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REMEDIAL INVESTIGATION FEASIBILITY STUDY (RI/FS) WORK PLAN FOR THE 100 OSER AVENUE SITE HAUPPAUGE, NEW YORK NYS DEC SITE NO. 1-52-162

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1.0 INTRODUCTION

1.1 Project Background

This *Remedial Investigation and Feasibility Study Work Plan for the 100 Oser Avenue Site* (RI/FS Work Plan) has been prepared by IT Corporation, Inc. (IT Corporation) on behalf of the New York State Department of Environmental Conservation (NYSDEC). The site is listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites (the Registry) as a Class 2 site, indicating that the site is considered to constitute a significant threat to the environment. The work plan has been prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Order on Consent (Index # D1-0023-98-09) with Anwar Chitayat that states that the NYSDEC will develop and implement a Remedial Investigation and prepare a Feasibility Study for the site to conduct more comprehensive contaminant characterization. Based on the review of several subsurface studies conducted at the site between the late 1980's and 1998, the NYSDEC determined that additional information is needed to determine: 1.) if all subsurface environmental impacts are related to on-site source areas or other off-site sources, and 2.) the nature and extent of contamination on site and down gradient of the site. Prior to being listed on the Registry, Mr. Chitayat (the owner of the property) had entered into a voluntary agreement with NYSDEC to perform remediation at the site. However, remediation under the voluntary cleanup program could not continue due to the site being listed on the Registry. Several other manufacturing facilities located to the south of the 100 Oser Avenue site are also listed on the Registry as Class 2 sites.

The additional investigation is required to determine the extent of residual source areas, to accurately evaluate if exposure to chemical constituents on-site results in a significant risk to human health or the environment, and to determine the need for remedial action. If remedial action is required, the additional site characterization data will be used during the preliminary and detailed evaluation of potential remedial alternatives as part of the site Feasibility Study. This work plan presents the methodology for characterizing the nature and extent of risks posed by the industrial residuals, off-site source areas and evaluating potential remedial options.

The elements of this work plan have been prepared in accordance with the Division of Environmental Remediation Technical and Administrative Guidance Memorandum 4025 (TAGM 4025), "Guidelines for Remedial Investigations/Feasibility Studies", March 31, 1989, and TAGM 4030, "Selection of Remedial Actions at Inactive Hazardous Waste Sites".

1.2 Project Objectives

Investigative work conducted at the site from the late 1980's to 1998 (**Section 7.0**, **References**) identified the presence of residual volatile organic compounds (VOCs) in groundwater and soil in exceedance of NYSDEC action levels. Several metals were also detected in groundwater in exceedance of NYSDEC groundwater standards. Additional site investigation is required regarding the nature and extent of residual source areas and impacts in order to accurately evaluate whether exposure to site constituents results in a significant risk to human health or the environment, and to determine what, if any, remedial action is needed. The objective of this Remedial Investigation and Feasibility Study work plan is to present the methodology for characterizing the nature and extent of risks posed by the industrial residuals and for evaluating potential remedial options. The approach for achievement of specific project objectives is presented in a following section.

In general, the overall goals of the RI/FS process are to obtain data to define site physical characteristics, source areas, and the extent of migration through potential pathways, in order to:

- Determine if these residuals present potential threats to human health and/or environmental receptors, and
- Develop and evaluate remedial alternatives (including the no-action alternative).

These goals will be achieved at the Oser Avenue Site by designing data collection activities to address the following specific objectives:

- Characterize background concentrations of the contaminants of concern (COCs) in the subsurface soils, sediments, and groundwater in the vicinity of the site;
- Characterize groundwater flow patterns across the site;
- Determine the nature and extent of potential impacts from on-site chemicals to the Falcon Drive Public well field through the groundwater on site;
- Identify potential source areas;
- Evaluate the hydraulic conductivity within the aquifer at the site for the purpose of estimating transport rates;
- Assess potential health risks posed by the industrial residuals at the site;

- Determine if Interim Remedial Measures (IRMs) are warranted for the site;
- Estimate volumes of material that may require treatment; and
- Evaluate applicable remedial alternatives, inclusive of presumptive remedies and treatability testing or other analyses that may be required as part of the Feasibility Study.

1.3 Work Plan Organization

The RI/FS Work Plan is organized into nine sections, one appendix and three associated documents, as described below:

- **Section 1.0: Introduction**: includes a brief summary of the Project Background and explanation of the Work Plan Organization.
- **Section 2.0: Site Background**: includes a review of the Site Background including Site Description and a Summary of Previous Investigations conducted at the site.
- **Section 3.0: Work Plan Rationale**: includes a description of the Data Quality Objectives and Work Plan Approach for the Remedial Investigation.
- **Section 4.0: Remedial Investigation Scope of Work**: includes descriptions of the Field Investigation tasks, the Analytical Program, the Remedial Investigation Report, and the Management of Investigation Derived Waste.
- **Section 5.0: Feasibility Study Scope of Work**: presents a description of the Development of Remedial Alternatives, the Preliminary Screening of the Remedial Alternatives, proposed Treatability Studies, the method for conducting a Detailed Evaluation of Alternatives, the Remedy Selection and describes the Feasibility Study Report.
- **Section 6.0: Project Management Approach**: includes a description of the Project Organization and Project Schedule to complete the RI/FS field and reporting activities.
- **Section 7.0: References**: includes a list of documents prepared as a result of investigations conducted at the site, correspondence between State agencies and representatives of the responsible party, and public information pertaining to the water supply well on Falcon Drive.

- **Section 8.0:** Subcontracts and M/WBE Utilization Plan
- **Section 9.0:** Budget
- **Figures:** Includes all figures referenced in this work plan.
- **Tables:** Includes all tables referenced in the work plan.
- **Appendix A:** Project Team Resumes

Other IT Corporation documents related to the Oser Avenue RI/FS include (but are not included herewith):

- Health and Safety Plan (HASP), May 1999
- Quality Assurance Project Plan (QAPP), August 1999
- Citizen Participation Plan (CPP), May 1999

2.0 SITE BACKGROUND

2.1 Site Description

2.1.1 Site Physical Setting

The Oser Avenue site is located in the Heartland Industrial Park, Suffolk County, New York at an approximate surface elevation of 120 feet above sea level (**Figure 1, Site Location Map**). The site is rectangular in shape, consists of approximately two and a half acres (210 feet by 518 feet) in area, and is oriented roughly north-south. The property is developed with a one-floor masonry building, roughly 24,000 square feet in area, located at the southern end of the property adjacent to Oser Avenue. The ground surface at the site changes approximately five feet, sloping from west to east. Approximately 0.6 acres at the north end of the site is wooded and undeveloped, with the majority covered by asphalt or the masonry building. Grassy areas border the driveway at the southeast corner of the site and account for less than ten percent of the site surface area. To the north, the property is bounded by residential property along Holiday Park Drive.

All utilities are brought to the site through underground connections. The facility discharges waste water to an on-site septic system located at the southeast corner of the property.

2.1.2 Site History

The following site history is taken from the Fanning, Phillips and Molnar (FPM) Work Plan (January 1998).

Aerial photographs show that the property was undeveloped and wooded in 1968. The next available photographs indicate that by 1976 the Site was developed to include the present building. The building was first owned by Vanderbilt Associates (Vanderbilt), who leased the building to Sands Textile Corporation (Sands) during the 1980s. Sands was reportedly a textile manufacturer utilizing tetrachloroethylene (PCE) to dry clean finished products. Vanderbilt sold the property in September, 1985. At some point after this, Anwar Chitayat began operations at the site and became the new owner of the property. Mr. Chitayat is the current owner of the property and majority interest owner of Anorad Corporation, which presently conducts manufacturing of precision positioning equipment at the Site. The FPM January 1998 report states that Anorad has never utilized PCE at the 100 Oser Avenue Site. Several investigations conducted at the subject property and neighboring properties during the late 1980s and early 1990s have found that PCE is the major contaminant at 100 Oser Avenue. The source of the contamination is alleged to be related to discharges of PCE and other solvents to former interior floor and sink drains connected to the on-site septic system, and discharges along the western side of the building in the area of sumps and drain pools during use of the facility by Sands. Sands operated as a textile manufacturer from approximately the mid 1970s to 1985, utilizing PCE to dry clean finished products.

Several other manufacturing facilities located to the south of the property (regionally upgradient) have been listed as Class 2 sites on the State's Registry of Inactive Hazardous Waste Disposal Sites and are either being investigated or remediated. Chemicals of interest at these upgradient sites also include chlorinated VOCs and metals. **Section 2.2, Summary of Previous Investigations** presents a chronological summary of the investigations conducted at the site.

2.1.3 Regional and Local Geology

The Site is located in central Long Island, which generally consists of approximately 1,000 to 1,500 feet of clastic, glacial sediments described as glacial kame deposits, fluvial sands or variably sorted till moraine deposits (D. Cadwell, "Surficial Geologic Map of New York, Lower Hudson Sheet", 1989).

The sequence of geologic units encountered at the Site, and the thickness of each (as determined from the previous investigations), are presented below and in **Figure 3, Geologic Cross Section**:

- Fill - bricks and rock fragments - approximately one foot thick.
- Upper Pleistocene Glacial Deposits - stratified kame moraine sand and gravel - approximately 80 feet thick.
- Lower Pleistocene Glacial Deposits - predominantly sand - approximately 120 feet thick.
- Magothy Formation - fine to medium sand with interbedded clay and silt - approximately 600 feet thick.
- Raritan Member of the Lloyd Formation - clay - approximately 300 feet thick.
- Precambrian Bedrock - (thickness not investigated), occurring at approximately 1,100 feet below the site.

2.1.4 Regional and Local Hydrogeology

Despite the previous subsurface investigation work completed at the site, only very limited site-specific data exists regarding groundwater flow direction or gradient. However, investigations conducted at neighboring sites, general information taken from the previous investigations at the Site, and a recently completed property elevation survey suggest that groundwater occurs at approximately 60 to 70 feet below grade and flows to the northeast toward Mill Pond, less than one mile northeast of the Site.

A report prepared by Fanning, Phillips & Molnar, October 1992 summarizes the Long Island Regional Planning Board's study of Hydrogeologic Zones, and states that the Site is located in the transition zone between groundwater discharge and recharge zones. Their interpretation suggests that groundwater may flow horizontally toward the northeast in the vicinity of the site at an apparent gradient of approximately 0.2%.

2.1.5 Groundwater Usage in the Vicinity of the Site

Previous investigations have found that a downgradient public drinking water wellfield has been potentially impacted from this site. The public wells are currently being treated to remove VOCs and are being regularly monitored to ensure compliance with drinking water standards. Potentially affected private wells will be identified and sampled as necessary.

2.2 Summary of Previous Investigations

Previous investigations have presented data identifying several potential source areas of contamination at the site:

- Soils and groundwater along the west side of the building in the vicinity of former underground and above ground storage tanks, a concrete sump, and an electrical transformer,
- Soils and groundwater in the vicinity of the northwest corner of the building near the existing loading deck and drain pool,
- Soils and groundwater in the vicinity of the existing septic tank in front of the southeast corner of the site building,
- Open pits within the building, and

- Several upgradient, off-site sources identified by NYSDEC as Class 2 Inactive Hazardous Waste Disposal Sites.

PCE is the most prevalent compound detected in site soil and groundwater samples. Other compounds detected at the site include various VOCs, chlorinated VOCs (CVOCs), and several metals (found in groundwater only).

The most recent investigation conducted at the site (Fanning, Phillips & Molnar, October 1992) states that three VOCs and metals are exclusively brought to the site by groundwater from other upgradient sources, while PCE and other CVOCs are either sourced by past onsite disposal activities or similarly brought on site from the upgradient sources. These potential upgradient sources have been identified as EMR Circuits at 99 Marcus Boulevard, Computer Circuits at 145 Marcus Boulevard, and Pall RAI, Inc. at 225 Marcus Boulevard (FPM, July 1990).

2.2.1 Subsurface Soils Investigation Results

Table 1a presents a summary of the soil data collected during the previous investigations at the subject property (**Section 7.0**, **References**), while historical sampling locations are presented on **Figure 2**, **Site Map**. Soil contamination was found to be concentrated in the shallow soils along the western side of the building (S-1: 2,756 ppm total VOCs at zero to five feet below grade) suggesting possible discharges of chlorinated solvents to the surface or shallow subsurface in the area. The impacts to soils in these areas appears to decrease with depth (D-1: 0.015 ppm total VOCs at 60 to 62 feet below grade).

Similarly, shallow soils in the vicinity of the northwest corner of the building near the loading deck (**Figure 2**, S-5: 12,194 ppm total VOCs) are impacted while the soils at greater depth (D-3: 0.007 ppm total VOCs at 60 to 62 feet below grade) are much less impacted. Soil conditions in the areas of the former pits within the building and the vicinity of the existing septic tank have not been investigated. However the Suffolk County Department of Health Services supervised the cleanup of the septic tank in 1989 documenting contamination with dichloroethylene, trichloroethane, trichloroethylene, and PCE.

Deep soil samples overall were less impacted than the shallow samples collected near the areas of concern. Generally, soil samples collected from the soil column near the water table across the Site suggest that contamination in this interval is attributable to contact with impacted groundwater, and less directly related to specific surface discharges.

2.2.2 Groundwater Investigation Results

Table 1b presents a summary of the groundwater data collected during previous investigations at the subject property (**Section 7.0**, **References**), while historical sampling locations are presented on **Figure 2**, **Site Map**. Groundwater at the site has been found to be impacted in all on-site monitor well locations. The primary compound detected in the groundwater is PCE at an average concentration of 22,600 ppb. The highest concentration of PCE was found on the Site in 1992 at a sampling location north of the building (E-3: 44,000 ppb), while PCE was detected in off-site, upgradient wells MW-2, MW-9 and MW-10 at an average concentration of 1,466 ppb in 1990.

Other VOC contaminants in groundwater (and the maximum concentrations detected on site) include vinyl chloride (11 ppb), methylene chloride (1,700 ppb), 1,1-dichloroethene (13 ppb), 1,1-dichloroethane (9 ppb), 1,2-dichloroethene (2,700 ppb), chloroform (17 ppb), 1,1,1-trichloroethane (850 ppb), carbon tetrachloride (710 ppb), trichloroethene (1,200 ppb), benzene (5 ppb), and toluene (2,800 ppb). Methylene chloride, carbon tetrachloride and toluene have reportedly never been used on site. Similarly, concentrations of chromium, copper and zinc were also detected in groundwater, however, since these metals were never used by any tenant or owner of the facility, it is suspected that their presence here are from an upgradient site.

The distribution of the CVOC compounds in groundwater suggest several potential sources of impacts at the site, including the former ASTs and sumps on the western side of the building, the loading deck area on the north side of the building, and off-site contributors. Sources of the non-chlorinated VOCs may include the fuel oil underground storage tank near the southwestern corner of building or upgradient releases.

2.2.3 Chronological Summary of Previous Investigations

Phase I Investigation of Potential Sources of Contamination, FPM, July 1990

This report was prepared for Anorad and presents the chain of ownership of the property the results of shallow soil sampling conducted on the west side of the property. The report also presents the results of groundwater samples collected from four monitor wells installed along the western side of the property in the area of the sumps and ASTs. Results from upgradient monitor wells are also presented demonstrating that contamination is coming to the site from upgradient sources, as well as specific on-site discharges of CVOCs.

