	75-09-2	0.50
1,1-Dichloroethane	75-34-3	0.50
cis-1,2-Dichloroethene	156-59-2	0.50
Chloroform	67-66-3	0.50
1,1,1-Trichloroethane	71-55-6	0.50
Carbon Tetrachloride	56-23-5	0.50
Benzene	71-43-2	0.50
1,2-Dichloroethane	107-06-2	0.50
Trichloroethene	79-01-6	0.50
1,2-Dichloropropane	78-87-5	0.50
cis-1,3-Dichloropropene	10061-01-5	0.50
Toluene	108-88-3	0.50
trans-1,3-Dichloropropene	10061-02-6	0.50
1,1,2-Trichloroethane	79-00-5	0.50
Tetrachloroethene	127-18-4	0.50
Chlorobenzene	108-90-7	0.50
Ethylbenzene	100-41-4	0.50
Xylene (m,p)	1330-20-7	0.50
Styrene	100-42-5	0.50
Xylene (o)	95-47-6	0.50
1,1,2,2-Tetrachloroethane	79-34-5	0.50
1,3-Dichlorobenzene	541-73-1	0.50
1,4-Dichlorobenzene	106-46-7	0.50
1,2-Dichlorobenzene	95-50-1	0.50
1,2,4-Trichlorobenzene	120-82-1	0.50
Hexachlorobutadiene	87-68-3	0.50
1,3,5-Trimethylbenzene	108-67-8	0.50
1,2,4-Trimethylbenzene	95-63-6	0.50
1,2-Dichlorotetrafluoroethan	76-14-2	0.50
1,2-Dibromoethane	106-93-4	0.50
1,3-Butadiene	106-99-0	0.50
Carbon Disulfide	75-15-0	0.50
Acetone	67-64-1	5.0
Isopropyl Alcohol	67-63-0	5.0
Methyl tert-Butyl Ether	1634-04-4	0.50
Cyclohexane	110-82-7	0.50
Dibromochloromethane	124-48-1	0.50
Methyl Ethyl Ketone	78-93-3	0.50
1,4-Dioxane	123-91-1	5.0
Methyl Isobutyl Ketone	108-10-1	0.50
Methyl Butyl Ketone	591-78-6	0.50
Bromoform	75-25-2	0.50

TABLE B-4C
OFF-SITE RI/FS SAMPLING PROGRAM
SOIL VAPOR SAMPLES
ANALYTE LIST AND METHOD DETECTION LIMITS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

Analyte	*CAS Number* [1]	*Reporting Levels (µg/l)* [2]
Bromodichloromethane	75-27-4	0.50
trans-1,2-Dichloroethene	156-60-5	0.50
4-Ethyltoluene	622-96-8	0.50
3-Chloropropene	107-05-1	0.50
2,2,4-Trimethylpentane	540-84-1	0.50
Bromoethene	593-60-2	0.50
2-Chlorotoluene	95-49-8	0.50
n-Hexane	110-54-3	0.50
Tetrahydrofuran	109-99-9	5.0
n-Heptane	142-82-5	0.50
1,2-Dichloroethene (total)	540-59-0	0.50
Xylene (total)	1330-20-7	0.50
tert-Butyl Alcohol	75-65-0	5.0

Notes:

1. Chemical Abstracts Service (CAS) Registry Number.
2. Reporting Levels (RL) as per Mitkem (via STL Burlington).

TABLE B-5A
OFF-SITE RI/FS SAMPLING GROUNDWATER (HYDROPUNCH) SAMPLES
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

QC Compounds	System Monitoring Compound Accuracy *(% Rec.)* [1]	*Blind Field Duplicate Precision (% RPD)*	*Method Blanks*	*MS/MSD Accuracy (% Rec.)* [1]	*MS/MSD Precision (% RPD)* [1]
all compounds		< 50	≤ 2.5 x RL for		
1,1-dichloroethene			methylene chloride,	61 – 145	14
trichloroethene			and cyclohexane.	71 – 120	14
benzene				76 – 127	11
toluene			≤5 x RL for acetone,	76 – 125	13
chlorobenzene			2-butanone.	75 – 130	13
toluene-d8	88 – 110				
bromofluorobenzene	86 – 115		≤ RL for all other		
1,2-dichloroethane-d4	76 – 114		compounds.		

Notes:

1. As per CLP SOW OLM04.2.

QC = Quality Control
% Rec. = Percent Recovery
% RPD = Relative Percent Difference
MS = Matrix Spike Sample
MSD = Matrix Spike Duplicate Sample
RL = Reporting Limit

TABLE B-5B
OFF-SITE RI/FS SAMPLING GROUNDWATER (MONITORING WELLS) SAMPLES
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

QC Compounds	*Deuterated Monitoring Compound Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (% RPD)*	*Method Blanks*	*MS/MSD Accuracy (% Rec.)* [1]	*MS/MSD Precision (% RPD)*
all compounds		< 50	≤ 5 x RL		
1,1-dichloroethene			for	61-145	14
benzene			methylene	76-127	11
trichloroethene			chloride,	71-120	14
toluene			acetone,	76-125	13
chlorobenzene			toluene,	75-130	13
vinyl chloride-d3	49-138		2-butanone,		
chloroethane-d5	60-126				
1,1-dichloroethene-d2	65-130		≤ RL		
2-butanone-d5	42-171		for		
chloroform-d	80-123		other		
1,2-dichloroethane-d4	78-129		compounds		
benzene-d6	78-121				
1,2-dichloropropane-d6	84-123				
toluene-d8	77-120				
trans-1,3-dichloropropene-d4	80-128				
2-hexanone-d5	37-169				
bromoform-d	76-135				
1,1,2,2-tetrachloroethane-d2	75-131				
1,2-dichlorobenzene-d4	50-150				

Notes:
1. As per CLP SOW OLC03.2.

QC = Quality Control; % Rec. = Percent Recovery; % RPD = Relative Percent Difference; MS = Matrix Spike Sample; MSD = Matrix Spike Duplicate Sample; RL = Reporting Limit

TABLE C-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
UTILITY MANUFACTURING SITE, NEW CASSEL, 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
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

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

NOTES:

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

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

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

TABLE C-2
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
UTILITY MANUFACTURING SITE, NEW CASSEL, 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
UTILITY MANUFACTURING SITE, NEW CASSEL, 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
UTILITY MANUFACTURING SITE, NEW CASSEL, 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
UTILITY MANUFACTURING SITE, NEW CASSEL, 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)

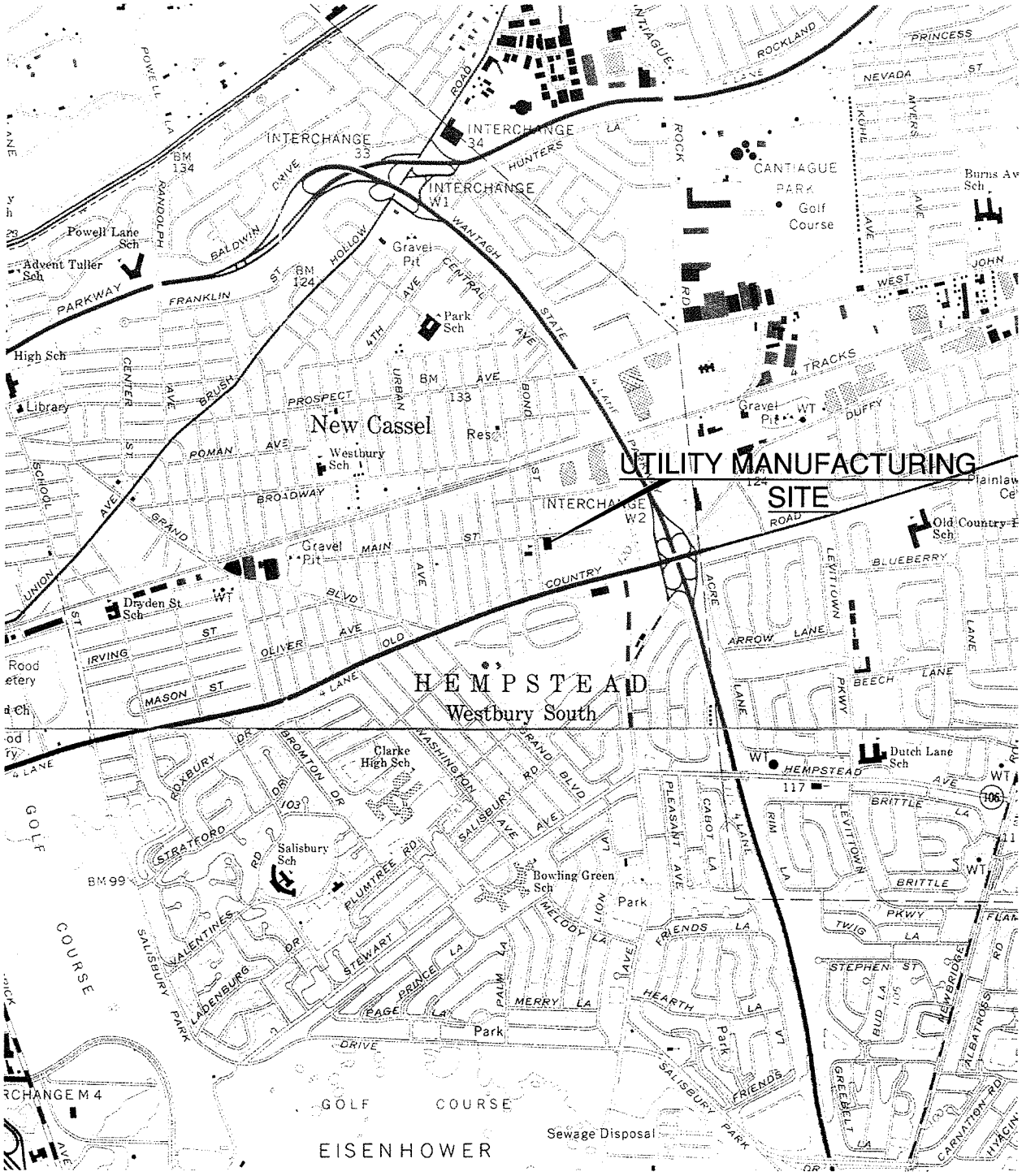
TABLE C-5
PERSONAL PROTECTION EQUIPMENT REQUIREMENTS
UTILITY MANUFACTURING SITE, NEW CASSEL, NEW YORK

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
UTILITY MANUFACTURING SITE, NEW CASSEL, 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

FIGURES



0 2000' 4000'

APPROX. GRAPHIC SCALE

SOURCE: USGS HICKSVILLE & FREEPORT NY QUADRANGLE, 1979

TITLE

SITE LOCATION MAP
UTILITY MANUFACTURING
700–712 MAIN STREET
NEW CASSEL, NEW YORK

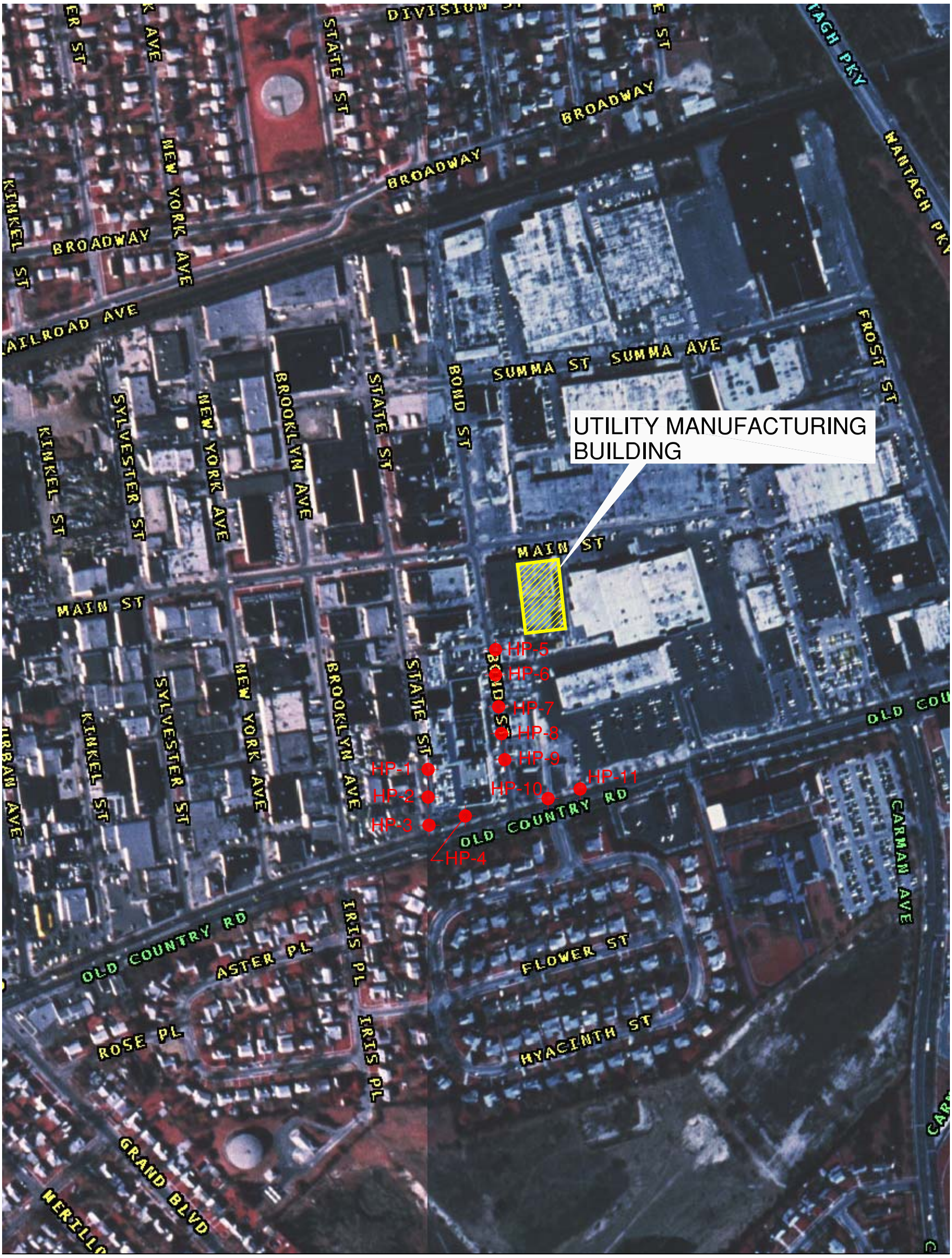
PREPARED FOR

NYSDEC SITE CODE No. 1–30–043H

ERM Environmental Resources Management

SCALE	FIGURE
GRAPHIC	1–1

DRAWN:	JOB NO.:	FILE NAME:	DATE
Y.S.	0001150	0001150–01–00	12/05/03



(HP-1) PROPOSED SOIL BORING LOCATION (APPROXIMATE)

0 300' 600'

APPROX. GRAPHIC SCALE

TITLE

PROPOSED SOIL BORING LOCATIONS
UTILITY MANUFACTURING
700–712 MAIN STREET
NEW CASSEL, NEW YORK

PREPARED FOR

NYSDEC SITE CODE No. 1–30–043H

Environmental Resources Management ERM			SCALE: GRAPHIC	FIGURE: 2–1
DRAWN: Y.S./EMF	JOB NO.: 0011500	FILE NAME: 0011500–01–002	DATE: 6/8/04	

FIGURE 2-2

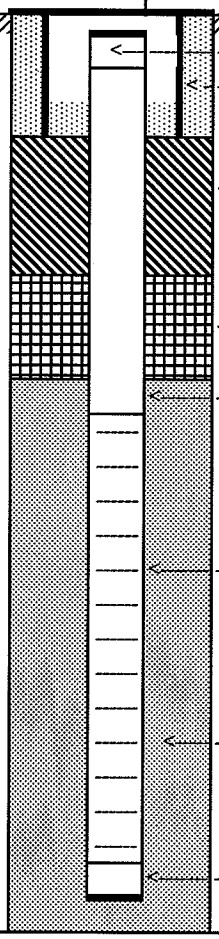
WELL : _____

TYPICAL MONITORING WELL CONSTRUCTION

Project Name & Location	*Project No.*	*Water Level(s)* (ft below top of PVC casing)			*Site Elevation Datum (feet)*
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)* 80
Surveyor					*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*

Generalized Soil Description	*Elevation	**Depth
	80.00	0.0
	79.75	0.3
	78.00	2.0
	-28.00	108.0
	-30.00	110.0
	-35.00	115.0
	-45.00	125.0
	-47.00	127.0

CONSTRUCTION DETAILS



DIAMETER: 2 " I.D.
MATERIAL: Schedule 40 PVC

SLOT SIZE: 0.010 "
DIAMETER: 2" I.D.
MATERIAL: Schedule 40 PVC

TYPE: # 0

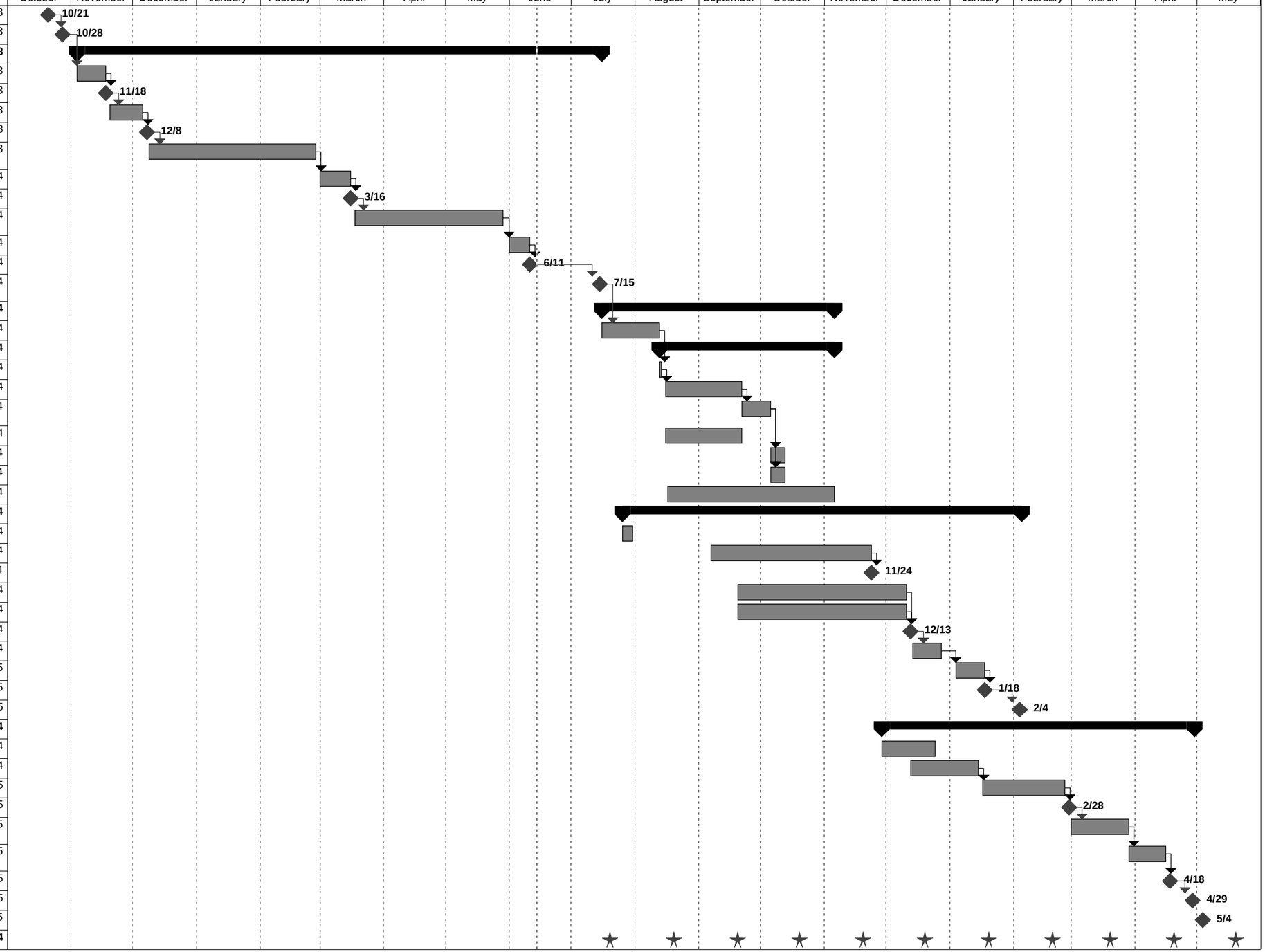
REMARKS _____

* Elevation (feet) above mean sea level unless noted

** Depth in feet below ground surface

FIGURE 4-1
DETAILED RI/FS WORK ASSIGNMENT IMPLEMENTATION SCHEDULE
UTILITY MANUFACTURING, INC. SITE - NEW CASSEL, NEW YORK
NYSDEC SITE CODE #1-30-43H

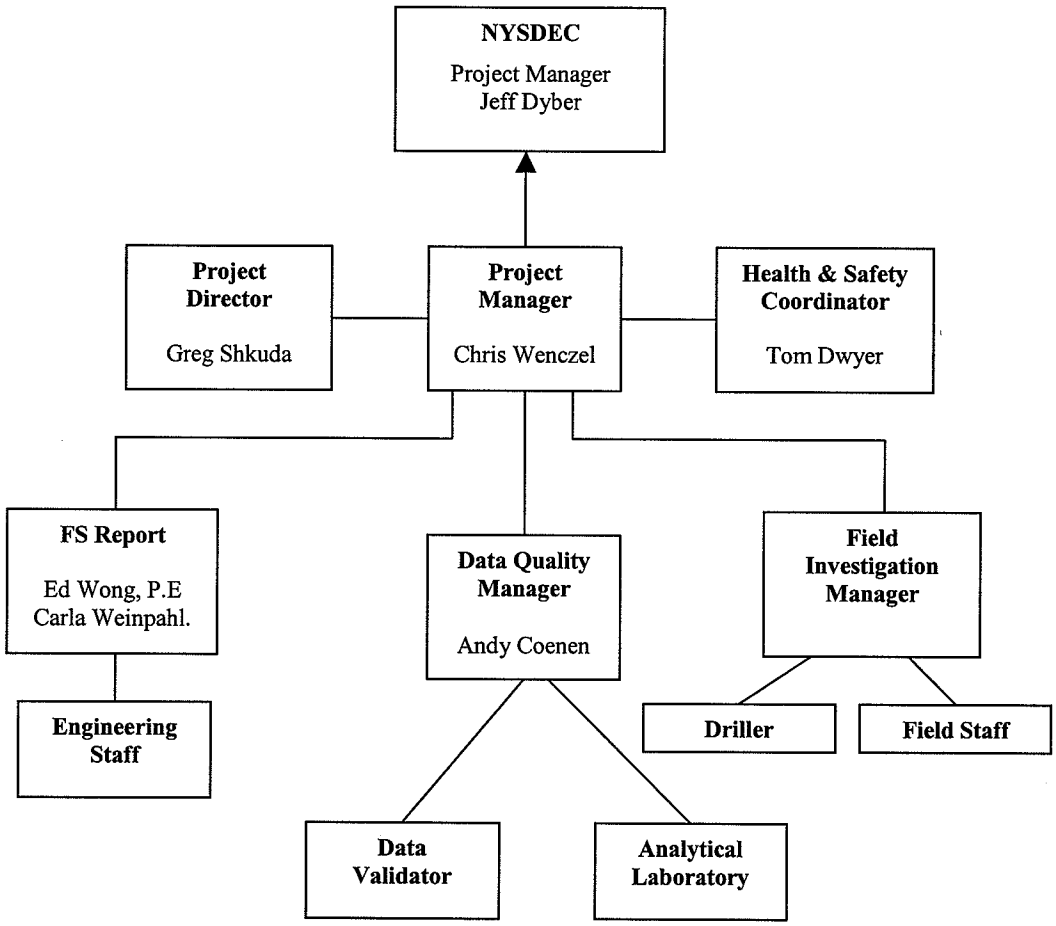
ID	Task Name	Duration	Start
1	Notice of Work Assignment	1 day	Tue 10/21/03
2	Submittal of Signed Work Assignment	1 day	Tue 10/28/03
3	**TASK 1 - RI/FS WORKPLAN DEVELOPMENT**	**183 days**	**Tue 11/4/03**
4	File Review	10 days	Tue 11/4/03
5	Site Inspection/Scoping Session	1 day	Tue 11/18/03
6	Scoping Plan Development	12 days	Thu 11/20/03
7	Submit Scoping Plan	1 day	Mon 12/8/03
8	NYSDEC/NYSDOH Review & Comment On Scoping Work Plan	59 days	Tue 12/9/03
9	Draft RI/FS Work Plan Development	11 days	Mon 3/1/04
10	Submit Draft RI/FS Work Plan	1 day	Tue 3/16/04
11	NYSDEC/NYSDOH Review & Comment On Draft RI/FS Work Plan	52 days	Thu 3/18/04
12	Finalize RI/FS Work Plan	8 days	Tue 6/1/04
13	Submit Final RI/FS Work Plan	1 day	Fri 6/11/04
14	NYSDEC Approval of Final RI/FS Work Plan & Issuance Notice To Proceed	1 day	Thu 7/15/04
15	**TASK 2 - REMEDIAL INVESTIGATION**	**81 days**	**Fri 7/16/04**
16	Pre-Field Activities (Access, Subcontracting)	20 days	Fri 7/16/04
17	**Field Investigation**	**61 days**	**Fri 8/13/04**
18	Mobilization	1 day	Fri 8/13/04
19	Temporary Vertical Profile Borings	27 days	Mon 8/16/04
20	Permanent Groundwater Monitoring Well Inst	10 days	Wed 9/22/04
21	Soil Gas Sampling	27 days	Mon 8/16/04
22	Groundwater Monitoring Well Sampling	5 days	Wed 10/6/04
23	Site/Sample Location Survey	5 days	Wed 10/6/04
24	Sample Analyses By Laboratory	59 days	Tue 8/17/04
25	**TASK 3 - RI REPORT PREPARATION**	**140 days**	**Mon 7/26/04**
26	SCG Identification	5 days	Mon 7/26/04
27	Receive Data & Validation	56 days	Tue 9/7/04
28	Submit Data Validation/Usability Report	1 day	Wed 11/24/04
29	Data Analysis/Evaluation	60 days	Mon 9/20/04
30	Health and Environmental Risk Assessment	60 days	Mon 9/20/04
31	Draft RI Report	1 day	Mon 12/13/04
32	NYSDEC Review & Comment on RI Report	10 days	Tue 12/14/04
33	Finalize RI Report	10 days	Tue 1/4/05
34	Final RI Report	1 day	Tue 1/18/05
35	NYSDEC Approval of Final RI Report	1 day	Fri 2/4/05
36	**TASK 4 - FEASIBILITY STUDY**	**110 days**	**Mon 11/29/04**
37	Remedial Technology Identification/Screening	20 days	Mon 11/29/04
38	Remedial Alternative Development	25 days	Mon 12/13/04
39	Detailed Remedial Alternative Analysis	30 days	Mon 1/17/05
40	Draft FS Report	1 day	Mon 2/28/05
41	NYSDEC/NYSDOH Review & Comment on Draft FS Report	20 days	Tue 3/1/05
42	Finalize FS Report & PRAP Preparation Support	14 days	Tue 3/29/05
43	Final FS Report	1 day	Mon 4/18/05
44	NYSDEC Approval of Final FS Report	1 day	Fri 4/29/05
45	PRAP Public Information Meeting	1 day	Wed 5/4/05
46	**Monthly Progress Reports**	**218 days**	**Tue 7/20/04**



Date: Mon 6/14/04 | Task | Milestone | Recurring Activity | Summary

FIGURE 5-1

UTILITY MANUFACTURING RI/FS ORGANIZATIONAL CHART



APPENDIX A

STANDARD OPERATING PROCEDURES (SOPS)

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

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A.0 STANDARD OPERATING PROCEDURES

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

Soil borings with collection of lithologic soil samples and Hydropunch groundwater sampling will be installed at 11 locations to characterize the off-site stratigraphic conditions and characterize off-site groundwater quality/impacts (i.e. determine if site-related contaminants have migrated off site). 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 OLM04.2.