Follow-Up Soil Investigation, FPM, November 1990
This report documents the results of a soil gas survey and soil sampling conducted as a follow-up to the previous work. Samples were collected from shallow and deep borings, indicating high levels of impacts of VOCs in shallow soils on the west side and northwest corner of the building associated with sumps and ASTs. Shallow soils in the eastern portion of the site were not impacted. Deep soil samples were impacted to a much lesser degree, indicating that soil impacts at this depth are associated by contact with the contaminated water table. The deep soil borings were converted to soil vapor extraction wells in anticipation of remediation at the site. The report recommended an engineering study to determine the applicability of soil vapor extraction technology at the site, and to pursue other potentially responsible parties for investigation and remediation activities.

Investigation of Potentially Responsible Parties, FPM, January 1992
This report was conducted for Anorad to identify potentially responsible parties within the vicinity of the Site. Pall RAI, Inc., United Guardian, Inc., Color Pak, Time Electronics, Computer Circuits Corporation, EMR Circuits and Standard Microsystems Corporation were investigated since they were located in an apparent upgradient direction from the 100 Oser Avenue Site. Pall RAI, Inc. was identified as the most probable source of contaminated groundwater at the Site. The report recommended additional groundwater sampling at the Site to clarify the contribution of contaminants from upgradient sources.

In-situ Vapor Extraction, FPM, May 1992
This report evaluated remediation options for the Site, recommending soil excavation, natural soil venting and capping as remedial options.

Remedial Investigation Report, FPM, October 1992
This report was prepared at the request of Anorad to determine if contamination on site was caused by on-site or upgradient sources. The work included the installation of five borings (**Figure 3, Geologic Cross-Section**) in a straight line trending northwest to southeast across the middle of the property behind the building. Groundwater was sampled from three discrete zones in the borings (zero to five, 25 to 30, and 45 to 50 feet below the water table), finding total VOCs ranging from 13 to 51 ppm. The greatest single analyte detected was PCE in concentrations ranging from 12 to 44 ppm. The report concluded that upgradient sources comprise a portion of the on-site plume, and that the contamination is limited to the upper 100 feet of the aquifer.

3.0 WORK PLAN RATIONALE

3.1 Data Quality Objectives

In general, the overall goals of the Oser Avenue RI/FS process are to obtain data to define site physical characteristics, residual source areas, and the extent of migration through potential pathways, in order to:

- Determine if these residuals present potential threats to human health and/or environmental receptors, and
- Develop and evaluate remedial alternatives (including the no-action alternative).

These goals will be achieved at the Oser Avenue site by designing data collection activities to address the following specific objectives:

- Characterize background concentrations of the contaminants of concern (COCs) in the subsurface soils and groundwater in the vicinity of the site;
- Characterize groundwater flow patterns across the site;
- Determine the nature and extent of potential impacts from industrial compounds to the Falcon Street well field through the groundwater on site;
- Locate and examine reasonably accessible drain lines within the facility in order to determine to what extent, if any, these structures may currently be acting as conduits for the migration of industrial residuals or impacted water or sediment;
- Investigate potential source areas;
- Investigate the extent of subsurface soil impacts that may exist along the western side of the Site which have been identified on Site plans;
- Evaluate the hydraulic conductivity within the aquifer at the Site for the purpose of estimating impact transport rates;
- Assess potential health risks posed by residuals at the Site;
- Determine Remedial Action Objectives (RAOs) for the Site;

- Evaluate applicable remedial alternatives, including completing treatability testing or other analyses that may be required as part of the Feasibility Study.

The data to be collected during the RI/FS will be of an analytical level appropriate to the specific objectives described above. A comparison of these specific objectives to analytical levels for the project is contained in **Table 2**.

3.2 Work Plan Approach

The overall approach for the Oser Avenue RI/FS is described in the following subsections of this work plan. Each subheaded section corresponds to an overall RI/FS goal as described in EPA *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 540 G-89 004, 1988), under which the specific project objectives listed above are enumerated and matched with the planned field and laboratory sampling, testing, and other data collection activities.

3.2.1 Investigate Site Physical Characteristics

Tasks to be completed in support of this overall goal and the following specific objectives include:

Objective	*Planned RI/FS Tasks*
Characterize groundwater flow patterns across the entire Site.	Install monitoring wells; collect water level measurements; determine flow direction and gradient.
Locate and examine reasonably accessible interior drain lines connected to the septic systems.	Perform video inspection of reasonably accessible drain lines.
Evaluate the hydraulic conductivity within the aquifer.	Complete aquifer slug tests; computer analysis of hydraulic conductivity; estimate groundwater velocity.

3.2.2 Define Source Areas

Tasks to be completed in support of this overall goal and the following specific objectives include:

Objective	Planned RI/FS Tasks
Characterize the identity and age of NAPL material which may be detected in monitoring wells.	Sample NAPLs; complete specialized "fingerprint" analyses.
Investigate soil quality in the area of the western side of the Site building	Install soil borings and conduct field screening of soil samples by portable gas chromatograph.
Investigate line sumps and pits which have been identified on Site plans.	Complete soil borings; waste characterization analyses; feasibility study analyses.
Estimate volumes of material that may require treatment at the Site.	Complete soil borings; site characterization analyses; waste characterization analyses; feasibility study analyses.

3.2.3 Define Nature and Extent of Residuals

Tasks to be completed in support of this overall goal and the following specific objectives include:

Objective	Planned RI/FS Tasks
Characterize the distribution and concentrations of the contaminants of concern (COCs) in the subsurface soils and groundwater.	Soil and groundwater characterization sampling.
Determine the nature and extent of potential groundwater-related impacts to the Falcon Street well field as they pertain to this site.	Install monitoring wells; collect and characterize groundwater samples.
Determine if upgradient or off-site sources are impacting Site groundwater quality.	Evaluate the distribution and occurrence of specific chemicals as determined from groundwater characterization sampling.
Assess potential human health risks.	In addition to other media described above, collect and characterize soil samples.

The proposed sampling tasks, testing tasks, laboratory procedures, and risk and alternative evaluations to be performed during the Oser Avenue RI/FS are described in detail in following sections of the work plan.

4.0 RI SCOPE OF WORK

This section describes the work effort which will constitute the RI at the 100 Oser Avenue site. The scope of work is based on the results of the April 27 and May 6, 1999 scoping sessions between the NYSDEC and IT Corporation, as well as the requirements stated in NYSDEC's Work Assignment for the 100 Oser Avenue site (DEC Site No. 1-52-162).

This section details the proposed investigation, assessment, and reporting tasks designed to generate information sufficient to enable IT Corporation to identify the presence and extent of the impacted soils and groundwater on site. RI/FS activities will be performed in accordance with US EPA and NYSDEC requirements, protocols, and guidance including EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 540 G-89 004, 1988), NYSDEC's TAGM 4025 "Guidelines for Remedial Investigations/Feasibility Studies", dated March 31, 1989, and TAGM 4030 "Selection of Remedial Actions at Inactive Hazardous Waste Sites".

4.1 Field Investigation

A description of proposed field activities for the 100 Oser Avenue site is presented in the following sections.

4.1.1 Pre-Field Work Site Reconnaissance

The primary objectives of this task are to coordinate site investigation activities with current on-site operating personnel, to verify the locations for all proposed soil borings, as well as to identify staging areas for equipment, materials and decontamination zones. Additionally, coordination with the Underground Facilities Protection Organization (UFPO) and current on-site personnel for clearance of subsurface utilities and services will be included in this task. The IT Corporation Project Manager will arrange a site reconnaissance meeting including the Site Manager, Project Geologist, a representative from the drilling subcontractor, and a NYSDEC representative at least one to two weeks prior to the scheduled start date of on-site activities. This will allow time for the facility to be notified of the scheduled activities and for moving stored equipment or materials for access to the proposed drilling/sampling locations (if necessary).

The NYSDEC will be responsible for notifying off-site property owners and arranging access permission. To the extent practicable, access arrangements will allow for flexibility in placing the sample/boring locations in case of subsurface interferences or other conditions requiring minor changes in sample/boring locations.

4.1.1.1 Off-Site Well Survey. An off-site private well survey will be conducted to determine the existence of private wells located approximately 3,500 to 4,000 feet downgradient (north-northeast) from the subject property and whether these wells have been impacted. The results of this survey will allow for the contamination levels to be recorded and subsequently provide information about the extent of contamination. This survey will be conducted by requesting well information (including billing records and historical environmental reports for the major water supply wells in the area) from the Suffolk County Department of Health and other pertinent regulatory agencies.

In addition, an inventory of public water supply wells within an approximate two-mile radius will be conducted. This inventory will be requested from an electronic database provider and supplemental information will be obtained from the local water authority. The inventory will include, if accessible, the following: location, depth, pumping rates, and quality data associated with each well that is identified.

4.1.2 Base Map Revision

Base map development was completed by Albert W. Tay, Licensed Land Surveyor, of Plainview, New York between April 20 and 24, 1999. The site map delineated current property boundaries, topography, and surface features such as buildings, roadways, aboveground utilities, drainage, and existing monitoring well and soil vapor extraction locations. Elevations were referenced to the National Geodetic Datum of 1929 mean sea level (MSL).

Subsequent to soil boring and monitoring well installation, each location will be identified on the survey map and will include the ground surface elevation (MSL). For each monitoring well installed at the site, the ground surface and top of the inner casing elevations (MSL) will be provided.

On-site and off-site utilities will be identified to protect the health and safety of field personnel and to prevent damage to underground utilities during intrusive activities. Public and privately owned utilities will be located by contacting responsible agencies/parties to provide mark-outs of underground utilities.

In an attempt to locate unidentified underground utilities, tanks, or other large metallic objects, IT Corporation will conduct a supplemental metal detector screening before subsurface investigation activities begin. This metal detector screening is intended as a precautionary and supplemental health and safety measure only. If the locator indicates the presence of a buried object, activities will not proceed in that location until the type of buried object is identified. If the object cannot be identified from surface or shallow digging, the location for that boring will be adjusted.

4.1.3 Indoor Air Monitoring

Air sampling for VOCs will be performed to determine whether contaminant sources are affecting indoor air quality on-site. This includes a presampling inspection to be performed prior to the testing to evaluate the structure, layout and physical conditions of the on-site building in order to identify and minimize conditions which may affect or interfere with the proposed testing. The presampling inspection will be performed at least two to three days prior to actual sampling. In addition to the presampling inspection, a chemical inventory will be created to provide an accurate assessment of the potential contribution of VOCs from on-site products and operations.

The indoor air samples will be collected using Summa canisters, which will be placed systematically throughout the building in consultation with the NYSDOH. Subsequent to air sampling, the canisters will be shipped to an accredited Environmental Laboratory Approval Program (ELAP) laboratory and analyzed via EPA Method TO-14 for VOCs. The analytical method used will allow for the analytes to have detection limits at levels in the range of typical background concentrations as reported in the NYSDOH and US EPA's indoor air databases. Quality Assurance/Quality Control measures will be followed to ensure that high quality data are obtained.

The detailed information collected prior to, and at the time of, sampling activities will aid in the interpretation of the test results. This information includes the following: floor plan, ventilation system, outdoor plot, ambient and subsurface concentrations, product inventory, sample locations, wind direction and potential interferences. The indoor air monitoring/sampling will measure levels of VOCs at concentrations low enough to compare to typical indoor air levels for health and safety purposes.

4.1.4 Soil Gas Survey

A soil gas survey will be performed on-site prior to the commencement of any field sampling activities. The soil gas survey will be conducted across the site in order to determine if any

VOC constituents are in the shallow subsurface soils, possibly resulting from the presence of VOCs in the soil and/or groundwater. The results of the soil gas survey will be used to determine whether VOCs are migrating through the subsurface and could potentially be of concern to nearby receptors (i.e., residential houses located immediately downgradient of the site).

Soil samples will be collected by installing dedicated sampling points at each of the six proposed locations requested by the NYSDOH (**Figure 4**). Sampling points will consist of four-inch long slotted, hollow-stem aluminum shield points (or equivalent) connected to Teflon tubing. Each sampling will be collected by a vacuum pump and placed into a plastic Tedlar sampling bag. The six soil gas samples (as well as one field blank per collection day) will be immediately shipped to an accredited ELAP laboratory and analyzed via EPA Method TO-14 for VOCs.

4.1.5 Field Sampling Activities

This section describes the specific field data collection activities and the rationale for these activities and analyses. A summary of proposed field activities; including sampling and analyses for 100 Oser Avenue is provided in **Table 3**. **Figure 4** depicts the locations of proposed sampling activities. In general, the field sampling program will consist of a two-phase approach. The initial phase will include HydroPunch groundwater and soil sampling, portable gas chromatograph analysis, soil boring installation, and soil and groundwater laboratory analysis. The second phase will include monitoring well installation, water table monitoring, and soil and groundwater sampling and laboratory analysis. The laboratory analytical program designed for this investigation is described in **Section 4.2**.

4.1.5.1 Portable Gas Chromatograph. A portable gas chromatograph (portable GC) will be used on-site during the HydroPunch and soil boring activities to provide real-time results of target chemicals detected in soil and groundwater samples. This will allow for field decisions to be made regarding the extent of contamination and the area(s) of maximum contamination. This characterization of on-site soils and groundwater will aid in the depth and placement of monitoring wells on-site. Details regarding portable GC procedures are described in the QAPP, which is presented under separate cover.

4.1.5.2 Soil Boring and Sampling

HydroPunch Sampling:

A total of 19 borings (14 HydroPunch groundwater sampling and 5 shallow soil sampling borings) are proposed in the locations indicated on **Figure 4**. The drilling and sampling of the

HydroPunch borings will be conducted in order to determine the vertical profile of groundwater impacts, as well as investigate the extent of shallow to deep subsurface soil impacts.

The 14 HydroPunch borings will be advanced through the unconsolidated deposits to an approximate depth of 220 feet utilizing a combination drill rig, capable of HydroPunch and soil borings, to a depth of approximately 175 feet below grade, or until collected groundwater/soil samples are deemed "clean" (i.e., detected contaminants of concern are found at acceptable levels, see **Section 4.2.2**) using the portable GC. Although the HydroPunch borings will be primarily used to collect depth-specific groundwater samples, soil samples will be collected at specific intervals (as indicated in **Table 3**) in order to aid in determining the vertical extent of contamination, as well as characterize the geology beneath the site. Soil samples will be screened for potential site-related impacts using visual observation and a PID.

The drilling and sampling of the soil borings will be conducted to investigate the extent of subsurface soil impacts that may exist in the areas of concern along the western side of the building. This area was the location for two former PCE ASTs and one waste oil AST. Soil sampling will be conducted at these locations to an approximate depth of 30 feet in order to provide vertical characterization of impacted soils and to provide additional stratigraphic information for the site. The borings will be advanced until collected soil samples are deemed "clean" using the portable GC.

Shallow Soil Boring Sampling:
The five soil sampling borings will be advanced through the unconsolidated deposits utilizing the combination drill rig to a depth of approximately 30 feet below grade. If signs of contamination are still present at the proposed finished depth, Geo-probing activities will continue until soils that are deemed clean, using the portable GC, are encountered. Soil samples will be collected every five feet and screened for potential site-related impacts using visual observations, supplemented by a photoionization detector (PID).