A.1.1 *Drilling Methods*

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

A.1.2 *Source of Water*

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

A.1.3 Drilling Equipment Decontamination

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

A.1.4 Lithologic Sample Collection

Split-spoon soil samples shall be collected continuously from ground surface to the water table, and at ten-foot intervals thereafter to the termination depth of approximately 125 feet bgs.

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

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

A.1.5 Borehole Logging

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

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

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

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

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

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

A.1.6 *Hydropunch Groundwater Sample Collection*

Groundwater samples will be collected from each of the 11 soil borings utilizing the Hydropunch method at ten-foot intervals from the water table [approximately 50 feet bgs] to 125 feet bgs. Accordingly, the lithologic soil samples and Hydropunch groundwater samples will alternate at five-foot intervals below the water table. ERM's drilling subcontractor will be responsible for provision of the Hydropunch sampling tool and all necessary accessory items (reusable and disposable) to collect groundwater samples.

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

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

A.1.7 Borehole Abandonment

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

A.1.8 Work Site Restoration

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(3) Remove well casing cap.

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

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

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

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

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

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

(9) Calculate elevation of water:

Ew = E - D
Where
Ew = Elevation of Water
E = Elevation at point of measurement
D = Depth to Water

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

In order to assess the potential for migration of VOC vapors emanating from impacted groundwater at the water table surface, soil gas samples will be collected at each of the 11 soil boring locations identified in Section 2.2.5. The soil gas samples will be collected at each location prior to performance of the soil boring. The soil gas samples will be collected using Summa canisters equipped with timed sample acquisition regulators. A NYSDOH ELAP-certified laboratory will analyze each sample for TCL VOCs using USEPA Method TO-15. Specific details are presented below.

(1) A 5/8-inch diameter pilot hole will be drilled to a total depth of 4 feet below ground surface at each soil vapor sampling location. The pilot hole will be drilled with an electric rotary hammer-drill powered by a portable generator. At locations where a concrete pad or asphalt covers the ground surface, an industrial-grade rotary drill equipped with a masonry bit will first be used to drill a pilot hole through the concrete pad/asphalt.

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

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

(4) After observing the required equilibration period, the tubing will be purged using a PID to evacuate 1 - 2 volumes (maximum) of the soil gas-sampling probe. The maximum PID reading (if any) and the subsequent sustained reading will be recorded in the field notebook and/or data collection forms. The Summa canister will then be attached to the Teflon tubing and the sampling regulator set to collect a soil vapor sample over a two-hour period, ensuring that the flow rate for the extraction of soil vapor samples shall not exceed 0.1 to 0.2 liters per minute. After the sample is collected, all Teflon tubing/corks will be removed and disposed of in the general refuse dumpster. All penetrations of concrete pads/asphalt will be sealed with cement/black top patch. The analytical detection limits shall be no greater than 0.5 parts per billion by volume (ppbv) or 1 microgram per cubic meter (ug/m^3).

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

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

A.5 SOP 5: MONITORING WELL CONSTRUCTION

A.5.1 Source of Water

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

A.5.2 Monitoring Well Borehole Construction

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

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

Cuttings generated from the construction of the boreholes will be contained in New York State Department of Transportation (NYSDOT)-

approved 55-gallon ring-top drums. The drums will be labeled according to the borehole/temporary well number.

A.5.3 Well Construction Materials

All monitoring wells shall be constructed of 2-inch inside diameter, threaded flush joint, schedule 40 PVC casing and screens ten (10) feet in length, of wire-wrapped construction having slot openings of 0.010-inches. Accordingly, well screen sand packs shall be a Type # 0 well sand. Type #00 fine sand shall be used to separate well screen sand pack from the overlying bentonite slurry seal. Only pure Wyoming bentonite shall be used for bentonite pellet seals and in cement/bentonite grout. Cement bentonite grout shall be prepared 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.

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

A.5.4 Monitoring Well Construction Procedures

A.5.4.1 Well Assembly and Screen Placement

Once the well string is assembled in each borehole, the well shall be suspended in a manner such that the screen is set approximately one (1) foot above the bottom of the borehole. When the well screen is properly positioned, Type #1 sand pack shall be placed in the annulus by a tremie pipe to extend four (4) to five (5) feet (minimum 20% of the screen length)

above the top of the screened interval to allow for settlement during development. Additionally, a 12-inch Type #00 sand pack shall be placed above the well screen sand pack to separate the bentonite seal from the well screen sand pack. During this time, the augers will be slowly removed. The well pipe will also be pulled up no more than ½ foot to allow sand material to fill the borehole beneath the well screen. In addition, during the installation of the sand pack, the sand will be tamped down using a weighted tape measure to minimize the potential for bridging, and to ensure the proper placement and thickness of the sand.

A.5.4.2 *Annular Seal*

Upon completing the placement of the sand packs, a minimum 2-foot thick bentonite pellet seal will be placed in the annular space. During the installation of the pellet seal, the pellets will be tamped down using a weighted tape measure to minimize the potential for bridging, and to ensure the proper placement and thickness of the pellet seal.

Once the bentonite seal is in place, the remaining annular space shall be backfilled by pressure injection of cement/bentonite grout using a tremie pipe. The end of the tremie pipe shall be positioned approximately five (5) feet above the top of the bentonite seal prior to injection of the cement/bentonite grout to prevent disturbance of the bentonite seal. Injection shall continue until there is a return of grout from the annulus of the borehole at grade. The tremie pipe shall then be retracted from the well. Additional grout shall be added as required so the top of the grout shall settle at a maximum of two (2) feet below grade.

A.5.5 Well Completions At Grade

For each of the wells, a 2-inch diameter PVC riser will extend from the top of the screen to approximately 4-inches below ground surface. A permanent mark will be made at the top of the well casing to provide a reference point from which to make future water level measurements.

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

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

A.6 *SOP 6: MONITORING WELL DEVELOPMENT*

All monitoring wells shall be developed by submersible pump or airlift methods to ensure the removal of any drilling fines and to restore the hydraulic properties of the surrounding formation. All wells shall be developed as soon as possible after installation, but not before well seal and grout set. At no time shall water be introduced into the well during well development procedures.

If submersible pumps are used during development, the pump shall be decontaminated to the satisfaction of ERM's Hydrogeologist, and new lengths of dedicated ASTM Drinking Water quality polyethylene hose shall be used as a discharge line. If an airlift assembly is used during well development, the air source an oil-less type compressor outfitted with appropriate oil trap and/or filters, and new lengths of dedicated ASTM Drinking Water quality polyethylene hose shall be used as a discharge line. Additionally, the airlift assembly shall be configured in a manner such that the air discharge shall remain within the discharge hose and not come in contact with the well. The adequacy of the airlift assembly to fulfill the aforementioned conditions and effectively develop the monitoring well shall be subject to the approval of ERM's Hydrogeologist.

Each well shall be developed to the point that the turbidity of the recovered well water is less than 50 NTUs. Additionally, pH, conductivity and temperature measurements of the development water shall be within 10% for a minimum of three consecutive measurements. ERM's Hydrogeologist shall be responsible for collection of turbidity, pH, conductivity and temperature measurements.

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

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

A.7 *SOP 7: GROUNDWATER SAMPLING*

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

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

A.7.1 *General Procedures*

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

- Clean all water-level measuring equipment using appropriate decontamination procedures.
- Wear appropriate health and safety equipment as outlined in the HASP. In addition, samplers will don new sampling gloves at each individual well prior to sampling.
- Visually examine the exterior of the monitoring well for signs of damage or tampering and record in the field logbook.

- Unlock well cap.
- Take and record in field logbook PID readings.
- Measure the static water level in the well with a decontaminated steel tape or electronic water level indicator. The tape or water level indicator will be rinsed with deionized water in between individual wells to prevent cross-contamination. Synoptic round of water level measurements will all be completed on the same day.
- All wells will also be checked for the presence and thickness of Light or Dense Non Aqueous Phase Liquids (LNAPL/DNAPL).
- If LNAPL or DNAPL is encountered on the top of the water table at the time of sampling, a sample of the LNAPL or DNAPL will be collected for analysis if accumulations are sufficient. Measurement of the thickness of this layer will be taken using an interface probe. A sample of the LNAPL or DNAPL may be obtained using a dedicated bottom-loading bailer. The sample will be sent to the laboratory for analysis of its chemical composition and physical properties (e.g., specific gravity, and gas chromatograph (GC) fingerprint). Initially, no groundwater sample will be collected from wells that contain LNAPL or DNAPL.
- If LNAPL or DNAPL is not detected in the well, continue with the low-flow sampling procedures described below.

A.7.2 *Low-Flow Sampling*

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

A.7.2.1 Sample Equipment

- Adjustable-rate, positive displacement pumps (e.g., centrifugal, submersible or bladder pumps constructed of stainless-steel or Teflon®). Peristaltic pumps may be used only for inorganic sample collection. The selected pump must be specifically designed for low-flow rates (i.e., use of a high volume pump that is adjusted down to a low flow setting is not permitted).
- Tubing: Tubing used in purging and sampling each well must be dedicated to that well. Once properly located, moving the pump in the well should be avoided. Consequently, the same tubing should be used for purging and sampling. Teflon® and Teflon®-lined polyethylene tubing must be used to collect samples for organic analysis. For samples collected for inorganic analysis, Teflon® or

Teflon®-lined polyethylene, PVC, Tygon, or polyethylene or silicon tubing may be used.

- Electronic water level measuring device, 0.01-foot accuracy.
- Flow measurement supplies (e.g., graduated cylinder and stop watch).
- Interface probe.
- Power or air source (generator, compressed air tank, etc.).
- In-line purge criteria parameter monitoring instruments - pH, turbidity, specific conductance, temperature, and dissolved oxygen.
- Decontamination supplies.
- Logbook and field forms.
- Sample bottles.
- Sample preservation supplies (as specified by the analytical methods).
- Sample tags or labels, chain of custody forms.
- Well construction data, location map, field data from last sampling event.

A.7.2.2 *Sample Procedure*

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

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

   - Measure and record the depth to water and pumping rate every 3 to 5 minutes (or as appropriate) during pumping. If purging continues for more than 30 minutes, readings will be recorded at approximately 10-minute intervals. However, once stabilization is indicated, a minimum of 3 consecutive readings at 3 to 5 minute intervals will be recorded prior to sample collection.

   - Care should be taken not to cause pump suction to be broken or entrainment of air in the sample. Do not allow the groundwater level to go below the pump intake.

- Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to minimize drawdown and/or to ensure stabilization of indicator parameters.

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

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

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

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

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

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

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

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

9) Secure the well.

A.7.3 Standard Purging and Sampling Procedure

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

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

Where

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

r = well radius (feet)

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

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

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

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

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

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

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

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

8) Re-lock well cap.

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

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

(2) Rinse the electrode with demineralized water.

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

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

(5) Adjust the pH meter to read 7.0.

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

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

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

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

(10) Rinse the electrodes with demineralized water.

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

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

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

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

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

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

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

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

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

(7) Record the results in the Field Notebook.

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

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

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

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

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

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

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

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

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

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

Notes:

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

(10) Record the results in the Field Notebook.

A.11 SOP 11: MEASUREMENT OF GROUNDWATER DISSOLVED OXYGEN

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

Calibration Procedure

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

(2) Perform a battery check.

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

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

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

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

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

Operating Procedure

(1) Calibrate the dissolved oxygen meter.

(2) Perform the battery check.

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

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

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

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

(7) Immerse the probe in the water sample.

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

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

(10) Record the results in the Field Notebook.

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

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

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

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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 RI/FS 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 RI sampling program and relevant field/laboratory QA/QC requirements are summarized in Tables B-1 through B-5.

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 he 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 RI/FS and any subsequent corrective actions. DQO define the total uncertainty in the data that is acceptable for each specific activity during the RI/FS. This uncertainty includes both sampling error and analytical error. Ideally, the prospect of zero uncertainty is the objective; however, the very processes by which data are collected in the field and analyzed in the laboratory contribute to the uncertainty of the data. It is the overall objective to keep the total uncertainty to a minimal level such that it will not hinder the intended use of the data.

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

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

B.1.3.2 Field Investigation Quality Objectives

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

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

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

contaminated and/or poor precision is obtained, the associated data will be appropriately qualified.

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

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

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

B.1.3.3 Laboratory Data Quality Objectives

The analytical laboratory will demonstrate analytical precision and accuracy by the analysis of various QC samples (i.e., laboratory duplicates, spike samples, matrix spike duplicates and laboratory control samples). Tables B-4A through B-5B present the relevant precision and accuracy criteria for

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

B.2.2 Equipment Calibration

Trained field team members will be familiar with the field calibration, operation, and maintenance of the equipment. They will perform field calibrations, checks, and instrument maintenance daily. The PID will be calibrated on a periodic basis with isobutylene. A trained team member will perform daily field checks and instrument maintenance prior to use. A trained team member using standard calibration solutions will calibrate the pH, conductivity, DO and turbidity meters. Field maintenance, calibration

and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments.

The Field Team Leader (FTL) will be responsible for keeping an instrument calibration/maintenance form for each measuring device. Each form will include at least the following relevant information:

- Name of device and/or instrument calibrated;
- Device/instrument serial and/or identification (I.D.) number;
- Frequency of calibration;
- Date of calibration;
- Results of calibration;
- Name of person performing the calibration;
- Identification of the calibration standards; and
- Buffer solutions (pH meter only).

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 RI/FS. In the event that field decontamination of reusable sampling equipment is necessary, decontamination procedures will be as follows:

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

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

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

B.2.3.5 *Meters and Probes*

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

- Phosphate-free laboratory detergent solution;
- Tap water;
- Methanol rinse (at the FTL's discretion);
- Deionized water (triple rinse).

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

B.2.4 Quality Assurance/Quality Control Sampling

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

B.2.4.1 *Field QA/QC Samples*

Trip Blanks

The trip blank will be used to determine if any cross-contamination occurs between aqueous samples during shipment. The analytical laboratory will supply trip blanks as aliquots of distilled, deionized water that will be sealed in a sample bottle prior to initiation of each day of fieldwork. Glass vials (40 ml) with Teflon®-lined lids will be used for trip blanks. The sealed trip blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank. Trip

blanks are analyzed for VOCs only. Trip blanks will only be used with aqueous samples and will not be used with soil vapor samples.

Field Blanks

Field blanks will be collected to evaluate the cleanliness of soil and aqueous sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment, sample bottles and contaminants present in the air. Field blanks will not be collected in association with soil vapor samples. Field blanks will collected at a frequency of one per decontamination event for each type of sampling equipment, and each media being sampled (e.g., a groundwater bailer for groundwater, and a hand auger for soil sampling), at a minimum of one per equipment type and/or media per day.

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

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

- Decontaminate sampler using the procedures specified in the QAPP;
- Pour distilled/deionized water over the sampling equipment and collect the rinseate water in the appropriate sample bottles;
- The sample will be immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory; and

- Fill out sample log, labels and COC forms, and record in field notebook.

Temperature Blanks

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

B.2.4.2 *Laboratory QA/QC*

Duplicate Samples

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

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

Matrix Spike/Matrix Spike Duplicate

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

B.2.4.3 *Field Records*

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

B.2.4.4 *Field Logbook*

The sample team or individual performing a particular sampling activity will keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use

this notebook, which will be kept as a permanent record. The field notebook will be filled out at the location of sample collection immediately after sampling. It will contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook will contain any deviations from protocol and why, visitor's names, or community contacts made during sampling, geologic and other site-specific information which may be noteworthy.

B.2.4.5 *Field Management Forms*

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

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

Form	Activity
Chain of Custody (COC) Form	All field sampling efforts
Status of Laboratory Sample Data	All field sampling efforts (Master Log)

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

B.2.5 *Sample Management*

B.2.5.1 Sample Containers

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

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

B.2.5.2 Sample Identification

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

- Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.
- Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities will be sequentially recorded in the notebook.
- The notebook, along with the COC form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.
- Each sample will have a corresponding notebook entry which includes:

- Sample ID number;
- Well or other sample location and number;
- Date and time;
- Analysis for which sample was collected;
- Additional comments as necessary; and
- Samplers' name.

- Each sample must have a corresponding entry on a COC manifest.
- The manifest entry for sampling at any one well is to be completed before sampling is initiated at any other well by the same sampling team.
- In cases where the samples leave the immediate control of the sampling team (i.e., shipment via common carrier) the shipping container must be sealed.

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

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

The second segment will identify the matrix type and a sample designation or identifier that identifies the sample depth, the sampling event number, or other designation depending on the sample type. The matrix type will be designated by a two-letter code, for example: Groundwater (GW). The sample identifier will be represented by a two to four-digit numeric code such as a depth internal for soil samples (e.g., 6"-12"). In the case of QC samples such as trip and field blanks, the third

segment will be six digits to represent the date (e.g., 080101 would represent 1 August 2001). In the case of groundwater sampling events, use of the identifier segment will be optional; except for in the case of MS/MSD sample sets where the identifier will identify the samples as the same.

The following will be a general guide for sample identification:

First Segment		**Second Segment**
AA or A 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 = Soil
TB = Trip Blank	SG = Soil Gas
FB = Field Blank	SE = Sediment
HY = Hydrant	CO = Concrete
XF = Transformer	WO = Wood
SB = Soil Boring	WP = Wipe
GP = Geoprobe Boring	GP = Geoprobe Boring

B.2.5.3 Sample Preservation

Soil samples collected during the RI/FS will be preserved by cooling to 4°C and maintained at this temperature until time of analysis. Groundwater samples for VOC analysis during the RI/FS 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 RI/FS 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 RI/FS activities will be used to determine the presence and concentration of certain analytes in groundwater and soil vapor samples. These locations were described in preceding sections.

All groundwater and soil vapor samples collected during the RI/FS activities will be submitted to Mitkem Corporation (Mitkem) of Warwick, Rhode Island. Mitkem 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
Hydropunch Groundwater	TCL VOCs	CLP Method OLM04.2
Soil Vapor	Full Method List VOCs	TO-15
Monitoring Well Groundwater	TCL VOCs	CLP Method OLC03.2

B.2.8 Instrument Calibration

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

B.2.9 Data Management and Reporting Plan

B.2.9.1 Data Use and Management Objectives

Data Use Objectives

The typical data use objectives for this RI/FS are:

- Ascertaining if there is a threat to public health or the environment.
- Locating and identifying potential sources of impacts to soil or groundwater.
- Delineation of horizontal and vertical constituent concentrations, identifying clean areas, estimating the extent and/or volume of impacted soil and groundwater.
- Determining treatment and disposal options.
- Characterizing soil for on-site or off-site treatment.
- Formulating remediation strategies, and estimating remediation costs.

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

In addition, NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for

VOC Analysis) will be completed and included with each data package. The sample tracking forms are specified and supplied by the 2000 NYSDEC ASP.

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

B.2.9.3 *Data Validation*

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

Field Data Validation Protocol

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

Laboratory Data Validation Protocol

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

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

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

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

imply a hierarchy of reliance on a particular document for validation. ERM will utilize all guidance documents and/or criteria relying on the most comprehensive reference sources to perform the most complete validation possible.

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

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

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

- Quantitation, detection limits;
- Holding times;
- Gas Chromatogram/ Mass Spectrometer (GC/MS) tuning and performance;
- Initial and continuing calibration data;
- Procedural method blank data;
- Field and trip blank data;
- Field duplicate results;
- Internal standard areas, and retention times;
- Surrogate compound recoveries;
- MS/MSD duplicate recoveries;

- Data system printouts;
- Chromatograms and mass spectra;
- Qualitative and quantitative compound identification; and
- Case narrative and deliverables compliance.

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

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

B.2.9.4 Data Presentation Formats

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

Data Records

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

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

Tabular Displays

The following data will generally be presented in tabular displays:

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

Graphical Displays

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

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

- Potential receptors.

B.2.10 Performance Audits

B.2.10.1 Field Audits

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

B.2.10.2 Laboratory Audits

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

B.2.10.3 Corrective Actions

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

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

ERM Inc.
DAILY FIELD REPORT

DATE:_____ JOB NO: _____

TIME: (arrive) _____ (depart) _____

LOCATION:_____ ACTIVITY:_____

FILED BY:_____ SIGNATURE:_____

FORMS ATTACHED TO THIS REPORT:

- ☐ Chain of Custody
- ☐ Shipping Manifest
- ☐ Field Sampling Reports
- ☐ Equipment Charge
- ☐ Subcontractor Invoice
- ☐ Injury Report

1. Significant work accomplished today?

Draw a sketch showing the location of site activity.

2. What field personnel and equipment were used today?

DAILY FIELD REPORT PAGE 2 PROJECT NO.: _____ DATE: _____

3. What unusual events happened today?

Describe: _____

4. Was any property damaged? YES NO

Explain: _____

5. What were the weather conditions at the site?

Time of Observation: _____

Precipitation: _____ Ground moisture: _____

Skies: _____ Air Temperature: _____

Wind (direction and speed): _____

6. Were there any visitors to the site? YES NO

NAME - COMPANY - PURPOSE OF VISIT

7. Were any photographs taken by ERM personnel? YES NO

Please detail location and description: _____

8. Additional comments:

Please attach additional pages and copies of field notes and chain of custody to this sheet, and send to file!

INSTRUMENT CALIBRATION LOG

INSTRUMENT NAME	SERIAL NUMBER OR I.D. #	DATE	RESULTS	NAME OF PERSON	IDENTIFICATION OF CALIBRATION STANDARDS

ERM Inc.

175 Froehlich Farm Blvd., Woodbury, New York 11797

ERM

Boring Number _____

BORING LOG

Project Name & Location	Project Number	Date & Time Started: Date & Time Completed:		
Drilling Company	Foreman	Sampler(s)	Sampler Hammer	Drop
Drilling Equipment	Method	Elevation & Datum	Completion Depth	Rock Depth
Bit Size(s)	Core Barrel(s)	Geologist(s)		

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	FID/ PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
	LOCATION:				SURFACE DESCRIPTION:	
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Page _____ of _____ Signature: _____ Date: _____

ERM Inc.

175 Froehlich Farm Blvd., Woodbury, New York 11797

Boring Number _____

BORING LOG

DEPTH (ft below grade)	SAMPLES: Sample Number	SAMPLES: Recovery (feet)	SAMPLES: FID/ PID (ppm)	SAMPLES: Blow Counts	SOIL DESCRIPTION	REMARKS
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Page _____ of _____ Signature: _____ Date: _____

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Blogfd.xls

ERM Inc.

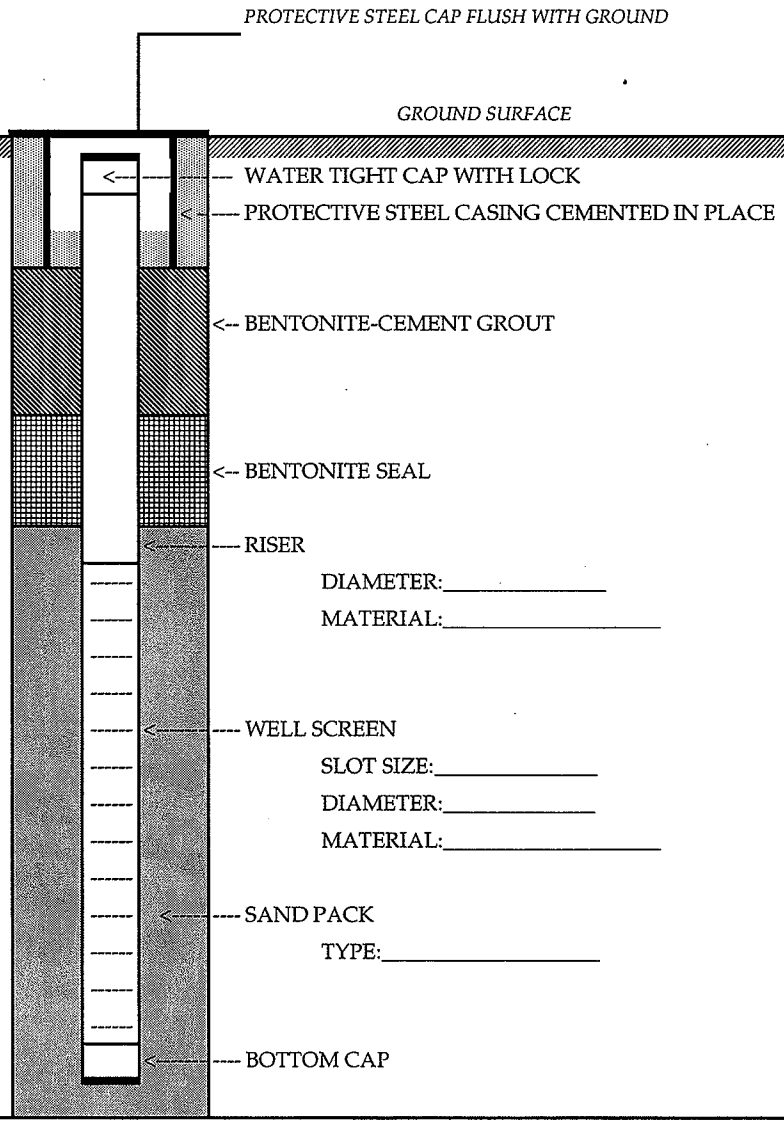
WELL : _____

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	*Project No.*	*Water Level(s)* (ft below top of PVC casing)			*Site Elevation Datum (feet)*
Drilling Company	*Foreman*	Date	Time	Level (feet)	*Ground Elevation (feet)*
Surveyor					*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion	*Geologist*				*Top of Riser Pipe Elevation (feet)*

Generalized Soil Description	*Elevation	**Depth
	0.00	0.0
	0.00	0.0
	0.00	
	0.00	
	0.00	
	0.00	
	0.00	
	0.00	

CONSTRUCTION DETAILS



REMARKS _____

_____

_____

* Elevation (feet) above mean sea level unless noted ** Depth in feet below ground surface

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rev. 9/96

WELL DEVELOPMENT DATA SHEET

Well Number: _____ **Date:** _____ **Project Name:** _____ **Project Number:** _____

Development Technique

Weather Conditions: _____

_____

Static water level before development: _____ (feet below top of casing)

Bottom of well: _____ (feet below top of casing)

Time Started: _____ Time Finished: _____

VERIFY YOU ARE REPORTING IN THE CORRECT UNITS!