Sample Screening Overview:
The physical characteristics of each soil sample will be visually classified and described based upon the unified soil classification system (ASTM D 2487-85). Each sample will be monitored with an HNu PID using an 11.7 lamp or OVA flame-ionization detector (FID) for volatile organic compounds. All sample classification descriptions, sample recovery, FID or PID readings and any other pertinent information will be recorded in field notebooks and on blank boring log forms.

Soil samples will be collected and analyzed in the field for volatile organic compounds using the portable GC. The soil samples will be placed in 16 oz. glass jars with septum seals and then prepared for head space analysis as outlined in the QAPP. The sample jar will be labeled with the date collected, boring number, sample number, depth, number of blows, and recovery in inches. Additionally, 25% of the samples will be submitted to the laboratory for analysis, based upon the results of visual/olfactory and PID screening, with the intent of verifying the portable GC results. The number of samples submitted for analysis may be reduced at boring locations where no elevated PID readings or obvious visual/olfactory qualities, characteristic of industrial by-products, are observed. Following completion of each boring, the borehole will be filled with a cement-bentonite grout. The surface areas will be repaired as needed.

4.1.5.3 Monitoring Well Installation and Development. Fifteen new groundwater monitoring wells (shallow, deep, and some couplets) are proposed to be installed at the locations shown on **Figure 4**. The number, depth, and location of these groundwater monitoring wells is dependent upon the results of the soil and groundwater samples collected during the HydroPunch and soil boring activities. These wells will be installed in impacted areas as well as areas which will allow for the horizontal extent of contamination to be delineated. The monitoring wells will be installed to investigate groundwater quality on-site, characterize groundwater flow patterns across the site, and determine the nature and extent of impacts from the site, and upgradient impacts, which may be coming on-site.

At each proposed monitoring well location, a boring will be advanced utilizing spun casing drilling techniques. No spilt spoon soil samples will be collected during the installation of the monitoring wells since the subsurface will have been previously characterized using the HydroPunch and portable GC data. The "shallow" well borings will be installed to a depth of approximately 10 -15 feet below the groundwater table, for a total boring depth of approximately 75 - 80 feet. The "deep" well borings will be installed to a total boring depth of approximately 200 - 220 feet. If elevated PID readings or obvious visual signs of impacted soil are present at the desired depth for monitoring well installation, then the boring will be advanced until evidence of such material is no longer present or until a confining layer is believed to have been encountered.

The wells will be constructed of 2-inch-diameter, either fiberglass reinforced epoxy (FRE) or stainless steel (which ever is most compatible in regards with the on-site contaminant concentrations) riser pipe and will be screened across the water table, or deeper in the aquifer, as determined by the portable GC results. A sump, 2 feet in length, will be attached to the bottom of the screen. The size of the screen openings will be 0.010-inch and No. 0 Morie Sand will be used as filter pack. The screen and filter pack sizes may be changed depending upon the nature of the material encountered in the boreholes. However, at this time, it is anticipated that 0.010-inch slot well screen and No. 0 Morie sand will be used. The annular space between the screen and the borehole will be filled with filter pack sand. The sand will be placed in increments to assure that native material does not collapse around the well screen. Frequent measurements of the sand level will be made using a weighted measuring tape. The sand pack will extend to approximately two feet above the top of the screen. Following placement of the sand pack, a two-foot thick (minimum) bentonite pellet or granular bentonite slurry seal will be put in place. Pellets will be installed by pouring them into the annular space carefully so as to prevent bridging. If a bentonite slurry is used, it will be installed by tremie pipe. The remainder of the borehole will be filled with bentonite and Portland cement grout mixture tremied to within one foot of the ground surface. Monitoring wells will be installed as indicated in **Table 5a - Typical Monitoring Well Section** and **Table 5b - Typical Shallow/Deep Well Couplet Section**.

A flush-mount, traffic-rated roadbox will finish the well head. The roadbox will have a bolt-down steel cap. A concrete apron will be installed around the roadbox after the grout has dried. The apron will be sloped to route drainage away from the well. An experienced geologist will supervise the soil boring and monitoring well installation.

The drilling equipment will be decontaminated at the decontamination (decon) station prior to each well installation. All decon water, as well as drilling wash water, will be stored in containers/tanks and sampled for disposal characterization.

The newly constructed monitoring wells will be developed by pumping or surging to create a good hydraulic connection between the well screen and the adjacent formation. Periodic measurements of pH, specific conductance, temperature and turbidity will be performed during development. Wells will be developed either by air-lift pumping techniques using the drill-rig or a variable-speed submersible pump. Fine-grained material around the well screen will be drawn into the well and removed by agitating the well water with a surge block or by pumping water from the well at alternating discharge rates. Accumulated sediments will be removed from the wells by pumping.

Development shall proceed until the turbidity reaches 50 NTU, with a less than 10 percent variance in all other parameters or until at least three to five well volumes are removed within a one hour period. This will minimize the effect of residual formational silts and clays that could potentially interfere with chemical analysis. Well development also increases the hydraulic conductivity immediately around the well which, in turn, reduces the potential of the well yielding an insufficient volume of water during the sampling procedure.

Each monitoring well will be developed as soon as possible, but not less than 48 hours after installation. The appropriate well development method will be selected depending on water level depth, well productivity and sediment content of the development water.

4.1.5.4 Water-Level Measurements. The water level in each monitoring well will be gauged to provide information on hydraulic gradients and groundwater flow at the site, as well as to provide information on the presence/absence of immiscible liquids. Measurements of water levels will be obtained using an electronic water-level instrument compatible with the concentrations on-site. Therefore, both an oil/water or chemical interface probe (IP) will be staged on-site.

4.1.5.5 Groundwater Sample Collection. One groundwater sampling event will be conducted. Groundwater samples will be collected from any accessible on-site pre-existing monitoring well and all 15 newly installed monitoring wells, as stated in Table 3. Sample collection will be performed in accordance with the procedures described below:

1) Obtain appropriate laboratory-prepared sample containers prior to sampling.

2) Determine the appropriate level of health and safety according to the approved Health and Safety Plan.

3) Calibrate a pH pen, conductivity meter, turbidity meter and thermometer.

4) Obtain a depth to water measurement, then determine the volume of water in each well by using $V = \pi r^2 h$ where:

   V = volume of water ($feet^3$)
   $\pi = 3.14$
   r = radius of well (feet)
   h = height of column of water in well (feet)

   Determine four well volumes in gallons by using $ft^3 \times 7.48$ gallons/$ft^3 \times 4$.

5) Use a decontaminated pump to purge the low-yield wells to dryness. Purge high-yield wells of at least four to ten well volumes until pH, conductivity and temperature have stabilized and turbidity has been reduced to 50 NTUs or less. The purge pump will be leakproof and free of oil and other adulterating

components. During purging, the pump intake should be maneuvered up and down the well to ensure that water stored in the casing is purged.

6) All purged water will be containerized and sampled for disposal characteristics.

7) Put on clean disposable latex sampling gloves prior to collecting samples.

8) If a polyethylene or teflon bladder-type positive displacement pump is used for purging, procure water from the pump after the pH, conductivity and temperature have stabilized, the turbidity is 50 NTUs or less, and after four to ten well volumes have been removed (high-yield wells) or well has been pumped dry (low-yield wells). Sampling should not be undertaken until the water level in the well has recovered from the purging process.

9) If a stainless steel submersible centrifugal pump is used for purging, remove it after sufficient purging and procure a water sample with a clean polyethylene, steel, PVC or teflon bailer and monofilament line. Sampling should not be undertaken until the water level in the well has recovered from the purging process.

10) Collect water samples in 40 ml glass vials (for volatiles) first. Fill the vial with sample water from the bailer to overflowing. Carefully but quickly slip the cap with the septum onto the vial with the teflon face of the septum toward the water (especially when sampling for volatile compounds). Tighten the cap securely, invert the vial and tap the cap against your hand to assure that there are no air bubbles inside. If bubbles are present, add a few more drops of sample water and reseal.

11) Collect samples for semi-volatiles in one quart (liter) amber glass jars next. Replace the teflon-lined cap. Place the sample in an ice chest at 4° C after labeling. Collect samples for pesticides/PCBs in one quart (liter) amber glass jars. Replace the teflon-lined cap. Place the samples in an ice chest at 4° C after labeling.

12) Collect samples for metals in one quart (liter) polyethylene jars, fill to the neck of the jar. Acidify the sample with trace grade nitric acid to a pH of 2 or less. Replace the cap.

13) Obtain duplicate and blank samples at the frequency required by **Table 3.**

14) Label the sample containers using cloth labels and waterproof ink and seal containers with custody seals. Labels will include the following information:

a. sample identification number,
b. job name and identification number,
c. well number and designation,

d. date and time of sample collection,
e. type of analysis requested (i.e., VOA, metals, etc.), and
f. name of sampler.

15) Fill out chain-of-custody form and reference the preservation technique in the remarks section.

16) Check to make sure the vial caps are tight, then place on ice immediately.

17) Store the collected samples together with any blank samples collected for that sampling event. The sample set and blanks must be stored together, under refrigeration, in an area known to be free of contamination.

18) Transport the sample set, on ice, via overnight courier, maintaining custody as described in the QAPP.

4.1.6 Slug Testing/Hydraulic Conductivity Evaluation.

Rising-head slug testing is proposed at the newly installed monitoring wells in order to evaluate hydraulic conductivity within the aquifer at different areas on-site. At each monitoring well tested two test repetitions will be performed. Initially, the depth to static water level will be measured with an IP, along with the total depth of the well for the determination of the standing water column height in the well. Then a transducer, used to collect changes in water level data, will be deployed to approximately one foot above the bottom of the well. The transducer will be connected to a data logger, which will be used to record the change in water elevation over a period of time. Next, a slug-bar will be lowered into the well to displace a volume of water. The water level in the well will be allowed to return to its approximate static elevation (within 90 % of the initial water level). Once static conditions have been re-established, the data logger will be activated and the slug-bar will be quickly removed from the well. Removal of the slug-bar will result in an instantaneous drop in water elevation within the well. The transducer and data logger then record the rise in water level over time as the groundwater elevation rebounds to static conditions. These data will be evaluated using the method devised by Bouwer and Rice (Bouwer and Rice, 1976; Bouwer, 1989).

4.1.7 Video Logging

In order to investigate the sewer line that runs beneath the building, video logging activities of the line and associated drainage piping will be performed. A remote-controlled video camera, mounted on a wheeled frame, will be run along the length of the central drain line beneath the building to inspect the integrity of the pipes (i.e., for cracks, holes, etc) and for residual sludge that may serve as a source area. Access to the sewer line will be made through either an interior floor drain or from the exterior septic tank system. Results of the video logging activities will determine if additional subsurface investigation is warranted, and the NYSDEC will be notified verbally from the field.

4.1.8 Data Reduction/Completeness Evaluation

As completed data packages are received from the contract laboratory, preliminary reduction and evaluation of the data will be conducted. The objective of this task is to evaluate, based on the historic and newly collected data, if data gaps still exist which warrant the collection of additional field data.

Preliminary geologic cross-sections and plan maps will be constructed to assist in the data completeness evaluation. The results of the data completeness evaluation will be transmitted to the NYSDEC in letter format prior to initiation of the remedial investigation report. If it is determined that data gaps exist, additional field activities will be proposed within the evaluation letter.

4.2 Analytical Program Summary

4.2.1 Data Quality Control/Quality Assurance and Management

4.2.1.1 ***Field Custody***. A sample is the physical evidence collected from the site of the environment. Strict control over possession and integrity of the samples will be maintained by the following procedures:

- Integrity of all sample containers to be used for the sampling tasks to be conducted.
- Establishing and maintaining the record of custody.
- Ensuring that each sample is protected and preserved properly during shipment.
- Checking laboratory handling procedures and samples information systems.

Detailed custody and handling procedures are listed in the QAPP (provided under separate cover).

4.2.1.2 Field Quality Control Checks. The intent of the internal quality control program is to detect potential problems at the source and if necessary, trace the sample's analytical pathways for introduction of contamination. The quality control data generated in the field will be used to monitor sampling technique reproducibility and cleanliness. Quality control data generated by the laboratory will not only monitor reproducibility (precision) in laboratory methods and cleanliness, but accuracy in analyzed samples submitted for analysis.

The field quality control checks monitor the data quality as it is affected by field procedures and conditions. The degree of effort (number of check samples per total samples taken) is stated in this section for each category. The acceptability criteria are outlined in the QAPP (provided under separate cover). All field quality control samples are submitted blind to the laboratory.

The function of each quality control sample is described as follows:

Rinseate blank:
A sample of rinse water from final decontamination of sampling equipment (split spoons, etc) will be collected and forwarded to the laboratory for analyses. This sample will provide a measure of the degree of sampling equipment decontamination and possible cross-contamination between locations. A minimum of one rinseate blank will be submitted for each analytical parameter.

Duplicate:
Blind field duplicates (as opposed to duplicate containers full of sample intended as backup) are sequential or co-located grab samples that are collected to monitor laboratory precision. A minimum of 10% of the total number of samples will be taken and submitted for analysis.

Trip Blank:
A sample of deionized water will be placed into a sample container at the laboratory and will accompany the containers and samples throughout the sampling process. These samples will provide a measure of the possible cross-contamination of samples through contact with the sample containers and through leaks or diffusion through the containers' caps. Trip blanks will only be analyzed for volatile organic compounds.

Field Blanks:
A sample of deionized water will be placed into a sample container on-site during field activities and will accompany the containers and samples throughout the sampling process. These samples will provide a measure of the possible contamination on-site due to site conditions and

field personnel handling, as well as cross-contamination of samples through contact with the sample containers and through leaks or diffusion through the containers' caps. A field blank will be collected daily and shipped to the laboratory for analysis.

4.2.1.3 Laboratory Quality Control. Quality control data will be generated by the laboratory to monitor reproducibility (precision) accuracy in samples submitted for analysis.

The internal quality control checks to be routinely implemented by the lab include replicates, matrix-spiked samples, matrix spike duplicates, surrogate spikes, and method blanks. The functions of each of these control checks, and performance specifications for each parameter are contained in the QAPP (provided under separate cover).

4.2.1.4 Field Data Collection and Reduction. IT Corporation field personnel will log all field measurements, observations, and field instrument calibrations in bound, waterproof field notebooks. Notebook entries will be dated, legible, and contain accurate and inclusive documentation of an individual's project activities and all other pertinent information. Each individual making an entry into the field notebook will date and sign their entry.

Data reduction for this investigation will consist of compiling drilling logs, tabulating field analytical results, and calculating groundwater elevation values from water level measurements and surveyed casing elevations.

4.2.1.5 Laboratory Data Collection and Reduction. The data reduction scheme used in the lab for each of the measurement parameters, including the formulas used for calculating concentrations for both water and soils, will be that stated in the standard operating procedure for the analytical methods used. All analyses will utilize a bound notebook into which will be recorded the following items, at a minimum:

- analyst,
- date,
- sample number (lab #), and
- analysis set-up conditions, e.g., dilutions, auto-sampler position number, or other instrument specifics not covered by an SOP.