TIME	DTW Feet	Pump (on/off)	Turb. NTU	Temp. (deg C)	pH SU	Cond. (mV)	ORP (m S/cm) or (S/cm)	Flow GPM	Comments
Initial Conditions									

NOTES: _____

_____

SAMPLING EQUIPMENT CHECKLIST

Job Number: _____ Project Manager: _____

Date: _____ Technical Lead: _____

Job Location: _____ Field Team: _____

Miscellaneous

- ____ Graphite Lubricant
- ____ Blow Torch
- ____ Flashlight
- ____ 100' Measuring Tape
- ____ Bug-Spray
- ____ Calculator
- ____ Compositing Containers
- ____ Tool Box
- ____ Soil Sampling Ladel
- ____ Mixing Tools
- ____ Paper Towels
- ____ Folding Table
- ____ Spare Batteries
- ____ 12V car battery
- ____ Beakers, Wash Bottles
- ____ Manhole Wrench
- ____ Small Buckets
- ____ 5 Gallons Buckets
- ____ Sponges
- ____ Large Garbage Bags
- ____ Shipping Labels
- ____ Masking Tape
- ____ Well Locks (#0536)
- ____ Duct Tape
- ____ Garden Hose
- ____ Sealable Storage Bags
- ____ Stop Watch
- ____ Chain-of-Custody Forms
- ____ Ice
- ____ filters, tubes and pump
- ____ 10% HCL
- ____ Knife /Bolt Cutter
- ____ Brush Saw
- ____ Plastic Sheeting
- ____ Walkie-Talkies
- ____ Marking Paint
- ____ Survey Equipment
- ____ HNU
- ____ Microtip
- ____ PID Calibration Kit

Sampling Equipment

- ____ Laptop Computer
- ____ Data Logger
- ____ Transducers
- ____ Instruction Books
- ____ pH Meter
- ____ Cond.-temp. meter
- ____ TLC Meter
- ____ Thermometer
- ____ QED Filters
- ____ Filter Chamber
- ____ Misc Tubing
- ____ Macho Hammer Drill
- ____ Macho Points
- ____ Extension Cords
- ____ Soil Auger
- ____ ESP
- ____ Turbidity Meter
- ____ Slug Test Bar
- ____ Sample Jars
- ____ Coolers
- ____ ___ Disposable Bailers
- ____ Bailer Rope
- ____ Water Level Indicator
- ____ Vacum Cell / Pump
- ____ Oil/Water Interface
- ____ Tedlar Bags
- ____ Air Velocity Meter

Personal Protection

- ____ Nitril gloves
- ____ Latex Surgical Gloves
- ____ Cotton Gloves
- ____ Tyvek suites
- ____ Field Boots /Raingear
- ____ Respirator
- ____ Cartridges
- ____ First Aid Kit
- ____ Safety Glasses
- ____ Hearing Protection
- ____ Hard Hat
- ____ Snake Bit Kit
- ____ Eyewash Kit

Decon Stuff

- ____ Decon Soap "Alconox"
- ____ D I Water
- ____ Plastic Tubs
- ____ decon wash tubs
- ____ brushes
- ____ Methanol / Hexane
- ____ Nitric Acid

Logistics

- ____ Field Notebook, Pencils
- ____ Data Sheets
- ____ Road Map/Directions
- ____ Site Map
- ____ Access Keys/Well Keys
- ____ Job Contact Names
- ____ Travel Advance
- ____ Motel Reservations
- ____ Business Cards
- ____ Telephone Numbers
- ____ Shipping Labels
- ____ Fax Sheets

Other: _____

LABORATORY SAMPLE BOTTLE REQUEST

TO: _____ ERM PROJECT NO: _____

COMPANY: _____ SITE NAME: _____

TELEPHONE: _____ SITE LOCATION: _____

FROM: _____ PROJECT MANAGER: _____

DATE: _____

Ship bottles to: _____ Needed by: _____

_____ Ship via: FEDEX

_____ USMAIL

_____ UPS

_____ Courier

ERM

ANALYSIS / METHOD	MATRIX					TOTAL
	WATER	SOIL	SEDIMENT	SLUDGE	OTHER	
TOTAL						

Special Request: _____

_____

_____

GROUND WATER SAMPLING RECORD

Low Flow Sampling Technique

SITE: _____ DATE _____

SAMPLE ID : _____

WELL ID : _____

NJDEP WELL PERMIT NO. : _____ Time Onsite: _____ Time Offsite: _____

SAMPLERS : _____ _____ _____

_____ _____ _____

_____ _____ _____

PID reading (ppm)..... _____ Time: _____ (hrs)

Depth of well (from top of casing)..... _____ Time: _____ (hrs)

DNAPL Level (from top of casing)..... _____ Time: _____ (hrs)

Static water level (from top of casing)..... _____ Time: _____ (hrs)

Static water level (after pump installation)..... _____ Time: _____ (hrs)

Water level after purging (from top of casing)..... _____ Time: _____ (hrs)

Water level before sampling (from top of casing).... _____ Time: _____ (hrs)

Depth of screened interval (from top of casing)..... _____

Purging Method:

_____ Peristaltic _____ Centrifugal

_____ Bailer _____ Pos. Displ.

_____ Submersible _____ Ded. Pump

Well Volume Calculation:

		1 volume	3 volumes
4 in. well:	_____ ft. of water x 0.65 =	_____ gal.	x 3 = _____ gal.
6 in. well:	_____ ft. of water x 1.47 =	_____ gal.	x 3 = _____ gal.

Depth of Pump: _____ (ft)

Purge Start Time: _____ (hrs) Purge Duration: _____ (min)

Purge End Time: _____ (hrs) Purge Flow Rate: _____ (lpm)

Volume of water removed:

_____ ltr. >3 volumes: yes ___ no ___ purged dry? yes ___ no ___

Field Tests:

Time/Duration		pH	Cond.	Turbidity	D.O.	Temp.	ORP	DTW	Drawdown	Flow Rate
units	(min)	(m S/	(S/cm)	U-22 (ntu) Hach	(mg/L)	(deg C)	(mV)	(ft. toc)	(feet)	(lpm)
Range		*0.1*	*3%*	*10%*	*10%*		*10%*		*0.3*	*0.2 - 0.5*
After Sample										

Sampling:

Time readings stabilized: _____ (hrs) Chain of Custody sample time: _____ (min)

Sample Start Time: _____ (hrs) Sample Flow Rate: _____ (lpm)

Sample End Time: _____ (hrs) Duration of sample time: _____ (min)

Collection Method:

_____ Stainless steel bailer

_____ Teflon bailer

_____ Pos. Disp. Pump

_____ Disposable bailer

_____ Dedicated pump

_____ Other: Submersible Pump

Analyses:

_____ VOCs - 602 _____ 503 _____ Other 601 _____

_____ SVOCs _____

_____ PP Metals _____

_____ PCB/Pest _____

_____ Physical _____

_____ Other _____

Analytical Method:

Observations

Weather/Temperature: _____

Sample Description: Turbidity: (circle one) HIGH MODERATE LOW

Free Product? yes ___ no ___ describe _____

Sheen? yes ___ no ___ describe _____

Odor? yes ___ no ___ describe _____

Comments:

_____

_____

ERM

WELL INSPECTION LOG

NAME OF CLIENT: _____ DATE: _____

NAME OF SITE: _____

PROJECT NO.: _____

OBSERVER: _____

WELL IDENTIFICATION										
Pad Needs Repair? (Y/N)										
Protective Casing Needs Repair? (Y/N)										
Lock Present? (Y/N)										
Expansion Cap Present? (Y/N)										
Well Casing Needs Repair? (Y/N)										

Comments (e.g. obvious issues such as persistant turbidity, siltation, low yield, etc.)

_____

_____

_____

_____

_____

_____

_____

ERM

Environmental Resources Management

Chain of Custody

Project Name / No. _____

Project Coordinator / Contact _____

Sampler(s) _____

Bottles Supplied By _____

Sheet No. _____

Type and No. of Containers

Date	Time	Comp.	Grab	Sample Identification	Soil	Water	Total No. of Containers										Analysis Requested

Relinquished By (Signature)	Date/Time	Received By (Signature)	Date/Time	Reason for Transfer

146621

STATUS OF LABORATORY SAMPLE DATA

Site: ____________________ Job No: __________

ERM Sample Number	Sample Date	Lab Sample ID Number	Delivery Date To Lab	Date Lab Results Received	Date QC Review Finished	Test Parameters

C:\SFORMS\Statsamp.xls
rev. 9/96

APPENDIX C

SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

Gregory Shkuda
Project Director

Chris Wenczel
Project Manager

Thomas R. Dwyer
Project Health and Safety Coordinator

Michael Mattern
Field Team Leader

Michael Mattern
Site Safety Officer

TABLE OF CONTENTS – APPENDIX C

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 RI/FS. 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): Chris Wenczel

Manages day-to-day activities; reports to PD.

ERM Project Health and Safety Coordinator: Thomas Dwyer

Directs development of HASP; provides technical advice on health and safety issues.

ERM Site Safety Officer (SSO): Mike Mattern

Responsible for implementation of HASP; reports to PD and PM.

C.3 FIELD ACTIVITIES

C.3.1 Task 2: Remedial Investigation

The objective of the RI is to on identify off-site groundwater impacts that pose a threat to public health or the environment. The Scope of Work contemplated by the WA involves an off-site investigation that includes the:

1. Installation of eleven soil borings to collect both lithologic samples to characterize off-site stratigraphic conditions; and, groundwater samples using a Hydropunch to characterize off-site groundwater quality/impacts (i.e. determine if site-related contaminants have migrated off site). This Task is comprised of the following subtasks:

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

   - Site Survey: Will be performed by a licensed New York State Surveyor, non-intrusive.

   - Soil Borings With Hydropunch: Boreholes to be advanced using hollow-stem augers (HSAs) and truck-mounted rotary drilling rig. Decontamination: All drilling equipment and the rear of the drill rig will be steam-cleaned prior to performance of the first boring and after each boring. The steam cleaner is capable of generating water at temperatures of at least 212^0 Fahrenheit.

   - Split spoon soil samples will be collected from ground surface to the water table (approximately 50-feet below ground surface) and at ten-foot intervals thereafter to a depth of 125 feet.

2. Installation of groundwater monitoring wells.

   - Based on the results of the Hydropunch groundwater sampling, up to five groundwater-monitoring wells will be installed at the discretion of the NYSDEC during a second mobilization. It has

been assumed that the wells will be screened at 115 to 125 feet bgs. Boreholes shall be advanced by hollow-stem auger drilling method. Each monitoring well shall be installed within a separate borehole. After the wells are developed, one groundwater sample will be collected from each well. Approximately two weeks following well development activities, groundwater samples will be collected from the newly installed wells and analyzed for TCL VOCs using CLP Method OLC03.2. It is anticipated that United State Environmental Protection Agency (USEPA) low-flow well sampling techniques will be utilized.

3. Collection of soil gas samples.

   - A soil gas sample will be collected at each of the eleven borings from four-feet bgs using a Summa canister and Teflon™ tubing. The borehole will be advanced using an electric rotary hammer powered by a generator.

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. Jeffrey Dyber. 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 Photovac photoionization detector (PID) with an 11.6 eV bulb or a flame ionization detector (FID) will likely be used for ambient air in breathing zone. Not all work at the site will require ambient air monitoring for all contaminants. During the mobilization phase of a particular project task or activity, either the Project Manager or the SSO will determine what contaminants may be encountered in order to have the appropriate instrumentation on-site. The Project Health and Safety Consultant is available to assist the Project Manager or the SSO in determining the appropriate instrumentation.

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

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

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

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

C.5 *PERSONAL PROTECTIVE EQUIPMENT*

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

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

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

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

C.5.1 *Respiratory Protection*

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

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

C.6 *HEAT AND COLD STRESS*

C.6.1 *Heat Stress*

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

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

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

C.6.2 Cold Stress

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

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

C.7 CLIENT SPECIFIC REQUIREMENTS

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

C.8 SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES

C.8.1 General Site Provisions

C.8.1.1 Smoking and Eating Areas

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

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

C.8.1.2 Temporary Facilities

This project will not require any temporary facilities.

C.8.1.3 Standard Operating Procedures

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

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

C.8.2 Safe Work Practices

C.8.2.1 Ergonomics

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

Several tasks associated with this project have the potential to cause back injuries, if proper lifting techniques are not followed. Site workers should not lift objects that are beyond their physical capabilities and the use of mechanical devices such as forklifts is encouraged. In addition, when

shoveling, site workers should not twist their backs while moving materials with the shovel. The proper technique is to move the feet.

Proper lifting techniques are summarized below.

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

Pre-Drilling/Pre-Excavation and Probing Protocol

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

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

C.8.3 Fall Protection

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

C.8.4 Weather Related Events

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

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

C.8.5 *Night Work*

This project will not involve activities being performed at night.

C.8.6 Noise

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

C.9 EMPLOYEE TRAINING

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

by their job function and responsibility. Once on-site all site workers will receive training covering at a minimum the following.

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

C.9.1 Subcontractor Training

The SSO will verify that subcontractor personnel have received all appropriate training as required by this HASP prior to their arriving on-site. 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° 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
Project Manager Chris Wenczel	Work: 631-756-8900 Mobile: 516-315-8221
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 Thomas Dwyer	Work: 631-756-8900 Mobile: 516-315-8305
Mr. Jeffrey Dyber, P.E. NYSDEC	Work: 518-402-4621
Local Emergency Responders – all services	Phone: 911
Hospital: North Shore University 972 Brush Hollow Road, #302 Westbury NY 11590	Phone: (516) 876-5200

C.17.5 *Incident Investigations*

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

C.17.6 *Directions to Nearest Hospital*

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

North Shore University Hospital
Address: 972 Brush Hollow Road #302, Westbury, NY 11590
516-876-5200

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

Job Hazard Analysis

Attachment 1

Site No. 1-30-43H

Work Assignment No. D003970-13

ERM®

JOB HAZARD ANALYSIS

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

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

Client:	W.O. #
Project Name:	
Location:	
ERM Principal-in-Charge:	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 taken to client's site.
☐ Dust -Describe source	☐ PPE (see PPE Section) ☐ Exposure monitoring (see monitoring section) ☐ Dust suppression
☐ Confined Space	Coordinator ERM Health and Safety for assistance

Community Air Monitoring Plan

Attachment 2

Site No. 1-30-43H

Work Assignment No. D003970-13

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.

Last Updated: June 20, 2000

Daily Safety Meeting Form

Attachment 3

Site No. 1-30-43H

Work Assignment No. D003970-13

Safety Meeting Documentation

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

Name	Signature	Company	Employee Number

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 vicinity	☐ 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 Principal In-Charge: 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

Project Sign-in Sheet

Attachment 4

Site No. 1-30-43H

Work Assignment No. D003970-13

ERM

PROJECT SITE SIGN-IN FORM

Site:

Date:________________

Employee	Company	Time In	Time Out

ERM Incident Reporting Form

Attachment 5

Site No. 1-30-43H

Work Assignment No. D003970-13

Incident Report

ERM

Case Number from OSHA 300 Log _____

Instructions: Complete form within 24 hours of incident and ensure that the Project Manager, OpCo H&S Coordinator, Director of H&S, and Medical Recordkeeping Coordinator receive it. If a piece of information does not apply, put N/A in the block. This form meets OSHA Form 301 Report requirements.

I. INJURY AND ILLNESS DATA AND SUMMARY

Date and time of incident Date: Time:	Location of incident (Name and address)	
Time injured employee started work on day of incident		
Reported by	Date reported	List any witnesses
Project Number	Project Manager	PIC
Injured employee name	Injured employee's home address	
Injured employee's sex Male Female	Injured employee's date of hire at ERM	

Type of Incident (circle one)

First aid/minor injury | All other injuries | Vehicle accident | Property damage | Near miss

What activity/task was taking place just prior to the incident? (Describe the activity/task as well as tools, equipment and material involved that set the stage for the incident. What was the worker doing.)

What changed about the situation or task to cause the incident? How did the incident happen? (Describe in detail the incident.)

Incident Report

ERM

If the incident involved an injury, describe it. (eg., cut to left ring finger, sprained right ankle, snake bit to left shin, pulled muscles in the lower back)	
Immediate actions taken (Describe actions taken and by whom immediately after the incident occurred.)	
What object or substance directly harmed the employee? (Examples, concrete floor, chlorine, H2S, manhole cover. If this question does not apply to the incident, write N/A.)	
If medical treatment was given away from worksite, state name and mailing address of both the facility and treating health care professional.	
Was employee treated in an emergency room? Yes No	Was employee hospitalized overnight as an in-patient? Yes No
Additional Consequences of incident (Describe damage to property/equipment, consequences to other employees or community, schedule)	
If the employee died, give date of death	
Is injury an OSHA recordable? (To be completed by OpCo Health and Safety Coordinator) Yes No	Name of person making determination

Incident Report

ERM

Name of person completing form		Signature of person completely form
Title of person completing form	Phone number of person completing form	Date form completed

Hospital Route Map and Directions

Attachment 6

Site No. 1-30-43H

Work Assignment No. D003970-13

YAHOO! GetLocal Maps

Yahoo! Maps

Back to Directions

Starting from: 1 655 Main St, Westbury, NY 11590-4906

Arriving at: 2 North Shore University Hosp
972 Brush Hollow Rd # 302, Westbury, NY 11590
(516) 876-5200

Distance: 2.5 miles **Approximate Travel Time:** 4 mins

Full Route

Destination

Directions		Miles	
1.	Start on **MAIN ST**	0.1	↑
2.	Turn Right on **BOND ST**	0.2	↱
3.	Turn Left on **OLD COUNTRY RD**	0.4	↰
4.	Take the **WANTAGH STATE PARKWAY NORTH/NORTHERN PARKWAY** ramp	0.1	↗
5.	Merge on the highway	1.3	↗
6.	Take the **NORTHERN PARKWAY EAST** exit towards **HAUPPAUGE**	0.1	↗
7.	Merge on the highway	0.1	↗
8.	Take the **BRUSH HOLLOW RD** exit towards **WESTBURY**, exit **#34**	0.0	↗
9.	Continue on **CEDAR RD**	0.1	↗
10.	Turn Right on **BRUSH HOLLOW RD**	0.2	↱

APPENDIX D

10 MARCH 2004 NASSAU COUNTY DEPARTMENT OF PUBLIC WORKS LETTER

THOMAS R. SUOZZI
COUNTY EXECUTIVE

PETER J. GERBASI, P.E.
COMMISSIONER

FILE COPY

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
1550 FRANKLIN AVENUE
MINEOLA, NEW YORK 11501-4822

March 10, 2004

Mr. Christopher Wenczel
Environmental Resources Management
520 Broad Hollow Road – Suite 210
Melville, New York 11747

Re: Monitoring Well Purge Water
Utility Manufacturing Corporation
700 Main Street, Westbury, New York

Dear Mr. Wenczel:

Your request to dispose approximately 5,000 gallons of purge water to the public sewer has been considered and is hereby approved. The discharge may be made from the collection (frac) tank, located on the Bowling Green Water District site, into the sanitary sewer through manhole #119. Prior to the discharge, please provide the analysis of volatile organic compounds (VOC's).

The determination of approval for the proposed discharge is based on the non-hazardous nature and sewer acceptable quality (total VOC's of less than 1 mg/l) as indicated in your proposal and analytical verification prior to the regulated discharge. The proposed disposal rate of up to one-hundred (100) gallons per minute is acceptable.

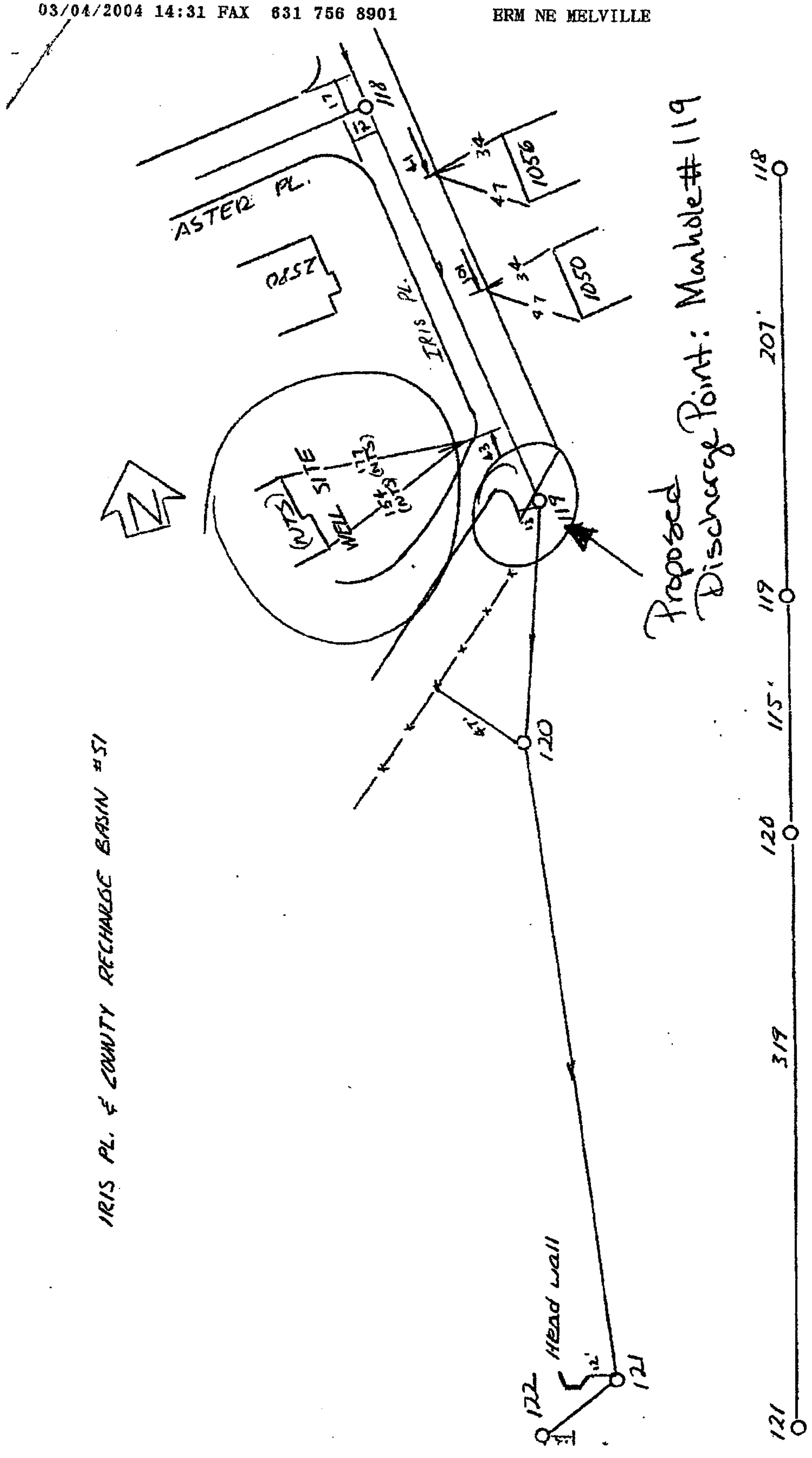
Your concern and cooperation are appreciated. If you have any additional questions with regard to this matter, please give me a call at (516) 571-7352.

Very truly yours,

Maurice J. Osman
Chief Chemist

MJO:jld
Enclosure

c: Richard Cotugno, NCDPW
Kevin Cleary, NCDPW


IRIS PL. & COUNTY RECHARGE BASIN #51
ASTER PL.
IRIS PL.
WELL SITE
(NTS)
Proposed
Discharge Point: Manhole #119
Head wall
1056
1050
118
119
120
121
122
207'
115'
319

Re: Permission To Discharge Well Purge Water To Sanitary Sewer
Utility Manufacturing
700-712 Main Street
Town of North Hempstead, Nassau County, New York

AGREED AND ACCEPTED BY:

Maurice J Osman
(Signature)

MAURICE J. OSMAN
(Printed Name)

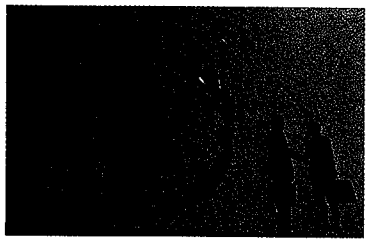
Chief Chemist, NCDPW
(Title)

March 10, 2004
(Date)

APPENDIX E

KEY PROJECT STAFF PROFESSIONAL PROFILES

Gregory K. Shkuda, Ph.D.



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

Publications (continued)

- 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.

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 issues
- Review of QA/QC plans
- Development of analytical protocols for litigation purposes
- Fingerprinting of petroleum fuels/oils/PCBs/MGP waste
- Risk Evaluation/Communication

Credentials

- Ph.D. Organic Chemistry, New York University, 1976
- MS. Organic Chemistry, New York University, 1973
- BA Chemistry, New York University, 1968

Professional Affiliations

- American Chemical Society

Publications

- Geller, S., S.C. Wei, G.K. Shkuda, D.M. Marcus, and C.F. Brewer, 1980. Carbon- 13-Enriched Tetra-L-AlanineHapten 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.

Key Projects

Directed a remedial design/remedial action (RD/RA) at landfill in Warwick, New York. The RD/RA was conducted on behalf of a PRP committee that included chemical manufacturing, paper and computer companies. The scope of the RD/RA included additional investigation, risk assessment and design of the remedial system. The scope of the remediation was dependent on interpretation of the investigation and the risk data through negotiations with USEPA Region II. Successful negotiations and USEPA's acceptance of the risk assessment allowed the PRPs to limit the scope of the remediation. Prepared informational documents for residents to detail scope of the RA and presented the final risk assessment of site at public meeting held at the conclusion of the RD/RA.

Provided expert testimony and litigation support for Potentially Responsible Parties (PRPs) at a Superfund site in Indiana. In this matter, analyzed production records to determine hazardous substances contained in the waste streams of other potential users of the disposal site. The analysis was designed to identify additional PRPs to require them to share in clean-up costs.

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 a remedial investigation/feasibility study (RI/FS) at an industrial facility in Plainview, New York including development of the scope of the investigation, and remediation. The remediation included interim measures (IRMs) designed to reduce potential risks to adjacent residential properties prior to the final remediation. Prepared informational documents for residents to detail scope of the IRM and potential impacts. Worked directly with residents to explain IRM. Presented final risk assessment of site at public meeting held at the conclusion of the FS.

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.

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.

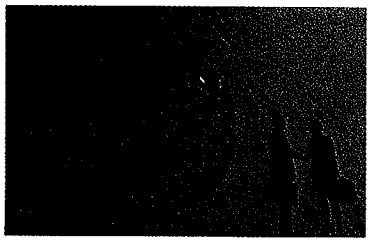
Collected ambient air monitoring data determining the concentrations of vinyl chloride being emitted from a municipal landfill and potentially impacting an adjacent elementary school.