For instrumental analysis, this analysis notebook will be instrument-specific and referred to as an instrument log. For other types of analysis, this analysis logbook will also contain all raw data collected by the analyst.

For all analyses, the data will not be blank-corrected and will be flagged if blanks do not meet acceptability criteria. Additionally, any result that is less than ten times the value of the blank will be considered suspect.

Chemists and technicians will be responsible for the measurement/analysis of each specified laboratory quality control parameter, and for calculations associated with the determination of parameter concentrations. All calculations are listed in the EPA SW-846 or NYSDEC ASP Category B method referenced. The chemists and their supervisors will review analytical results, applying calculation checks on a minimum of 10 percent of the results on each report. These individuals will determine whether or not the results are acceptable, though the ultimate authority to determine acceptability will be with the laboratory's Director of Quality Assurance.

The laboratory section manager will be responsible for the final review of all data and for the proofing of reports prior to submittal of the reports to IT Corporation.

Final reports will be typed from the in-process report forms approved by the supervisor after the review of all supporting data. The in-process forms along with all hardcopy data output and other case records will be stored together in a single secure location indexed by project number for at least three years. This location will be in IT Corporation's Latham, New York office. At the end of the three year period, the files will be returned to NYSDEC for archiving.

All data will be cross-checked for correctness by the analytic laboratory's QA Director for reported values, detection limits, percent moisture and dilution factors (if applicable), after data has been reduced and transcribed into the final reporting format.

4.2.1.6 Data Usability Summary Report.. A complete record of each sample's history will be available for documenting its progress from the time of sample collection to arrival at the laboratory and through the laboratory from sample receipt to reporting. Data Usability Summary will include the use of dated entries, signed by analysts and supervisors, on work-sheets and logbooks used for all samples, the use of sample tracking and numbering systems to logically follow the progress of samples through the laboratory, and the use of quality control criteria to reject or accept specific data.

The Data Usability Summary Report (DUSR) procedures for volatile and semi-volatile organic compounds are outlined below, and will be performed by an independent third-party validator certified to produce DUSRs in New York State.

The requirements that will be checked in during the review are listed below:

- Holding Times
- Blanks
- Surrogate Recovery
- Matrix Spike/Matrix Spike Duplicate or Laboratory Control Samples
- Field Duplicates
- Compound Identification
- Compound Quantitation and Reported Detection Limits
- Overall Assessment of the Data for the Case

4.2.1.7 Reporting of Data and Outliers. Outliers are unusually large or unusually small values in a population of observations. It is necessary to eliminate outliers during QC data review because of the skewing effect which can destroy the effectiveness of the QC data.

All analytical data (field and laboratory) will then be summarized in tables in the RI/FS Report with appropriate qualifications as indicated by review of field and laboratory performance. Unusable data will be identified by the process described above.

Analytical data will be used in the assessment of Health Risk to determine cleanup levels for the site that are adequately protective of human health.

4.2.2 Environmental Sample Analyses and Collection Methods

The RI/FS sampling and analytical program for the 100 Oser Avenue site has been designed to meet the specific project objectives stated in **Section 4.1**. **Table 3** presents a summary of the sampling and analysis program designed for the 100 Oser Avenue RI/FS, including field and laboratory analyses and quality control sample requirements.

Soil and groundwater samples collected during the HydroPunch and soil boring activities will be analyzed in the field for VOCs using a portable GC. The VOCs to be screened include tetrachloroethene (PCE), trichloroethene (TCE), trichloroethane (TCA), dichloroethene (DCE), dichloroethane (DCA), vinyl chloride, and BTEX. Following the field analysis, 25% of the samples will be forwarded to the laboratory for QA/QC purposes, as well as additional analyses for additional parameters; including SVOCs, PCBs, metals, grain size, total organic carbon, and pH.

Analysis for disposal purposes is proposed for drill cuttings and water generated during drilling and sampling activities. These analyses are: ignitability, corrosivity, reactivity, and TCLP volatiles, semivolatiles, PCBs/Pesticides, and metals.

Laboratory sample analyses will be performed using NYSDEC Analytical Services Protocol (ASP 1995) - CLP levels, whenever possible. The laboratory will be an accredited Environmental Laboratory Approval Program (ELAP) laboratory, and well-versed in generating data under the NYSDEC ASP and Superfund program. Use of ASP methods and formats for reporting and other deliverables facilitates the DUSR, as discussed in **Section 4.2.1.6**.

Portable GC and laboratory analytical results will be compared to NYSDEC's TAGM 4046 "Determination of Soil Cleanup Objectives and Cleanup Levels, dated January 1994, and Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, dated June 1998.

4.2.2.1 Soil. A portable GC will be used on-site during the HydroPunch and soil boring activities in order to obtain real-time results of target analytes. Subsequent to the field analyses, 25% of the soil samples will be forwarded to the laboratory. The laboratory analyses will be used to further characterize soil samples collected from the subsurface borings, and for QA/QC purposes. **Tables 3 and 4** indicate the number of soil samples that will be analyzed in the field and laboratory and the analytical method.

4.2.2.2 Groundwater. The portable GC will be used on-site during the collection of groundwater samples form the HydroPunch borings in order to obtain real-time results of target analytes. Subsequent to the field analyses, 25% of the groundwater samples will be forwarded to the laboratory. The laboratory analyses will be used to further characterize the samples collected from the HydroPunch borings, and for QA/QC purposes. **Tables 3 and 4** indicate the number of samples that will be analyzed in the field and laboratory and the analytical method.

Subsequent to determining the vertical and horizontal extent of on-site and down-gradient contamination, groundwater monitoring wells will be installed. The groundwater samples collected from these wells, as well as the pre-existing on-site wells, will be forwarded directly to the laboratory; they will not be analyzed via a portable GC. **Tables 3 and 4** indicate the tentative number of samples that will be analyzed by the laboratory and the analytical method. The number of samples will depend upon the number of monitoring wells finally installed.

The laboratory analytical data will be compared to New York State standards and guidance values, and will be used to assess risks to human health and the down-gradient water supply well(s). In addition, data from upgradient monitoring wells (if accessible) will be used to assess contamination potentially due to upgradient (off-site) sources.

4.3 Qualitative Human Health Risk Assessment

The purpose of performing a qualitative risk assessment for the Oser Avenue NYSDEC site is to determine the potential current and future risk to human health posed by potential exposure to chemicals of potential concern in environmental media. The objectives of the qualitative risk assessment developed by IT Corp will be as follows:

- Determine if exposure to constituents detected at the site result in potential exposure to humans;
- Identify the chemicals of potential concern which may contribute to potential risk of exposure; and
- Identify potential human receptors to the selected chemicals of potential concern.

In order to accomplish these objectives, the qualitative evaluation will review available site data to select the chemicals of potential concern, identify potential exposure scenarios, and qualitatively characterize the potential risk from exposure to the chemicals of potential concern based on the toxicity of the constituents. The risk assessment will be conducted according to the U.S. Environmental Protection Agency's (USEPA) *Risk Assessment Guidance for Superfund: Volume I-Human Health Evaluation Manual (Part A)* and applicable New York State Department of Environmental Conservation's (NYSDEC) guidance based on recommendations provided by the NYSDEC site manager. Based on IT's preliminary review of the site the following steps are proposed to support the RI/FS.

4.3.1 Identify Chemicals of Potential Concern

The first step will review and summarize data from the previous and proposed site investigations. This evaluation will include a general description of the data collected at the site, including background sampling, sampling locations, and media. It is anticipated that data summary tables will be completed for all chemicals detected and a subset of chemicals will be selected as chemicals of potential concern in each environmental medium. The objective of this selection process is to reduce the complexity of the assessment by focusing on the chemicals presenting the most significant potential for human exposure. The goal of this process is to identify the chemicals in each media that will most likely contribute to potential risks. As a result, the assessment focuses on the most significant chemicals from a risk perspective. At the site, volatile organic compounds (VOCs) such as tetrachloroethene (PCE) and methylene chloride have been detected in soil and groundwater. Chemicals of potential concern in each medium will be reviewed using a panel of selection criteria based on EPA and NYSDEC requirements including:

- chemical characteristics
- frequency of detection
- essential nutrient status
- laboratory or sampling artifacts
- comparison with background concentrations
- comparison with applicable standards or criteria (i.e., groundwater standards; soil cleanup objectives, ambient water quality criteria, sediment criteria)

For example, soil data will be compared to the appropriate criteria provided in NYSDEC's *Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels* (TAGM 4046). While groundwater data will be compared to applicable NYSDEC standards outlined in Part 703 *Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards* of Title 6, Article 2: Classification and Standards of Quality and Purity. If site-specific, upgradient, or literature background concentrations are higher than the risk-based criteria than background values will be used in the comparison for both soil and groundwater. A table summarizing the chemicals of potential concern for human health will be prepared with the basis for exclusion of chemicals from the risk evaluation.

4.3.2 Human Health Exposure Assessment

The next step is the process of identifying human receptors at the site based on current and foreseeable future site activities and uses and characterizing the nature of their contact with chemicals of potential concern detected. The objective of the exposure assessment is to estimate the type and magnitude of human exposure to the selected chemicals of potential concern in the soil and groundwater. This is called a site conceptual model and describes the realistic potential exposure pathways for the site.

Potential land use scenarios will be evaluated to determine what populations might be impacted from exposure to chemicals in impacted media. This evaluation will be based on local zoning and established land use trends in the areas surrounding the site. Preliminary analysis of potential land use scenarios assumes the site will remain active industrial based on historical use (this may require a deed restriction) with the surrounding area being mixed use, i.e. upgradient is industrial with downgradient areas being residential. Preliminary investigation suggests that several important pathways of exposure to site-related chemicals of concern may exist. A tentative identification of pathways that are likely to be selected for analysis include:

On-site Construction/Facility Workers *(current/future land use)*

- incidental ingestion of soil
- dermal contact with soil
- inhalation of volatiles from soil

Soil is the only complete pathway for on-site workers, as volatile organic compounds were detected in soil. However, the site is paved so facility workers would only be exposed during outside work activities involving maintenance of landscaped areas. However, in the future a construction worker may have direct contact with soil during activities involving excavation. Groundwater is not likely to be a complete exposure pathway for on-site workers or construction workers as it is not used as a potable supply on-site and depth to groundwater is approximately sixty feet below ground surface.

Off-site Downgradient Residents *(current/future land use)*

- ingestion of drinking water
- dermal contact while showering or bathing
- inhalation of vapors while showering or bathing

Groundwater is a potential complete exposure pathway for off-site residents as impacts have been detected in a public water supply well located downgradient of the site.

The exposure assessment will consider these potential exposure scenarios in terms of realistic site-specific conditions. IT will identify realistic potential pathways for human exposure for chemicals of potential concern based on current and foreseeable future land uses to complete a site conceptual model.

4.3.3 Qualitative Risk Assessment Results

Using the information generated during the first two steps, IT will determine the potential risks from exposure to human health in qualitative terms. The final phase will compare the measured levels against applicable criteria to determine if the concentrations of chemicals of potential concern either individually or in mixtures, at or near the site present a potential risk to human receptors. The objectives of risk assessment to be completed during the 100 Oser Avenue site RI/FS will be to determine if exposure to site constituents results in significant risk to human health and the environment; to determine what constituents contribute most significantly to the risk; and to identify the most sensitive receptors.

In order to accomplish these objectives, the baseline risk assessment will identify the constituents of interest, identify potential exposure scenarios, define the toxicity of the constituents of interest and ultimately characterize the potential risk to human health resulting from exposure to these constituents. The risk assessment will only address those exposure pathways that are plausible. This approach will also provide the basis for establishing practical remediation goals if the risk assessment indicates that remediation is necessary.

A Step II Contaminant-Specific Impact Assessment will be conducted at 100 Oser Avenue in accordance with NYSDEC guidelines. Step II impact analysis consists of three phases: Pathway Analysis, Criteria-Specific Analysis, and Toxic Effect Analysis. The results of the pathway analysis will determine whether a criteria-specific analysis is warranted. If a toxic effect analysis is warranted, an RI/FS work plan addendum will be submitted containing the tasks to be completed for the toxic effects analysis.

The following sections describe the proposed tasks to be completed during the Health Risk Assessment.

4.4 Remedial Investigation Report Preparation

Following a completion of the field program, data generated during the investigation will be evaluated and a remedial investigation report prepared for submittal to the NYSDEC. The 100 Oser Avenue Remedial Investigation/Feasibility Study report will contain a detailed and comprehensive synopsis of the tasks completed to date, as well as those intended for the future as required by applicable portions of the CERCLA, NCP, and USEPA reporting guidelines. Supporting data, including raw analytical data, boring logs, and well construction diagrams will be included in the report. The report will be organized as follows:

4.4.1 Introduction

The introductory section will summarize the purpose and scope of the 100 Oser Avenue remedial investigation studies. In order to accomplish this task the following information will be provided:

- project objectives
- site location and description
- background
- previous investigations
- report organization

4.4.2 Study Area Investigations

A detailed description of the scope and methodologies employed to complete the 100 Oser Avenue remedial investigation at the site will be provided. This discussion will present the number, locations, and media of sample collection activities, as well as the field techniques employed to accomplish such activities. The scope of the analytical program will also be addressed in this discussion whereupon the parameters tested and methodologies used will be described. Deviations from the field program as described in this work plan will be described and explained.

At a minimum, the following subsections are anticipated to be incorporated into the field methodologies section:

- field mobilization
- HydroPunch borings and sampling/analysis
- soil boring and sampling/analysis
- monitoring well installation and development
- groundwater level measurements
- groundwater sampling/analysis
- hydraulic conductivity determination (slug testing)
- disposal characterization sampling

4.4.3 Physical Site Characteristics

The geologic and hydrologic conditions which characterize 100 Oser Avenue, as determined by both the literature review and the site investigation, will be presented in this section. Physical characteristics of site soils, including detection of chemical impacts, will be described. Hydrologic conditions, as determined through the evaluation of water table evaluations and preparation of groundwater contour maps, will provide initial insight into hydrogeologic conditions at the site. This section will consist of the following subsections:

- regional geologic setting
- local/site-specific geology
- regional hydrologic setting
- local/site-specific hydrology

4.4.4 Nature and Extent of Impacts

The nature and extent of impacts within the various media, including soil and groundwater, will be discussed in this section. The results of the sewer line investigation will also be presented, by appropriate graphical presentations, in this section. These evaluations will include:

- assessment of source areas
- assessment of soil observable impacts - vertical and horizontal
- assessment of observable groundwater impacts

The report will include EarthVision™ data visualization software from Dynamic Graphics, Inc. to create three-dimensional conceptual site models. These models will depict both contaminant distributions in three dimensions and site geology. When merged, both the contaminant and the geology can be viewed simultaneously. These EarthVision™ models will be used to help identify data gaps, to select appropriate remediation technologies and to help identify sources of contamination and contaminant pathways.

4.4.5 Health Risk Assessment

An evaluation of chemical of concern (COC) fate and transport for each potential source will be presented in this section. Potential concentrations of COCs in different environmental media as a function of time along with potential routes of migration and COC persistence will be discussed.