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.

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. Provided technical assistance to a project which evaluated the potential risks to a school population presented by an overfill of a fuel oil heating tank located adjacent to the school. Assessed indoor air monitoring data.

Christopher W. Wenczel



More than sixteen years of diversified experience in the environmental consulting field specializing in hydrogeology, hazardous waste management/ remediation and water supply. Diverse project experience includes work under CERCLA, RCRA, TSCA, NJDEP Site Remediation Program, NJPDES, NYSDEC Voluntary Cleanup Program, NYSDEC Oil Spill Program.

Diverse experience includes the development and implementation of complex remedial investigation and feasibility study (RI/FS) plans for USEPA and NYSDEC Superfund sites in both New York and New Jersey which included twelve National Priority List (NPL) sites. In addition, extensive experience in planning and performance of other compliance site investigations such as RCRA Corrective Action, and property transfer due diligence environmental quality site assessments.

Mr. Wenczel's experience includes activities such as preparation of MOAs, preliminary site assessments, site investigations, remedial actions, and long-term monitoring programs at former landfills and manufacturing facilities.

Fields of Competence

- Site Investigation/Remediation Strategy & Implementation
- Ground Water Resource Development
- Multi-Media Sampling Remediation
- Hydrogeologic Testing, Analyses and Interpretation
- Analysis of Surface and Ground Water Flow Systems
- Surface and Ground Water Quality Monitoring
- Applied Geophysics
- UST Assessment, Removal & Remediation
- Soil Vapor Extraction/Air Sparging

Credentials

- B.S., Geology, State University of New York at Oneonta, 1985
- M.S., Earth Sciences/Hydrogeology, Adelphi University, 1990
- State of New Jersey Certified Underground Storage Tank Investigator, Certification No. G0001622
- 40-Hour OSHA 1910.120 Health and Safety Training, 1987
- 8-Hour OSHA Supervisory Training For Level B Activities, 1989
- 8-Hour OSHA Annual Refresher Training, 1987 - 2001
- International Symposium on Environmental Geotechnology, Lehigh University and the International Committee on Environmental Geotechnology, Allentown, PA, 21 -23 April 1986
- Theory and Application of Vadose Zone Monitoring, Sampling and Remediation, NGWA, Somerville, MA, 7-9 April 1992
- Assessment, Control and Remediation of LNAPL Contaminated Sites, API/USEPA, East Brunswick, NJ, 20 October 1994
- Environmental Horizontal Well Symposium, NGWA, Indianapolis, IA, 28-30 October 1995,
- Petroleum Hydrocarbons & Organic Chemicals in Ground Water: Prevention, Detection and Remediation, NGWA, Houston, TX, 13-15 November 1996
- NJDEP Technical Requirements For Site Remediation Seminar, Cook College @ Rutgers, 27 May 1998
- NJDEP UST License Renewal Course, New Jersey Society of Professional Engineers, 10 September 1998
- DNAPLs In Fractured Geologic Media: Monitoring, Remediation & Natural Attenuation, Univ. of Waterloo, San Francisco, CA, 8-10 December 1999
- NJDEP UST License Renewal Course, New Jersey Society of Professional Engineers, 11 September 2001
- Hydrogeology of Fractured Rock: Characterization, Monitoring, Assessment & Remediation, Fractured Rock Educational Services, Princeton, NJ, 19-22 May 2003

site, Swope Oil Company site, the Metaltech/Robintech/National Pipe site, the Sarney Farm site, the Montclair/West Orange Radium site, and 150 Fulton Avenue.

Senior Hydrogeologist responsible for the coordination and supervision of a comprehensive RI at the Pfohl Brothers NYSDEC State Superfund site (120 acres) located in Williamsville, NY. The site investigation of Pfohl Brothers Landfill included: preparation of a RI work plan, Health and Safety Plan (HASP), a Quality Assurance Plan (QAPP), geophysical surveys using terrain conductivity, magnetometry and ground penetrating radar, soil borings, ground water monitoring well installation in both bedrock and overburden aquifers, soil sampling, sludge sampling, hydrologic monitoring of surface water bodies, surface water sampling, ground water sampling, landfill leachate sampling, test pitting and drum sampling. In addition to the overall site characterization, evaluated the presence of low-level radionuclide contamination on the site, delineated and mapped over 450 radioactive "hot-spots" using scintillometers. Radionuclides found at the site included radium-226, thorium-232, cesium-132 and uranium-238 in the form of discarded machine parts, radioluminescent badges, and ore rocks.

Installation of ground water and landfill gas monitoring wells as part of an RI for the Port Washington Municipal Landfill NPL site, Port Washington, New York. Additionally, participated in the development and implementation of a landfill gas sampling program using flux boxes, landfill gas monitoring wells and summa canisters.

Senior Hydrogeologist responsible for the coordination and performance of a comprehensive environmental assessment at the former ESSO petroleum refinery, San Nicholas, Aruba, N.V. The investigation included: the installation of a ground water monitoring well network, characterization of the subsurface geologic and hydrogeologic regime, test pitting, soil sampling, an above ground storage tank investigation, ground water sampling, mapping of extensive LNAPL bodies, data analyses/interpretation, and preparation of an Site Assessment Report.

Participated in two NPL site RD programs, Vestal Well 1-1, Vestal, New York and the Lipari Landfill, Pitman, New Jersey. Activities for the Vestal Well 1-1 site included the preparation of a Remedial Design work plan, HASP and QAPP, performance of a soil boring program and design of a 1000 gpm air stripper. Activities for the Lipari Landfill included the design of an automated extraction/injection well network and a 300 gpm production well.

Project Manager responsible for execution several major environmental investigative/cleanup tasks at the former Brooklyn Navy Yard (Brooklyn Navy Yard Industrial Park {BNYIP}), that have included:

1. Phase I & II Site Assessment/Investigation Services Related To a NYSDEC Voluntary Cleanup Agreement
2. Implementation of Interim Remedial Measures
3. Investigation and Closure of Underground Storage Tanks

ERM performed a Phase I Preliminary Site Assessment data gathering and evaluation process in conjunction with a Phase II Site Investigation to address key data gaps for potential area and activity-specific sources of hazardous substances. The Phase I Preliminary Site Assessment included site inspections, review of all historic data/records, previous investigations performed at the BNYIP to date, inspection of BNYIP facilities, interviews of facility personnel regarding current and past operations.

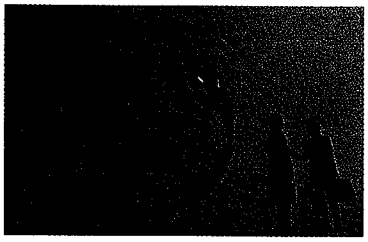
The Phase II investigation included the sampling and characterization of environmental conditions at electrical substations/transformer areas, drum storage areas, dry docks and facility-wide ground water characterization. The Phase II Investigative findings were then integrated with the Phase I Site Assessment information to prepare a Comprehensive Environmental Assessment Report (CEAR) for the BNYIP.

ERM provided complete turn-key services for investigation and closure of 10 underground petroleum storage tanks located in seven separate areas at the BNYIP. These services included pre-closure site investigations at each tank locations, preparation of all regulatory required work plan documents, notification of interested regulatory agencies (NYSDEC, NYCFD), procurement of necessary permits, closure by excavation and removal of the USTs and effected soils, complete restoration of each former tank location, and preparation of a final comprehensive UST Closure Report for submittal to NYSDEC.

ERM performed an Interim Remedial Measure (IRM) at former electrical substation to mitigate PCB contamination resulting from releases of electrical transformer dielectric fluids. The IRM included characterizing the extent of PCB contamination on concrete surfaces and soils/sediments associated with the former transformers. The IRM included the removal, containment and disposal of soils/sediments containing high levels of PCBs from a subsurface vault, cleaning, scrarification, and final encapsulation of all effected concrete surfaces within the vault and other concrete surfaces associated with the former transformers. A Final Remediation Report was prepared and submitted to NYSDEC for review and official acknowledgment that "no further action" is required at this electrical substation.

Thomas R. Dwyer

Project Manager/Office Health and Safety Coordinator



ERM-Northeast, Melville Office Health and Safety Coordinator responsible for office compliance with applicable OSHA and ERM Environmental Health and Safety (EHS) regulations and protocols. Responsible for approving Site-Specific Health and Safety Plans, as well as developing and presenting classes for EHS training. Development, performance and reporting of Site Investigation and Remediation (Phase I, II, III, RI/FS), and Site-Specific Health and Safety plans. Three years as Corporate Health and Safety Manager for former consulting firm - performing OSHA program development, implementation, and enforcement. Responsible for writing and implementing Health and Safety Plans (HASPs) for all investigation and remediation projects. Nine years experience in the management of soil and groundwater investigations for a wide variety of sites including Superfund and RCRA facilities. Two years teaching geology courses at Syracuse University. Health and Safety trainer for two years at a training facility in the Washington DC area.

Credentials

- Professional Geologist #317 New Hampshire
- M.S., Geology, Syracuse University, 1994
- B.S., Geology, State University of New York at Cortland, 1992
- A.A.S., Business Management and Marketing, Queensborough Community College, 1988

Professional Affiliations

- American Institute of Professional Geologists
- Geological Society of America
- National Ground Water Association

Publications

- 1996, Dwyer, T.R., Mullins, H.T., and Good, S.C.; "Paleoclimate Implications of Holocene Lake-Level Fluctuations, Owasco Lake, New York." Geology, v 24; no 6, p 519-522.
- 1996, Wellner R.W. and Dwyer, T.R., "Late Pleistocene-Holocene Lake-Level Fluctuations and Paleoclimates at Canandaigua Lake, New York" in H.T. Mullins and N. Eyles, eds. Subsurface Geology of the New York Finger Lakes: Implications for Late Quaternary Deglaciation and Environmental Change. Geological Society of America Special paper 311.
- 1996, Mullins, H.T., Hinchey, E.J., Wellner, R.W., Stephans, D. B., Dwyer, T.R., Anderson, W.T., and Hine, A.C. "Seismic Stratigraphy of the Finger Lakes" in H.T. Mullins and N. Eyles, eds. *Subsurface Geology of the New York Finger Lakes: Implications for Late Quaternary Deglaciation and Environmental Change.* Geological Society of America Special paper 311.

Registration

- OSHA approved 40 hour and 8 hour (refresher) Health and Safety training for Hazardous Waste Operations and Emergency Response (HAZWOPER) 29CFR1910.120(e)(2,4)
- OSHA Title 29 CFR 1926 Excavation Competent Person Trained
- OSHA Title 29 CFR 1910.120 Hazard Communication Trained
- OSHA Title 29 CFR 1910.146 Confined Space Entry Trained
- OSHA Title 29 CFR 1910.120 HAZWOPER Supervisory Training
- Red Cross First Aid/CPR Trained

Fields of Competence

- Use of air monitoring equipment for worker protection and perimeter monitoring including photoionization detector; flame ionization detector, Jerome mercury vapor analyzer, explosivity meters, mini-rams, O_2 meters, and others
- Corporate Health and Safety manager for a nationwide Environmental Consulting Firm.
- Health and safety oversight for numerous investigations involving a wide variety of worker exposure issues.
- Site Health and Safety Officer performing health and safety plan development, implementation and enforcement.
- Management of soil and ground water pollution investigations
- Analysis of surface and ground water flow systems
- Surface and subsurface water quality monitoring
- Development of site-specific drilling/sampling programs
- Stratigraphic analysis, correlation and interpretation
- Tank removal and associated soils assessment
- Aquifer test analysis
- Applied geophysics
- Design and installation of monitoring well networks
- Health and Safety Plan preparation and implementation
- Design, operation and maintenance of multi-phase recovery and treatment systems
- Air quality monitoring
- Phase I and compliance auditing

Key Projects

Health and Safety Manager for all of the projects listed below. Included Job Hazard Analysis, identifying proper engineering controls and personal protection equipment, decontamination procedures, compliance with applicable regulations, monitoring requirements, medical monitoring, personnel training and development and implementation of Site Health and Safety Plan.

Project Manager and Health and Safety Officer of Remedial Investigation/Feasibility Study for a former solvent recycling facility (Superfund Site) situated in a glacial outwash plain. The project included writing and approval of Work Plan and Health and Safety Plan. Investigation of dense non-aqueous phase liquids. Field program included geophysical study including ground penetrating radar and electromagnetic study; over 50 vertical ground water and soil profiles; and, monitoring well installation and ground water sampling.

Project Manager and Health and Safety Officer for field program of Remedial Investigation and Feasibility Study of a former cable manufacturing facility located on the bank of the Hudson River. Included surface and subsurface sampling, test pits, monitoring well installation and sampling, study of tidal affect on ground water flow, and hydraulic conductivity tests. Supervised underwater survey and sediment coring and analysis using commercial divers. Health and Safety considerations included boating safety and water entry.

Project Manager and Health and Safety Officer responsible for the investigation and delineation of three separate hydrocarbon release sites at a Naval Air Station in Maryland. Responsibilities included preparing Work Plan, Sampling and Analysis Plan, and Health and Safety Plan, selection and oversight of subcontractors, data reduction and preparing final report including recommendations for remedial alternatives. Project included real-time personnel and perimeter air monitoring.

Project manager and Health and Safety Officer for the delineation and remediation of fuel oil spill on a lakeside property on Greenwood Lake, New York. Delineation accomplished with soil boring samples; on and off-site laboratory analysis of soil samples. Approximately 300 tons of soil removed and excavation backfilled and graded. Continuous air monitoring was employed. Site received closure from the New York State Department of Environmental Conservation.