4.4.6 Conclusions and Recommendations

This section of the 100 Oser Avenue Remedial Investigation report will summarize the conclusions of the field investigation. These conclusions will be based on the geologic and hydrogeologic information and analytical results for the soil and groundwater samples collected at the site.

4.5 Management of Investigation Derived Waste

Management of the Investigation derived waste (IDW) generated on-site during the RI field activities will be handled by an approved subcontractor. The appropriate number of samples for each matrix will be collected by the subcontractor and forwarded to an approved laboratory to be analyzed for waste disposal characterization. Upon receipt of the analytical results, the subcontractor will remove all impacted soils and groundwater and dispose of properly at an off-site facility.

4.5.1 Drill Cuttings

Drill cuttings generated during soil boring/monitoring well installation will be segregated into either a "clean" or "impacted" pile based on visual observation and PID readings. However, based on the historical data regarding groundwater being impacted with metals, which can not be detected using a PID, soils at and below the water table will automatically be deemed "impacted".

The impacted soils will be sampled by the subcontractor and analyzed for waste characterization (ignitability, corrosivity, reactivity, and TCLP VOC, SVOC, PCBs/Pesticides, and metals) and subsequently disposed of off-site. "Clean" soils will be either used to backfill the annular well space, along with filter sand pack, or used as fill in the wooded area north of the building and parking area.

4.5.2 Development and Decontamination Water

Water generated during decontamination of equipment, monitoring well development, and purging of monitoring wells during sampling activities will be analyzed for waste characterization and subsequently disposed of off-site.

4.5.3 General Refuse and PPE

Waste personal protective equipment (PPE) generated on-site will be placed in NYS Department of Transportation approved 55-gallon drums and handled by the approved subcontractor to be removed and properly disposed of off-site. In addition, general refuse generated on-site will be placed into plastic bags and removed from the site on a weekly basis.

5.0 FS SCOPE OF WORK

This scope of work outlines the activities to be completed as part of the Feasibility Study (FS) for the 100 Oser Ave site. The objective of the FS will be to develop and evaluate remedial alternatives for the site. The approach of the FS will be to use presumptive remedies in the selection of remedial alternatives. The FS will be based on the NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) applicable to selection of remedial action at inactive hazardous waste sites (TAGM HWR-90-4030) and the U.S. EPA *Guidance for Conducting Remedial Investigations and Feasibility Studies* under CERCLA (U.S. EPA 1988).

5.1 Development of Remedial Alternatives

Remedial alternatives for 100 Oser Ave will be developed in this section of the FS. This will be accomplished through the following steps:

5.1.1 General Response Actions

General response actions for each medium of interest will be developed that may be taken to satisfy the remedial action objectives for the 100 Oser Ave site. The general response actions will define removal, treatment, disposal, containment or other actions, singly or in combination to satisfy remedial action objectives.

5.1.2 Volumes or Areas of Media

Volumes or areas of environmental media (soil, sediment, groundwater, etc.) to which general response actions may be applied, taking into account the requirements for protectiveness as identified in the remedial action objectives and the chemical and geological characterization of the site, will be determined. The media to be addressed will be determined by information on the nature and extent of contamination, risk assessment, applicable or relevant and appropriate New York State Standards, Criteria, and Guidelines (SCGs), cleanup criteria/standards, etc.

5.1.3 Identification and Screening of Technologies

Based on the general response actions, treatment technologies applicable to each medium of interest will be identified and screened to ensure that only those technologies applicable to the impacts present, their physical matrix, and other site characteristics are considered. This screening will identify those technologies that would effectively address the impacts and media at the site, but will also take into account a technology's implementability and cost.

Preference will be given to those technologies "that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of hazardous substances, pollutants, or impacts" (TAGM HWR-90-4030). In addition, technologies which have been demonstrated to be successful on other similar sites will be given preference. The following provides the hierarchy of technologies, as defined in the guidance, from most desirable to least desirable:

- Destruction
- Separation/Treatment
- Solidification/Chemical Fixation
- Control and Isolation Technologies
- Off-Site Land Disposal

5.1.4 Assembly of Alternatives

The potential technologies and process options will be assembled into media-specific or site-wide alternatives. The developed alternatives will be defined with respect to size and configuration of the representative process options; estimated time for remediation; rates of flow or treatment; spatial requirements; distances for disposal; and required permits, imposed limitations, and other factors necessary to evaluate the alternatives.

5.2 Preliminary Screening of Remedial Alternatives

The preliminary screening of remedial alternatives will narrow the list of potential alternatives to be evaluated through the use of presumptive remedies. The criteria for this screening will include effectiveness and implementability.

5.2.1 Effectiveness Evaluation

The extent to which the alternative will eliminate significant threats to public health and the environment through reductions in toxicity, mobility, and volume of the hazardous waste at the site will be evaluated. Both short-term and long-term effectiveness will be evaluated with short-term referring to the construction and implementation period and long-term referring to the period after the remedial action is in place and effective. The expected lifetime or duration of effectiveness will be identified for each alternative.

5.2.2 Implementability Evaluation

Both the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative will be evaluated. Technical feasibility refers to the proven ability to construct, reliably operate and meet technical specifications or criteria, and the availability of specific equipment and technical specialists to operate necessary process units. It also includes operation, maintenance, replacement, and monitoring of technical components of an alternative. Administrative feasibility refers to the compliance with applicable rules, regulation, and statue and the ability to obtain approval from other offices and agencies. In addition, the availability of treatment, storage, and disposal services and capacity will be evaluated. Specifically, the implementability evaluation will include the following analysis factors:

- Technical Feasibility
  - Ability to construct technology
  - Reliability of technology
  - Schedule of delays due to technical problems
  - Need of undertaking additional remedial action, if necessary
- Administrative Feasibility
  - Coordination with other agencies
- Availability of Services and Materials
  - Availability of prospective technologies
  - Availability of necessary equipment and specialists

5.2.3 Cost Evaluation

The last criteria, cost, is considered only at the level of order-of-magnitude because the evaluation is not progressed to the stage where detailed costs are available and because the cost estimates are only significant in terms of their relation to each other. In this phase, an alternative may be eliminated from consideration for cost reasons only if the likely cost is an order of magnitude greater than another alternative which will achieve the same general response objectives.

5.3 Treatability Studies

Treatability studies pertaining to the remedial technologies identified in the screening of remedial alternatives may be conducted to determine the suitability of the identified technologies to site-specific conditions. However, since remedial action objectives, general response actions, or remedial alternatives have not been developed for the site, development of site-specific treatability studies is not appropriate at this time. Data collected from 100 Oser Ave during RI activities will be sufficient to evaluate general treatment, disposal, and containment technologies for the FS, allowing unsuitable technologies to be eliminated from further consideration. In addition, this information, combined with literature data regarding the performance of the selected technologies, will allow a detailed evaluation of alternatives to be completed. Additional, site-specific testing relating to the detailed design or operating parameters of the selected alternative will be addressed during the remedial design phase of this project.

5.4 Evaluation of Alternatives

5.4.1 Analysis of Alternatives

This section of the FS report will present an analysis of the remaining individual alternatives utilizing the seven criteria presented below. The analysis will focus only on a limited number of alternatives remaining from the preliminary screening. It will build on previous evaluations conducted during the development and preliminary screening of alternatives and will incorporate any treatability data and additional site characterization information collected during the RI. The detailed analysis of alternatives will be presented as a narrative discussion accompanied by summary tables. On overview of the seven criteria which will be discussed is presented below.

5.4.1.1 Compliance with Applicable New York State Standards, Criteria, and Guidelines (SCGs). Compliance with SCGs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate New York State requirements or other Federal environmental standards which are more stringent than state SCGs. If a SCG is not met, justification for use of one of the six waivers allowed under CERCLA and SARA will be discussed.

5.4.1.2 Overall Protection of Human Health and the Environment. Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

5.4.1.3 Short-Term Effectiveness. Short-Term Effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved. The evaluation will focus on the following factors: protection of the community during remedial actions; environmental impacts; time until remedial response objectives are achieved; and protection of workers during remedial actions.

5.4.1.4 Long Term Effectiveness and Permanence. Long-Term Effectiveness and Permanence addresses the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met. The evaluation will focus on the following factors: permanence of remedial alternative; magnitude of remaining risk; adequacy of controls; and reliability of controls.

5.4.1.5 Reduction of Toxicity, Mobility, and Volume. Reduction of Toxicity, Mobility, or Volume Through Treatment addresses the anticipated performance of the remedial technologies that a remedy may employ. The evaluation will focus on the following factors: the amount of hazardous material to be addressed; the degree of expected reduction in toxicity, mobility, or volume; the degree to which treatment is irreversible; and the type and quantity of treatment residuals.

5.4.1.6 Implementability. Implementability addresses the technical and administrative feasibility of a remedy, including the availability of material and services needed to implement a particular option. The technical feasibility evaluation will focus on: construction and operation; reliability; ease of undertaking additional remedial action; and monitoring considerations. The administrative feasibility evaluation will focus on activities needed to coordinate with other offices and agencies. The availability evaluation will focus on: treatment, storage, and/or disposal options; necessary equipment or specialists; and required services and materials.

5.4.1.7 Cost. Cost addresses the estimated capital and operation and maintenance costs, and net present worth costs. Capital costs will include: construction costs; equipment costs; land and site-development costs; buildings and services costs; relocation expenses; disposal costs; engineering expenses; legal fees and licenses or permit costs; and contingency allowances. Operation and maintenance costs will include: operating labor costs; maintenance, materials, and labor costs; auxiliary material and energy; disposal of residues; purchased services; administrative costs; insurance, taxes, and licensing costs; replacements costs; and costs of periodic site reviews. In addition, future capital costs and costs of future land use will be considered. Present worth costs will use a discount rate equivalent to the 30-year U.S. treasury bond rate and periods of performance will not exceed 30 years.

5.4.2 Comparative Analysis

A comparative analysis will be conducted to evaluate the relative performance of each alternative in relation to each specific evaluation criterion. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key trade-offs for the alternatives can be identified. This section will be presented as a narrative discussion accompanied by a summary table.

5.5 Remedy Selection

The recommended remedial alternative for the site, based on the comparative analysis, will be presented in this section. It will include a discussion of the alternative and clear rationale for its selection.

5.6 Feasibility Study Report

The results of the feasibility study will be presented in a stand-alone feasibility study report for submittal to NYSDEC. The report will be developed consistent with the NCP and patterned after U.S. EPA 's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (October 1988).

A typical outline of the major sections of the report will include:

- Introduction
  - Purpose and Organization of Report
  - Background Information (Summarized from Remedial Investigation Report)
  - Volume/Area Estimates
- Remedial Action Objectives
  - SCGs
  - Baseline Risk Assessment
  - Media Specific RAOs

- Development/Preliminary Screening of Alternatives
  - General Response Actions
  - Development of Remedial Alternatives
  - Preliminary Screening of Remedial Alternatives
- Detailed Evaluation of Alternatives
  - Description of Evaluation Criteria
  - Comparative Results of Specific Alternative Evaluation
- Selection of Preferred Alternative
  - Presentation of Selected Remedy

A draft feasibility study report will be submitted to NYSDEC for review, and a final feasibility study report which includes appropriate NYSDEC comments will be submitted.

6.0 PROJECT MANAGEMENT APPROACH

6.1 Project Management Process Description

The Work Breakdown Structure (WBS) Project Management Technique will be employed to ensure that all project schedule and cost objectives are met. The WBS provides the technical and organizational foundations for subdividing project work, scheduling project tasks, and monitoring expenditures. The technique consists of defining, in increasing levels of detail, the tasks, subtasks, or project elements and the resources needed to complete each element. The WBS is used to assign responsibility for each work package, establish schedules and milestones, allocate resources, track costs against estimates, assess the status of the project effort, evaluate work performance, and determine the necessity for revision of the project effort in response to changed conditions.

6.2 Project Cost and Schedule Control System

Timeline and internal accounting programs will be used to monitor and control schedules, performance, and cost on a WBS task-specific basis. The Project Manager will oversee the production of all reports and deliverables. The Project Manager will authorize all work and expenditures on the project and will receive regular reports from the task leaders, and reports from IT Corporation's senior management.

6.3 Information Flow Patters

The management structure for the proposed project will be designed to ensure information exchange among all members of IT Corporation's senior management; the Project Manager and subcontractors; and the Project Manager and NYSDEC's Project Manager. The Project Manager will be the primary point of contact with NYSDEC's Project Manager.

Monthly progress reports will be provided to NYSDEC by the fifth day of each month. The progress report format will be formatted to briefly and concisely address the issues of scope, schedule and budget.

6.4 Project Organization

The management and technical staff required to execute this project and their areas of responsibility are identified in **Figure 6**, **Project Organization**. The responsibilities of key personnel are further described as follows:

Technical Advisor, Nick Hastings
A Technical Advisor will provide technical support and overall quality assurance. The primary objective of quality assurance is to facilitate compliance with regulatory agency guidance and regulations. The technical advisor will address the broad range of technical activities and disciplines needed for successful support of this RI/FS.

Project Manager, Tom Antonoff
The Project Manager is responsible for maintaining the schedule, keeping the project within budget, and ensuring the technical adequacy of the work performed.

Site Manager and Health and Safety Officer, Stephanie Commerford
The Site Manager is responsible for all site activities, and directs all IT Corporation and subcontractor field staff. The Site Health and Safety Officer (SHSO) is responsible for the preparation of the Health and Safety Plan, and for verifying that subcontractors have adequate Health and Safety Plans. If the SHSO observes unsafe conditions, the Officer will have stop-work authority.

Project Quality Assurance Manager, Dan Chen
The Project Quality Assurance Manager (PQAM) is responsible for verifying that QA requirements are followed by the project team.

6.5 Project Schedule

A detailed project schedule of activities with milestones is presented as a Gantt chart schedule in **Figure 7**.

7.0 REFERENCES

NYSDEC, Division of Hazardous Waste Remediation, Division Technical and Administrative Guidance Memorandum. *Selection of Remedial Actions at Inactive Hazardous Waste Sites*, HWR-90-4030, May 1990.

NYSDEC, Division of Water, Technical and Operation Guidance Series (1.1.1), *Ambient Water Quality Standards and Guidance Values*, June 1998.

NYSDEC, Division of Hazardous Waste Remediation, Division Technical and Administrative Guidance Memorandum. *Determination of Soil Cleanup Objectives and Cleanup Levels*, HWR-92-4046, January 1994.

U.S. EPA, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, EPA 540/G-89/004, October 1988.

D. Cadwell, "Surficial Geologic Map of New York, Lower Hudson Sheet", 1989.

Electric Log Data from Public Well Field at Falcon Drive, November 1971.

Falcon Drive Public Well Information.

Phase I Investigation of Potential Sources of Contamination, Fanning, Phillips & Mohar, July 1990.

Follow-up Soil Investigation, Fanning, Phillips & Mohar, November 1990.

Proposed Remedial Investigation, Fanning, Phillips & Mohar, July 1991.

Investigation of Potentially Responsible Parties, Fanning, Phillips & Mohar, January 1992.

In-sit Vapor Extraction, Fanning, Phillips & Mohar, May 1992.

Conceptual VES Plan (figure), Fanning, Phillips & Mohar, May 1992.

Budgetary Cost Estimate for Clean-up, Fanning, Phillips & Mohar, July 1992.

Remedial Investigation Report, Fanning, Phillips & Mohar, October 1992

Cost of Clean-up, Fanning, Phillips & Mohar, October 1992.

Work Plan for Investigation and Remediation, Fanning, Phillips & Mohar, January 1998.

Order on Consent, September 1998.

Letter from NYSDOH concurring with DEC's classification of Site, September 1998.

Letter from Anwar Chitayat's attorneys regarding the forwarding of all data in their possession, October 1998.

Notification Letter to Suffolk County Development Agency, November 1998.

8.0 SUBCONTRACTS AND M/WBE UTILIZATION PLAN

There are seven areas of service under Tasks 1 and 2 for the 100 Oser Ave Site amenable to subcontracting. These are:

- Drilling
- Laboratory analysis
- Data Validation
- Waste Management
- Surveying
- Sewer Line Inspection
- CPP & QAPP Preparation

Services for drilling, laboratory analysis, data validation, and CPP/QAPP preparation will be procured from standby subcontracts maintained for this purpose by IT Corporation. Site-specific bids will solicited for waste management, surveying, and sewer line inspection services.

Three quotes will be solicited from well drilling firms on standby subcontract to IT Corporation for work at the 100 Oser Avenue Site.

Chemtech will provide analytical services for this work assignment. This laboratory is a standby subcontractor to IT Corporation and are a Minority-owned Business Enterprise (MBE).

Data Validation services shall be provided by EDV, Inc., a standby subcontractor to IT. EDV, Inc. is a Women-owned Business Enterprise (WBE).

Delaware Engineering, P.C., a WBE, will produce the CPP and QAPP reports for the Oser Avenue site. This is a sole source, direct procurement of professional, fixed-fee services consistent with NYSDEC procedures. Financial statements for Delaware Engineering have been provided for NYSDEC review.

Competitive bids were solicited from 3 firms for surveying services, according to NYSDEC procedures. The lowest quote was received from Albert W. Tay, L.L.S, who was selected to provide this service.

Competitive bids will be solicited from 3 firms each for waste management and sewer line inspection services, according to NYSDEC procedures. IT Corporation will attempt to identify M/WBE firms which provide these services and solicit bid from those firms.

TABLES

TABLE 1A

SOIL ANALYTICAL RESULTS

NYSDEC - Oser Avenue
Hauppauge, New York

(parts per million)

	S-1		S-2		S-3		S-4		S-5		S-6		D-1	
Depth (feet)	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs
0 - 5	2756.53	2756.6	158.5	165.6	70.4	91.7	4.5	16.7	12176.2	12194.4	ND	2.8		
5 -10														
10 - 15														
15 -20														
20 - 25														
25 - 30														
30 - 35														
35 - 40														
40 - 45 (40 - 42)														
45 - 50														
50 - 55														
55 - 60														
60 - 65 (60-62)													0.015	0.015

Notes:

1. CVOCs = total Chlorinated Volatile Organic Compounds
2. TVOCs = Total Volatile Organic compounds
3. ND = not detected above the detection limits
4. blanks indicate that a sample was not collected for analysis

TABLE 1A

SOIL ANALYTICAL RESULTS

NYSDEC - Oser Avenue
Hauppauge, New York

(parts per million)

	D-2		D-3		D-4		MW-12		MW-13		MW-14		MW-16	
Depth (feet)	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs	CVOCs	TVOCs
0 - 5													N/A	N/A
5 -10														
10 - 15									0.847	0.847				
15 -20														
20 - 25														
25 - 30														
30 - 35														
35 - 40														
40 - 45 (40 - 42)	0.016	0.016												
45 - 50														
50 - 55														
55 - 60							200	200			10,001.4	10,001.4		
60 - 65 (60-62)			0.007	0.007	0.02	0.02								

Notes:
1. CVOCs = total Chlorinated Volatile Organic Compounds
2. TVOCs = Total Volatile Organic compounds
3. ND = not detected above the detection limits
4. blanks indicate that a sample was not collected for analysis

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TABLE 1B

GROUNDWATER ANALYTICAL RESULTS

NYSDEC - Oser Avenue
Hauppauge, New York

(parts per billion)

Analytes	NYSDEC Standard*	MW-12 4/90	MW-13 4/90	MW-14 4/90	MW-16 4/90	E-1 6/92	E-2 6/92	E-3 6/92	E-4 6/92	E-5 (0-5') 6/92	E-5 (45-50') 6/92
CVOCs	N/A	16,600	13,178	33,546	40,814	13,292	28,300	46,767	32,300	13,986	9,300
TVOCs	N/A	17,065	15,978	33,592	40,835	13,292	32,500	50,687	36,300	18,386	15,100
Vinyl Chloride	2	ND	ND	10	11	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	1,000	1,700	51	19	700 DJ	1,300 J	1,300 BJ	1,200 J	1,700 J	1,200 J
1,1-Dichloroethene	5	ND	ND	ND	13	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND	9	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (cis- and trans-)	5 for each isomer	580	71	900	2,700	52	ND	590 E	700 J	100	ND
Chloroform	7	17	ND	5	12	ND	ND	5 J	ND	ND	ND
1,1,1-Trichloroethane	5	83	14	130	850	32	ND	92	ND	ND	ND
Carbon Tetrachloride	5	710	360	70	ND	420 E	ND	310 E	ND	140	ND
Trichloroethene	5	210	33	380	1,200	88	ND	470 E	ND	46 J	ND
Benzene	1	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	14,000	11,000	32,000	36,000	12,000 D	27,000	44,000	30,000	12,000	8,100
Toluene	5	460	2,800	46	21	ND	ND	620 BJ	ND	ND	ND
Acetone	50 guidance value	ND	ND	ND	ND	ND	4,200	3,300 B	4,400	4,400 B	5,800 B

Notes:
* - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, dated June 1998
ND - not detected above method detection limit
D - Concentration after dilution
J - Estimated value due to concentration below mean detection limit
E - Estimated value prior to dilution
B - Detected in method blank

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TABLE 2

DATA OBJECTIVES AND CORRESPONDING ANALYTICAL LEVELS

NYSDEC - Oser Avenue
Hauppauge, New York

DATA USES	ANALYTICAL LEVEL	TYPE OF ANALYSIS
Site Characterization (Soil Screening) Air Monitoring During Implementation	LEVEL I	Total Organic Vapor (PID)
Site Characterization Evaluation of Field Investigation Alternatives	LEVEL II	Volatile Organics by Field GC Methods Detection Limits Vary from Low ppm to Low ppb
Site Characterization Engineering Design	LEVEL III	Organics/Inorganics/Metals/ PCBs by NYSDEC ASP Methods TCLP Characteristic analyses
Risk Assessment Evaluation of Alternatives	LEVEL IV	TCL/TAL Analytes; Indicators (NYSDEC ASP Category B Analyses)
None Specified	LEVEL V	

TABLE 3

FIELD INVESTIGATION SAMPLING AND ANALYSIS SUMMARY

NYSDEC - Oser Avenue
Hauppauge, New York

PHASE I - HYDROPUNCH ACTIVITIES
1.0 Soil Sampling Program

		Sampling Intervals							Proposed Analyses								
Sampling	Boring						Total Samples		VOCs		SVOCs	PCBs	Metals	Grain sz	K Test	TOC	pH
Location	Depth	0-30' or	0-60'	30'-60'	60'-100'	100'-220'	PGC	go to LAB	by PGC	to LAB	LAB	LAB	LAB	LAB	in field	LAB	LAB
IT HP-1	220	1		2	2	4	9	3	9	3							
IT HP-2	220	6		3	2	4	15	4	15	4	1	1	1	3	in field	2	2
IT HP-3	220	6		3	2	4	15	4	15	4							
IT HP-4	220	6		3	2	4	15	4	15	4							
IT HP-5	220		2		2	4	8	2	8	2							
IT HP-6	220	6		3	2	4	15	4	15	4	1	1	1				
IT HP-7	220	6		3	2	4	15	4	15	4	1	1	1				
IT HP-8	220	6		3	2	4	15	4	15	4	1	1	1				
IT HP-9	220		2		2	4	8	2	8	2							
IT-HP-10	220		2		2	4	8	2	8	2							
IT HP-11	220		2		2	4	8	2	8	2							
IT HP-12	220		2		2	4	8	2	8	2							
IT HP-13	220		2		2	4	8	2	8	2	1	1	1	3	in field	2	2
IT HP-14	220		2		2	4	8	2	8	2							
IT SB-1	30	6					6	2	6	2	1	1	1				
IT SB-2	30	6					6	2	6	2							
IT SB-3	30	6					6	2	6	2	1	1	1	3	in field	2	2
IT SB-4	30	6					6	2	6	2							
IT SB-5	30	6					6	2	6	2	1	1	1				
Totals:	3230	67	14	20	28	56	185	51	185	51	8	8	8	9	0	6	6
								Duplicates:		5	1	1	1			1	1
								Rinseate blanks:		6							

Trip Blanks: approx 3/week for 4 weeks for all samples
Field Blanks: approx. 1/day for 4 weeks for all samples

TABLE 3

FIELD INVESTIGATION SAMPLING AND ANALYSIS SUMMARY

NYSDEC - Oser Avenue
Hauppauge, New York

PHASE I - HYDROPUNCH ACTIVITIES
2.0 Depth Discrete Groundwater Sampling Program

						Proposed Analyses				
Sampling	Sampling Intervals			Total Samples		VOCs		SVOCs	PCBs	Metals
Location	0-60'	60'-100'	100'-220'	PGC	go to LAB	by PGC	to LAB	LAB	LAB	LAB
IT HP-1	0	3	4	7	2	7	2			
IT HP-2	0	3	4	7	2	7	2	1	1	1
IT HP-3	0	3	4	7	2	7	2			
IT HP-4	0	3	4	7	2	7	2	1	1	1
IT HP-5	0	3	4	7	2	7	2			
IT HP-6	0	3	4	7	2	7	2	1	1	1
IT HP-7	0	3	4	7	2	7	2	1	1	1
IT HP-8	0	3	4	7	2	7	2	1	1	1
IT HP-9	0	3	4	7	2	7	2			
IT-HP-10	0	3	4	7	2	7	2			
IT HP-11	0	3	4	7	2	7	2			
IT HP-12	0	3	4	7	2	7	2			
IT HP-13	0	3	4	7	2	7	2	1	1	1
IT HP-14	0	3	4	7	2	7	2			
Totals:	0	42	56	98	28	98	28	6	6	6
						Duplicates:	3	1	1	1
						Rinseate blanks:	4			

Trip Blanks: approx 3/week for 4 weeks for all samples
Field Blanks: approx. 1/day for 4 weeks for all samples

TABLE 3

FIELD INVESTIGATION SAMPLING AND ANALYSIS SUMMARY

NYSDEC - Oser Avenue
Hauppauge, New York

PHASE II - MONITORING WELL INSTALLATION

3.0 Groundwater Monitoring Well Sampling Program

Sampling	Sample	Existing	Well Location		Well Material		Proposed Analyses							Depth to	HRC
Location	Location?	MW?	On/S	Off/S	FRE	PVC	VOCs	SVOCs	PCBs	Metals	pH	Conductivity	Turbidity	Water	Parameters
IT MW-1 S	x		x		x		1	1	1	1	1	1	1	x	1
IT MW-1 D	x		x		x		1	1	1	1	1	1	1	x	
IT MW-2 S	x		x		x		1				1	1	1	x	
IT MW-3 S	x		x		x		1	1	1	1	1	1	1	x	1
IT MW-3 D	x		x		x		1	1	1	1	1	1	1	x	
IT MW-4D	x		x		x		1				1	1	1	x	
IT MW-5 S	x		x		x		1				1	1	1	x	
IT MW-5 D	x		x		x		1				1	1	1	x	
IT MW-6 D	x			x	x		1				1	1	1	x	
IT MW-7 S	x			x	x		1				1	1	1	x	
IT MW-8 S	x		x		x		1				1	1	1	x	
IT MW-9 S	x		x		x		1				1	1	1	x	
IT MW-9 D	x			x	x		1	1	1	1	1	1	1	x	
IT MW-10 D	x			x	x		1				1	1	1	x	
IT MW-11 D	x			x	x		1				1	1	1	x	
MW-2	x?	x		x		x	1				1	1	1	x	
MW-9	x?	x		x		x	1	1	1	1	1	1	1	x	
MW-10	x?	x		x		x	1				1	1	1	x	
MW-12	x?	x	x			x	1	1	1	1	1	1	1	x	1
MW-13	x?	x	x			x	1				1	1	1	x	
MW-14	x?	x	x			x	1				1	1	1	x	
MW-15	x?	x		x		x	1				1	1	1	x	
Totals:	22	7	13	9	15	7	22	7	7	7	22	22	22	22	3
Duplicates:							3	1	1	1	field	field	field		TBD
Rinseate blanks:							4								

Trip Blanks: approx 3/week for 4 weeks for all samples

Field Blanks: approx. 1/day for 4 weeks for all samples

S =	Shallow monitoring well. It will be screened over the water table interface (60' to 80' - conditions permitting)
D =	Deep monitoring well (depth could be up to 220')
HRC =	Specific groundwater parameters required to evaluate the efficacy of the use of Hydrogen Release Compound (acids, gases, etc)
TOC =	Total organic carbon
On/S =	On-site wells proposed/found at 100 Oser Avenue
Off/S =	Off-site wells proposed/found on adjacent property
K Testing =	Lab derived hydraulic conductivity testing - samples collected via Shelby Tubes
FRE =	Fiberglass reinforced epoxy well materials
PVC =	Polyvinyl chloride well materials