Project Manager and Health and Safety Officer for an investigation into a major tetrachloroethylene (PCE)-contaminated groundwater plume at a former dry-cleaner in Glen Cove, New York. The investigation was conducted under the oversight of the New York State Department of Environmental Conservation Albany's Division of Remedial Action. Investigative methods to date have included soil vapor sampling and analyses, shallow soil investigation using Geoprobe and laboratory analyses of samples, near-surface geophysics for utility locations, deep borings (to 200') with continuous screening and sampling, well installation, gamma logging of new and existing wells, groundwater collection and analyses.

Directed the investigation of a former manufactured gas plant (MGP) formerly operated by Central Hudson Gas & Electric located along the Hudson River in Newburgh, NY to determine the extent of subsurface coal-tar contamination caused by the former MGP. The scope of work included the collection of soil and groundwater samples using standard drilling and direct push equipment. Both overburden and double-cased bedrock monitoring wells were installed to target specific intervals of the aquifer.

Directed the investigation of a former MGP located along the Black River in Watertown, NY. The scope of work included test pitting, soil borings and monitoring well installation. Both surface and subsurface soil samples were collected. Groundwater samples were collected from "Geoprobe" grab points and monitoring wells. Surface water samples from the Black River were also collected. All field activities were overseen and approved by a NYSDEC representative.

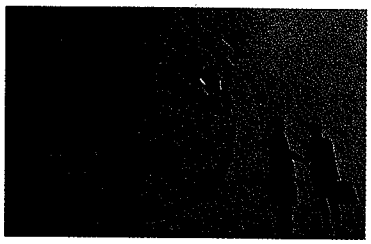
Performed mercury vapor monitoring for cleanup of water distribution system for a confidential major metropolitan city.

Project Manager for Phase I and Phase II Investigations of a 660-acre former hospital complex on Long Island. The Phase I included an extensive probe into historical records and a site reconnaissance of all 650 acres and 60 buildings. The Phase II involved the investigation of 11 Areas of Concern identified in the Phase I. Field activities included: test pits; soil borings; well installation; and sub-aqueous sediment, soil, and ground water sample collection and analysis. Responsible for all aspects of project including budgeting, management, development of project scope, sampling and analysis plan, field oversight, and reporting.

Project Manager and Health and Safety Officer for a long-term pumping test for a confidential client in upstate New York to determine the hydraulic connection between an abandoned contaminated quarry pond and local ground-water flow. The scope of work included installing and sampling new monitoring wells and collecting data with transducers installed in the wells around the site while the remediation system pumped water from the pond through a carbon filtration system.

Managed an investigation to determine the lateral and vertical extent of dissolved chlorinated solvents in ground water at a former automobile parts manufacturing plant in eastern Michigan. The scope of work included vertical profiling of ground-water quality including both on-site and off-site analysis of ground water samples. Installation of on-site and off-site monitoring wells. The investigation was overseen by a representative of the Michigan Department of Natural Resources.

Edward S. Wong, P.E.



Fifteen years of environmental consulting experience in remedial investigations, feasibility studies, regulatory compliance, and evaluation of industrial manufacturing and commercial sites. Design experience in wastewater and groundwater treatment and in sanitary waste treatment especially sequencing batch reactors. Additional experience with air pollution control devices and remedial design including soil vapor extraction, and groundwater pump and treat, feasibility studies and environmental insurance claim evaluation. Project responsibilities included preparation of contract documents, especially technical specifications, cost estimates, proposals, and construction oversight.

Professional Affiliations

- National and New York State Society of Professional Engineers (NSPE & NYSSPE)

Registration

- Registered Professional Engineer in the State of New York

Fields of Competence

- Sanitary And Industrial Wastewater Treatment
- Air Emission Control, Permitting, and Sampling
- Remedial Investigation Plans
- Corrective Action Plans
- Construction And Remedial Action Specifications

Credentials

- B.S. Chemical Engineering, Virginia Polytechnic Institute and State University, 1986
- 40-hour Health and Safety Certification

Key Projects

Prepared engineering reports, developed specifications and design drawings, and provided oversight of construction for numerous small-community wastewater treatment plants ranging from 50,000 GPD to over 1,000,000 GPD. Designs included variable frequency blower drives, structural development, air diffusers, sacrificial anodes, programmable logic controllers, motor control panels, silencers, specialty coatings, force mains, thrust blocks, and deep wet wells. Also prepared permitting and operations and maintenance plans. Projects ended 1998.

Construction Quality Manager (CQM) for federal project involving the design and construction oversight of an underground tank farm design, construction and removal of 16,000 cubic yards of contaminated soil. Project ended 1997.

Investigated, prepared remedial plans, and implemented remedial actions for numerous gasoline services stations and six former petrochemical terminals. Remedial actions included soil vapor extraction, groundwater pump and treat and dig-and-haul solutions. Project ended 2002.

Key Projects (continued)

Senior engineer for the Charlton/Southbridge municipal water supply design and construction management project that consisted of: the installation of 3,000 linear feet of 8-inch, HDPE-wrapped low-pressure, water distribution ductile iron piping (DIP); replacement of 800 linear feet of high-pressure transmission DIP; and connection of eight end users to the newly constructed system. Project ended 2001.

Designed, prepared specifications, and provided oversight for the installation of an in-situ bio-remediation system for a separate-phase petroleum spill at an operating railyard. System was design for both application of chemical oxidation and enhanced bioremediation technologies. Project ended 1999.

Designed, prepared specifications, and performed construction oversight of in-situ soil washing remediation project involving sub-surface surfactant injection for extraction of transformer oils spill at power facility in New Jersey. Project ended 2000.

Permit evaluation of major microfilm developing firm's six facilities and obtaining necessary air and wastewater permits in conformance with federal pre-treatment performance standards and state regulations including New Jersey, Pennsylvania, Delaware, and Maryland. Project ended 1999.

Evaluated over $500 million in environmental insurance claims for a diverse range of industries including wood treatment, manufacturing gas plant, chemical production, textile, reclamation, petroleum, metal working, and manufacturing sites. Project ended 2002.

Computer modeling of a lead-acid battery plant emissions for a 30+ year period, utilizing Industrial Source Complex 3 (ISC3) and development of report on impact of airborne emissions on surrounding soil. Project ended 2000. Also modeled groundwater treatment system off-gas, which allowed the discontinuation of a $30,000 per month oxidizer system. Project ended 2001.

Project Engineer for closure of a 5,000,000-gallon oil terminal in Staten Island, New York. Duties included development of feasibility studies, bench-scale and pilot scale bioremediation studies, development of an integrated corrective action plan, and preparation of technical specifications for excavation and bioremediation of over 100,000 tons of impacted soils. Project ended 2001.

Completed numerous Phase I and Phase II investigations for industrial and commercial real estate transactions as per ASTM standards.

Performed a full-scale environmental and safety audit for a major contracting firm involved with underground tank removals. Audit included OSHA compliance including hazard communications, confined space entry; lock-out/tag-out; and emergency response, environmental regulations, wastewater management, Spill Prevention Control and Countermeasures (SPCC), Toxic Substances Control Act, and SARA Title III, Community Right-to-Know, and Department of Transportation regulations. Project ended 2001.

Completed a feasibility study for removal of 10,000 tons of PCB's contaminated soils at veterans' hospital in Northport Long Island. Remedial actions considered included various capping options as well as excavation and offsite removal, and onsite thermal destruction. Project ended 2002.

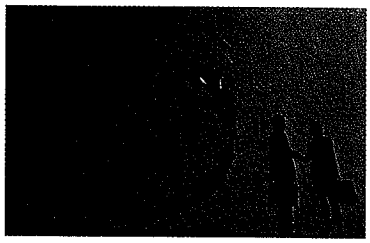
Completed the design, construction, operational oversight and final closure for a soil vapor extraction (SVE) system and a vapor phase activated carbon capture system at a industrial printing facility. Remediation also included the capping of wastewater leachate discharging system. Project ended 1992.

Completed numerous designs, permits and installations of air emission sources and control equipment ranging from such sources as printed circuit board manufacturers, photodeveloping facilities, co-generation facilities, vapor degreasing units, high-volume printing facilities, equipment manufacturers, repair facilities, and paint formulators. Prepared stack testing protocols and developed long-term emission control plans. Control equipment utilized includes thermal and catalytic oxidizers, bag houses, cyclones, and venturi scrubbers. NJ co-gen project ended 1998.

Project Director for environmental management of over 50 facilities operated by the New York Board Of Cooperative Educational Services (BOCES). Duties included management of all hazardous waste developed at each site, indoor air compliance, asbestos removals, aboveground and underground tanks, etc. Project ended 1991.

Completed aboveground tank designs, permitting, and installations from 100-gallon tanks to 100,000-gallon tanks. Tank products included petroleum products, waste products, solvents, raw manufacturing materials, and finished chemical products, as well as pressurized tanks for anhydrous ammonia and liquefied natural gas.

Carla Weinpahl



Over seventeen years of experience with leading environmental consulting firms. Experience includes hazardous waste site assessment and remediation, conceptual design, feasibility analyses and cost estimation for soil and groundwater treatment systems and air pollution control equipment, ISO 14001 certification assessments, product life cycle analysis, preparation of air pollution control and water discharge permits, sewer system evaluations, evaluation of sludge management and treatment technologies, compliance auditing of industrial facilities, pre-transaction environmental assessments (audits), and evaluation of solid waste disposal and wastewater treatment alternatives.

Fields of Competence

- Hazardous Waste Site Remediation
- Soil and Groundwater Remediation
- CERCLA Feasibility Studies
- ISO 14001 Certification Assessments
- Product Life Cycle Assessments
- Air Pollution Control
- Sewer System Evaluations
- Water and Wastewater Treatment
- Hazardous Waste Management
- Compliance Assessments
- Regulatory Permitting

Credentials

- M.S., Civil/Environmental Engineering, Polytechnic University, 1997
- B.S., Chemical Engineering, State University of New York at Buffalo, 1986

Key Projects

Hazardous waste site investigation and remediation projects for BICC Cables Corporation, Ford, AT&T and Metro-North Railroad Company. Preparation of CERCLA Feasibility Studies for the Facet Enterprises Site (NY); and the former Goldisc Recordings facility (NY). Preparation of workplans and remedial investigation report for state lead facilities: BICC Cables Corporation (NY). Preparation of feasibility studies and remediation plans for state lead facilities: BICC Cables Corporation (NY); Duane Marine Site (NJ); the former Red Devil facility (NY); the Metro-North Harmon Railroad Yard (NY).; former Brintec Cables Facility (NJ); Shenango Steel Mold (NY); and Orange County Landfill (NY).

Reviewed remedial actions, response actions and associated cost estimates for insurance company settlement negotiations. Projects involved: assessing the appropriateness of the remedial action and project costs, evaluating consistency with appropriate regulations and assessing potential insurance coverage issues. Claims ranged from $1 million to $260 million.

Reviewed the proposed response actions, as well as the incurred and projected remedial costs, for a New Jersey hazardous waste site. This work was conducted for a major insurance carrier to assist with management of the claim.

Prepared a critique of the technical approach and costs for a confidential client in a cost recovery action involving removal and disposal of approximately 460 drums. Project included: identifying alternate disposal methods, evaluating consistency with CERCLA and the NCP and assessing project costs. Work was used in providing expert witness testimony.

Reviewed a proposed remedial action for a NYS inactive hazardous waste site, developed an alternate remedial approach for the PRP committee that was accepted by NYSDEC.

Completed a conceptual system design and feasibility study for the expansion and redesign of a groundwater remediation system for a large petroleum terminal.

Conducted ISO 14001 certification assessments for Fortune 500 consumer and personal products R&D and manufacturing facilities, pharmaceutical manufacturing facilities, and medical device R&D and manufacturing facilities. Conducted compliance assessments for consumer and personal products, pharmaceutical, medical device, and aviation R&D and manufacturing facilities.

Conducted sewer system evaluation studies at the Exxon Linden Technology Center and the Crompton & Knowles chemical facilities. Responsibilities included: engineering evaluation of findings, subcontractor oversight, cost tracking and report preparation. NJDEPE approval letter for the Exxon site commended Exxon and ERM for their work.

Completed a comparative Product Life Cycle Assessment for container decoration technologies. Assessment included: identification and comparison of the potential environmental impacts posed by raw materials, manufacturing, consumer use and disposal utilized by these technologies.

Prepared a critique of emission factors for fiberglass reinforced plastic (FRP) open molding processes associated and compiled a summary of emission studies addressing these processes.

Prepared the ISRA Site Evaluation submission for the New York Times Carlstadt, New Jersey printing facility. Prepared soil cleanup plan for an ISRA facility.

Developed and implemented pilot studies for soil vapor extraction systems at numerous sites in NY, NJ and CT.

Performed air pollution control studies for soil and ground water remediation systems, printing, textile processing, petroleum storage and distributing and personal products manufacturing facilities. Studies involved evaluating methods to reduce contaminant emissions and conducting feasibility studies (technical/economic) for add-on controls when necessary.

Conducted technology assessments and odor impact evaluations for dewatering and processing systems proposed for the New York City Sludge Management Program.

Prepared numerous air and water permits for facilities located in NY and NJ. Operations included soil vapor extraction, groundwater remediation petroleum products research and development, pharmaceutical production, surface coating operations, and textile processing facilities. Also prepared and obtained numerous NJ pilot permits.

Michael B. Mattern

Environmental Scientist

More than four 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.

Fields of Competence:

- Computer skills (IBM, Windows, Microsoft, Internet, some AutoCAD)
- Field sampling and recording skills
- 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

Credentials:

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

Key Projects:

Participated in a Sodium Permanganate in 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.