m:\oser_ave\tables3.wk4

TABLE 4

SUMMARY OF FIELD SAMPLING PLAN

NYSDEC - Oser Avenue
Hauppauge, New York

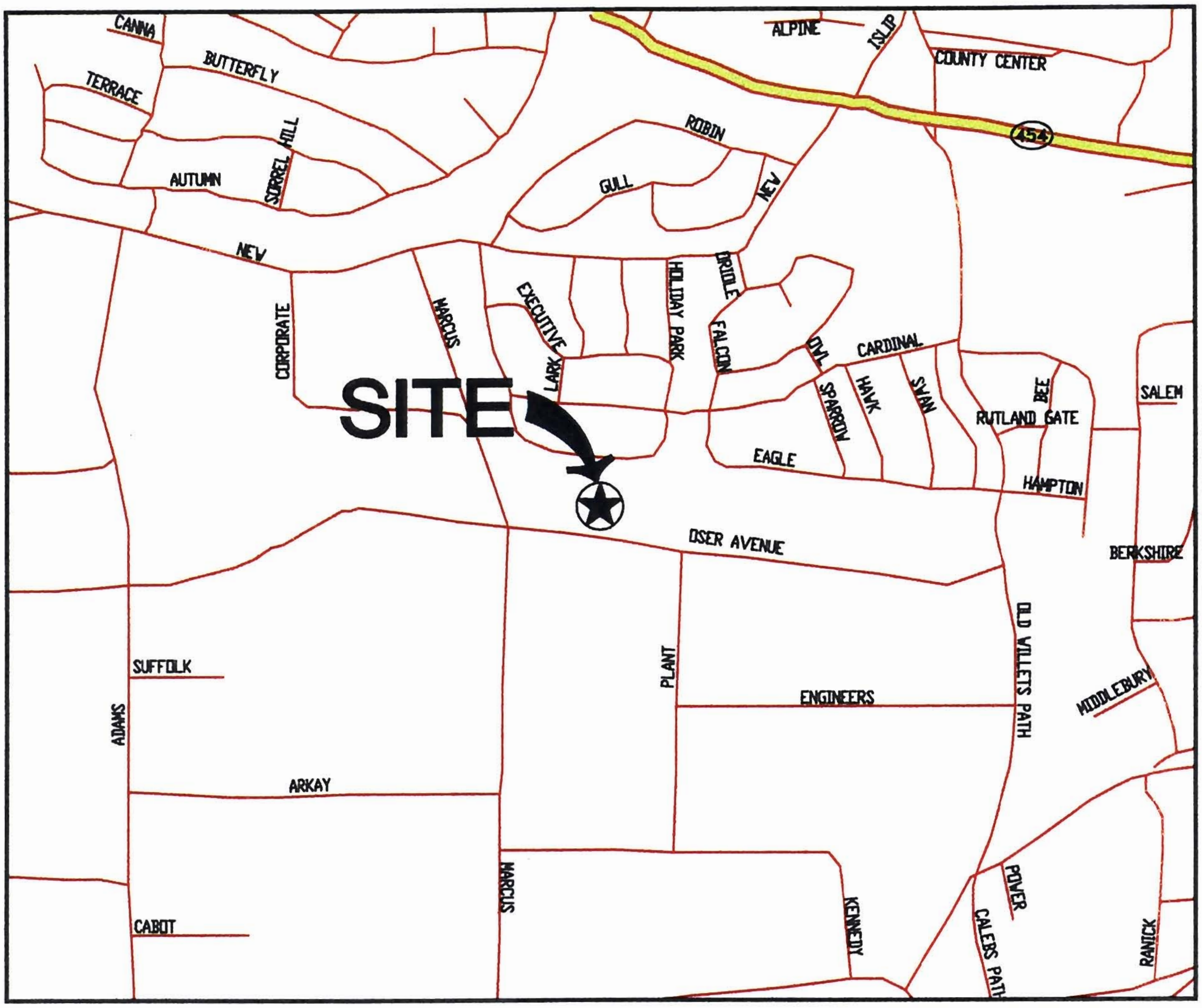
Matrix	No. of Samples	Analytical Parameters	Analytical Method No.	Types of Containers	Holding Times*	Preservative Used
AIR (indoor/outdoor air)	approx. 11	VOCs	TO-14	Summa Canisters	14 days	none
AIR (soil gas survey)	6	VOCs	TO-14	Tedlar Bags	24 hours	none
SOIL	See Table 3	Volatiles	ASP 95-1	2 @ 40 ml vial/glass	14 days	HCl to pH < 2
		Semivolatiles	ASP 95-2	1 @ 1L/glass	7 days to extr.	Ice
		Pesticide/PCB	ASP 95-3	1 @ 1L/glass	7 days to extr.	Ice
		Metals	200.7 CLP-M	1@500 ml/polyethylene	6 months	HNO3 to pH < 2
		Grain size	TBD	n/a	n/a	n/a
		Total Organic Carbon (TOC)	Lloyd Kahn Method (415.1)	1 @250 ml/glass	28 days	H2SO4 to pH < 2
		pH	9040	1 @ 40 ml/glass	24 hours	n/a
GROUNDWATER (collected from HydroPunch)	See Table 3	Volatiles	ASP 95-1	2 @ 40 ml vial/glass	14 days	HCl to pH < 2
		Semivolatiles	ASP 95-2	1 @ 1L/glass	7 days to extr.	Ice
		Pesticide/PCB	ASP 95-3	1 @ 1L/glass	7 days to extr.	Ice
		Metals	200.7 CLP-M	1@500 ml/polyethylene	6 months	H2SO4 to pH < 2
GROUNDWATER (collected from monitoring wells)	See Table 3	Volatiles	ASP 95-1	2 @ 40 ml vial/glass	14 days	HCl to pH < 2
		Semivolatiles	ASP 95-2	1 @ 1L/glass	7 days to extr.	Ice
		Pesticide/PCB	ASP 95-3	1 @ 1L/glass	7 days to extr.	Ice
		Metals	200.7 CLP-M	1@500 ml/polyethylene	6 months	H2SO4 to pH < 2
		pH	9040	1 @ 40 ml/glass	24 hours	n/a
		HRC Parameters	TBD	TBD	TBD	TBD
EQUIPMENT (RINSEATE) BLANK	1 per 20 samples, or 1 per area and matrix type	See Specific Matrix	See Specific Matrix	See Specific Matrix	See Specific Matrix	See Specific Matrix
FIELD DUPLICATES	1 per 10 samples, or 1 per area and matrix type	See Specific Matrix	See Specific Matrix	See Specific Matrix	See Specific Matrix	See Specific Matrix

Notes : * from verified time of sample receipt at the laboratory (samples must be received by laboratory within 48 hours of collection).

m:\oser_ave\fsp_tbl2.wpd

FIGURES

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	ALB	DEO	5-14-99			1882-SLM



SCALE 1:15,625

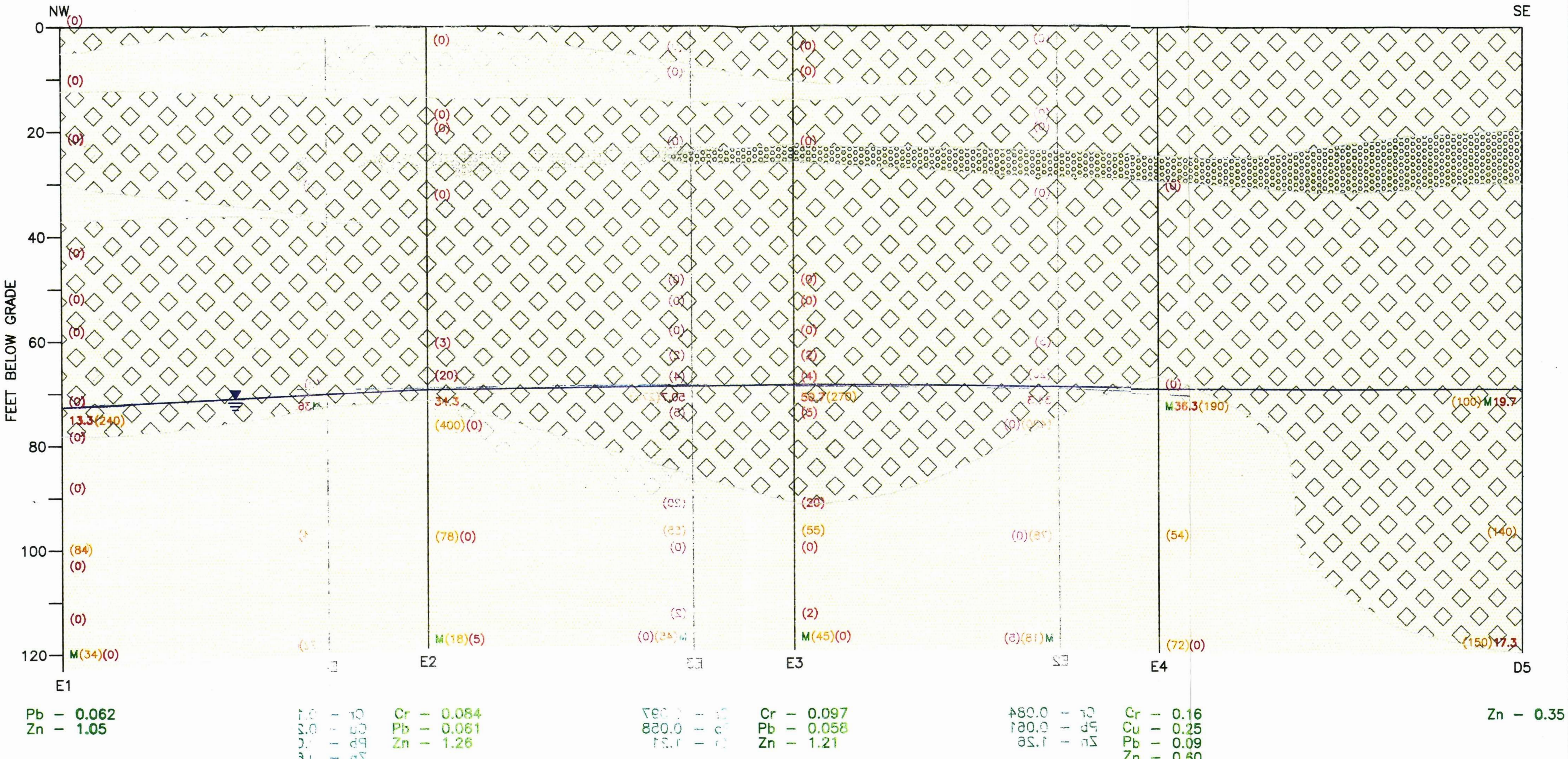
REFERENCE:
MAP FROM DELORME'S MAP EXPERT, FREEPORT, MAINE.

IT CORPORATION

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

FIGURE 1

SITE LOCATION MAP
100 OSER AVENUE
HAUPPAUGE, NEW YORK



LEGEND

13.3 TOTAL VOCs (ppm) WATER–LABORATORY
(240) OVA SCREEN (ppm) WATER
M METAL SAMPLE INTERVAL WATER
(0) CUTTINGS SCREEN (ppm) SOIL

SAND WITH MINOR GRAVEL, COBBLES, OR PEBBLES
PEBBLES AND GRAVEL, SOME SAND
SAND

REFERENCE:
GEOLOGIC AND ANALYTICAL INFORMATION OBTAINED FROM FANNING, PHILIPS, AND MOLNAR, 1992.

REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	ALB	1882–XSC

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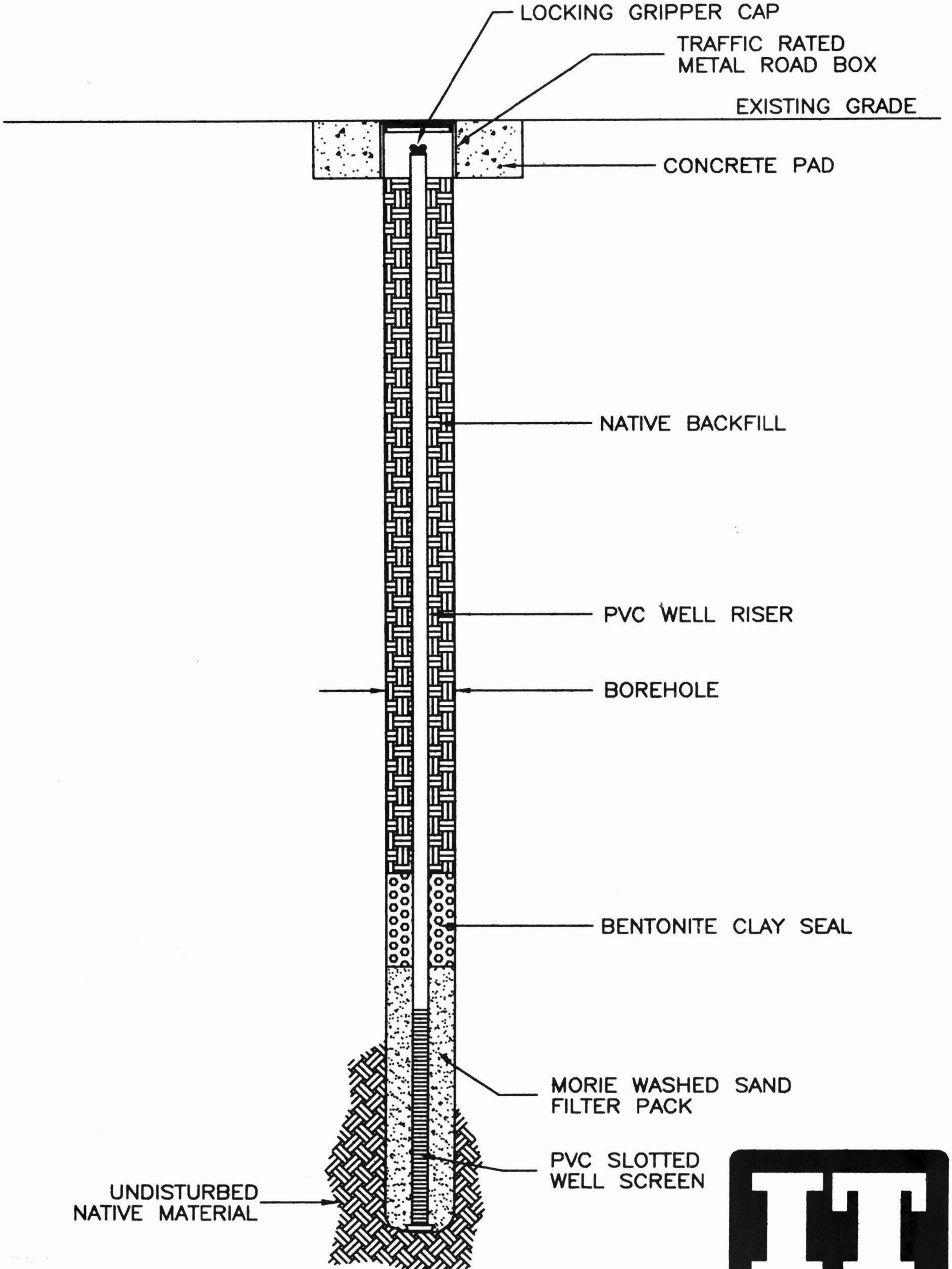
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GEOLOGIC CROSS SECTION
100 OSER AVENUE
HAUPPAUGE, NEW YORK

DESIGNED BY	DFS	5/6/99	CHECKED BY	
DRAWN BY	DEO	5/11/99	APPROVED BY	
SCALE: AS NOTED	DRAWING NO. 3		SHEET NO.	REVISION NO.

FIGURE 5A
TYPICAL MONITORING WELL SECTION



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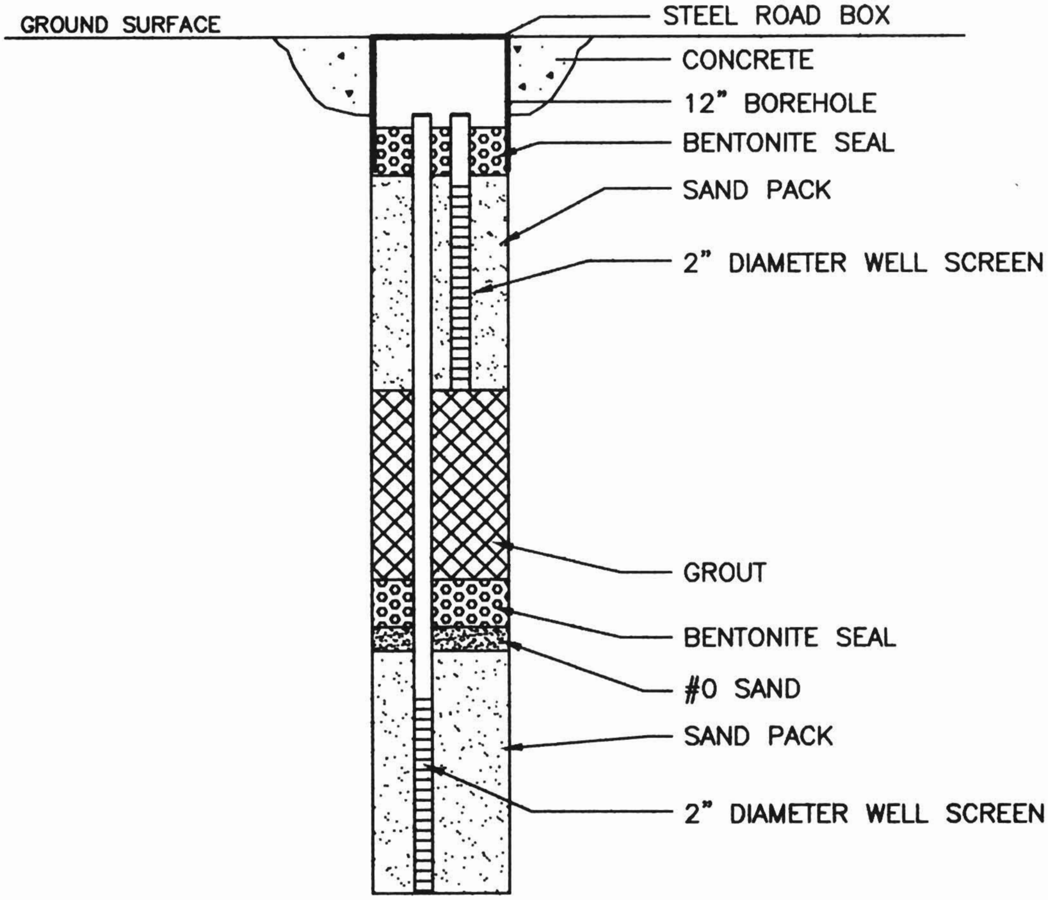
May 11, 1999

1882-MWX.DWG

FIGURE 5B
TYPICAL SHALLOW/DEEP WELL COUPLET SECTION



NOT TO SCALE

May 11, 1999

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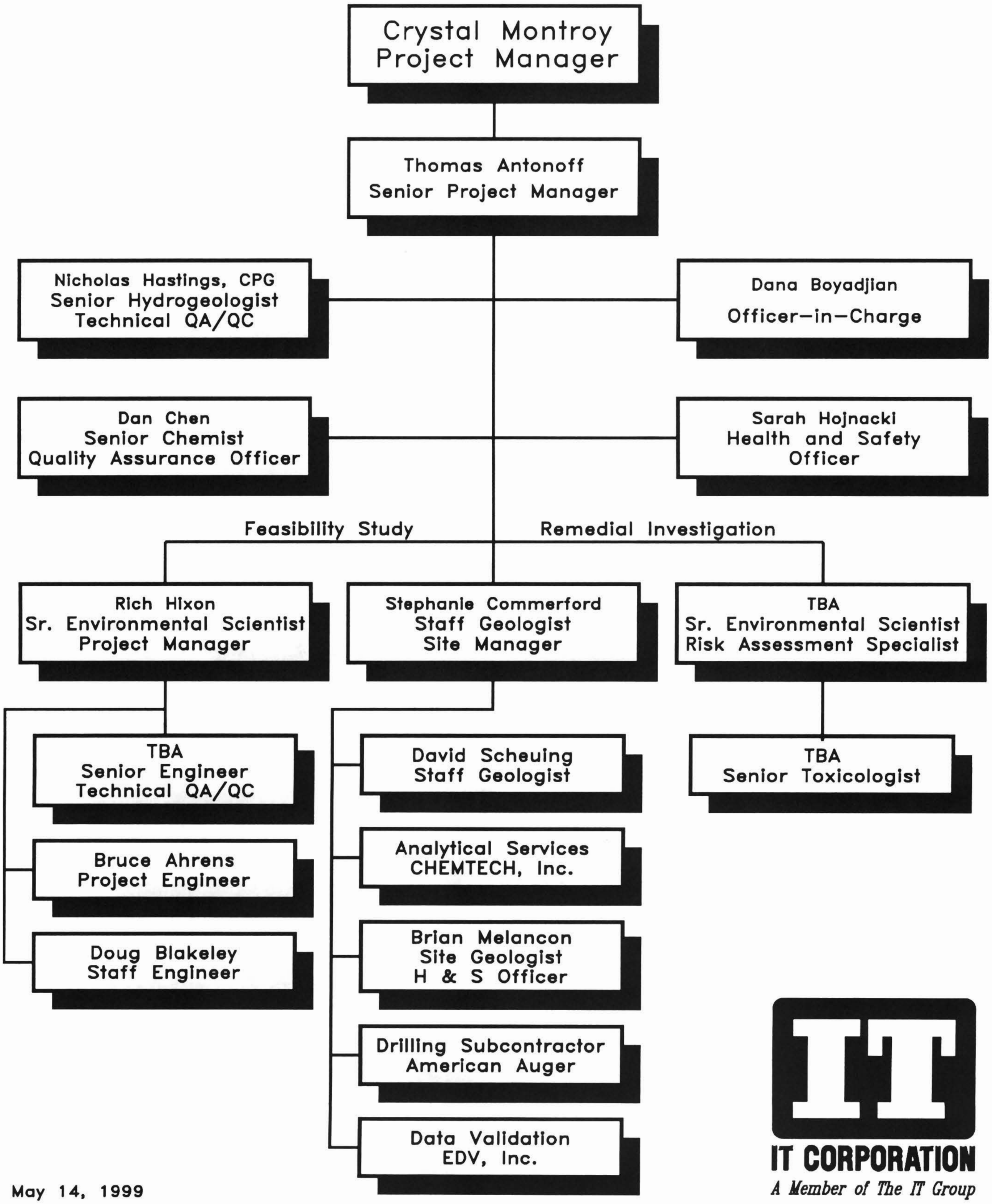
Figure 6
Project Organization
Oser Avenue RI/FS Study
New York State Department of Environmental Conservation



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OSER-ORG.DWG

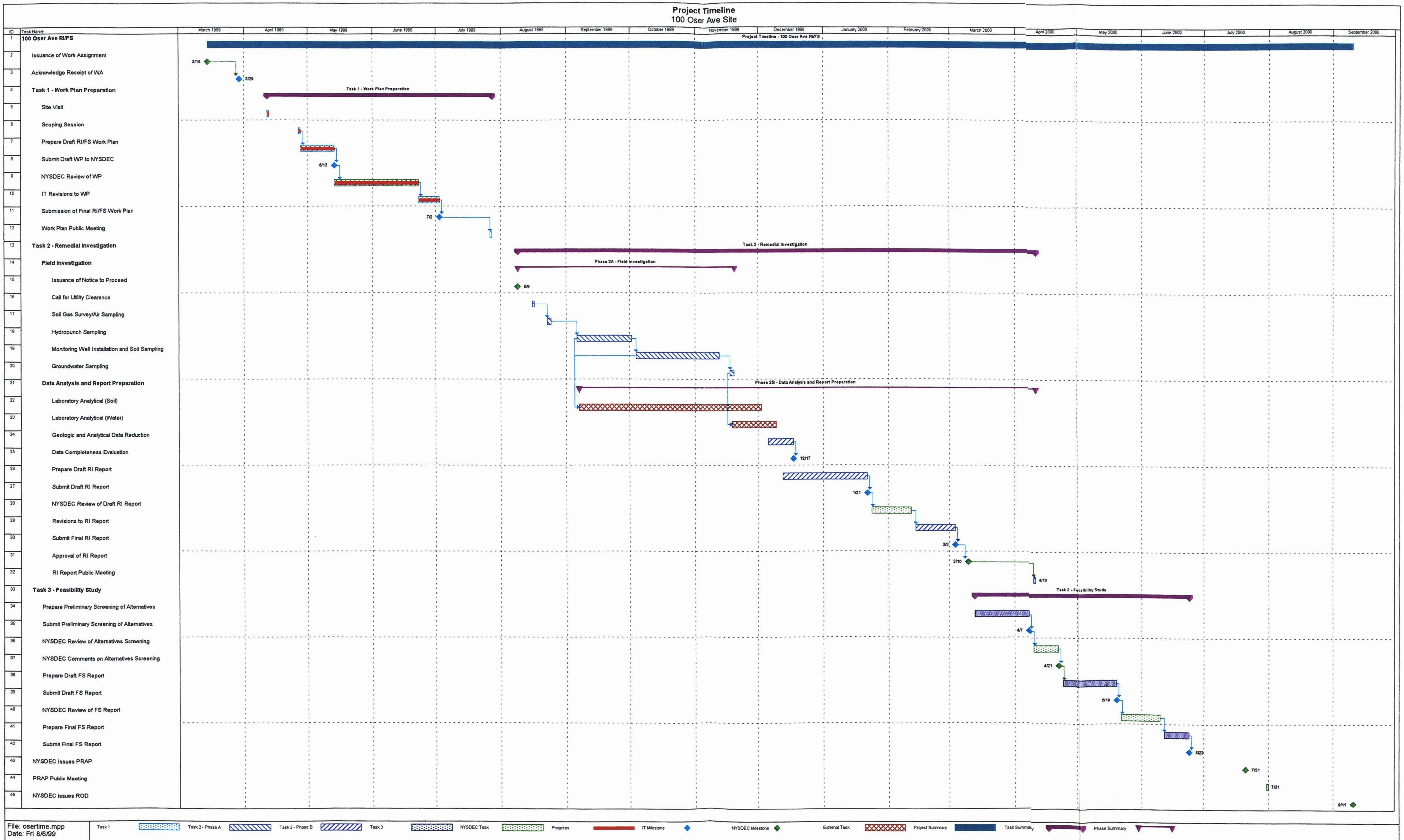

Figure 7
100 Oser Ave RI/FS

APPENDIX A
PROJECT TEAM RESUMES

Nicholas A. Hastings, RPG, LEP
Senior Project Manager

EDUCATION

ScB, Geological Sciences, Brown University, 1987

PROFESSIONAL PROFILE

Nicholas Hastings, RPG, LEP, is a Senior Project Manager with Fluor Daniel GTI's Windsor, Connecticut, office. Entering the environmental industry in 1987, Mr. Hastings is responsible for managing assessment and remediation projects for chemical manufacturers and major petroleum marketers. Much of his project experience involves RCRA and state Superfund sites. As an expert on RCRA regulations, Mr. Hastings also assists other project managers with RCRA projects in EPA Regions I and II.

In EPA Region II, Mr. Hastings has directed RCRA Facility Investigation (RFI) and Interim Corrective Measure (ICM) activities for a number of regulated facilities. On one project, he negotiated significant work scope changes with the regulatory agency, which resulted in an estimated $400,000 cost savings for our client.

As a Licensed Environmental Professional (LEP), Mr. Hastings also is authorized to direct environmental activities at eligible sites. Under this program, eligible sites can move from assessment and remediation to closure under the direction of an LEP, thus eliminating project supervision by the Connecticut Department of Environmental Protection (CTDEP).

Before joining Fluor Daniel GTI, Mr. Hastings worked for 3 years as a Project Manager and Hydrogeologist with IT Corporation in Massachusetts and later in Connecticut. He managed personnel and projects in Connecticut, New York, Massachusetts, and Northern New England.

PROJECT EXPERIENCE

Project Manager, Assessment and Remediation, Former Electronics Manufacturing Facility, CT
Directed assessment and remediation activities for client in accordance with Connecticut Transfer Act requirements and an aggressive property transfer and redevelopment schedule under the state's urban sites development program. Designed, installed, and operated SVE and air sparge systems as part of site-wide remediation program.

Project Manager, Assessment and Remediation, Former Manufacturing Facility, CT
Directed remediation activities for site impacted by chlorinated solvents and metals in soil and groundwater. Installed and operated interim pump-and-treat system, which addressed 11 million gallons of water and recovered 350 pounds of copper in 2 years. Designed, installed, and operating SVE and air sparging system to address VOC source areas. VOCs reduced to nondetect levels in 1 year of operations. Addressing copper-containing soil through a combination of excavation and *in situ* treatment via an infiltration gallery.

Task and Activity Manager, RI/FS and System Design, Superfund Site in EPA Region I
Managed project team through data interpretation, technology screening and selection, and system design phases of a remedial investigation and feasibility study (RI/FS). System designed to address dense nonaqueous-phase liquid (DNAPL) and

light nonaqueous-phase (LNAPL). Process included three-dimensional modeling and presentation graphics to guide remedial design decision process with EPA, CTDEP, and the US Army Corps of Engineers (USACE).

Project Manager, RCRA Corrective Action, RCRA-Regulated Site, EPA Region II
Manages and serves as member of the negotiating team for a high-priority RCRA corrective action site in EPA Region II. Management has included Interim Corrective Measures (ICM), RCRA Facility Assessment (RFA) sampling visit, and RCRA Facility Investigation (RFI) phases of the RCRA corrective action process.

Project Hydrogeologist, RCRA Project, RCRA-Regulated Site, EPA Region I
Implemented groundwater modeling program to design a system to recover impacted groundwater and liquid-phase product at a defense contractor's RCRA-regulated site in EPA Region I.

Project Manager and Hydrogeologist, RCRA Projects, RCRA Facilities, EPA Regions I and II
Involved with numerous aspects of other EPA Regions I and II RCRA projects, including work with corrective action programs, RCRA facility closure programs, and RCRA facility monitoring programs.

Project Manager, Remediation and Closure, Industrial Facilities, CT, MA, NY
Evaluated and implemented remediation and site closure alternatives for electroplating, metals processing, and pharmaceutical plants located in Connecticut, Massachusetts, and New York, with multiple hazardous waste environmental impacts, including chlorinated solvents and toxic metals.

Project Manager, Remediation, Aboveground Bulk Storage Facilities, Various States
Managed design, installation, and operation of multiple recovery well systems to recover product and contain groundwater at tidally influenced petroleum bulk storage facilities in Connecticut, Massachusetts, New Jersey, New York, and Pennsylvania. Design and sizing of the dual-pump well systems often accomplished using three-dimensional computer modeling of the initial aquifer pump test results.

Project Manager, Site Assessments/Remediation, Retail Service Stations, Various States
Managed environmental site assessments at numerous retail sites in Connecticut, Massachusetts, New York, Pennsylvania, Rhode Island, and northern New England, in accordance with state and EPA guidelines. Designed and implemented additional phases of remedial action and investigation, planning, and implementation of remediation alternatives for projects including *in situ* soil vapor extraction (SVE), water treatment, and bioremediation.

SPECIAL QUALIFICATIONS

Health and Safety Training
OSHA 40-Hour Hazardous Waste Activities Training
OSHA 8-Hour Refresher for Hazardous Waste Activities (annual)
OSHA 8-Hour Management/Supervisory Training
OSHA Excavation and Trenching Safety Training
OSHA Confined Space Entry Training

Registrations and Certifications
Registered Professional Geologist (RPG), Delaware
Licensed Environmental Professional (LEP), Connecticut

Academic and Professional Affiliations
Environmental Professionals' Association of Connecticut
- Member of CTDEP RSR Revision Technical Advisory Group (1997-98)

Association of Groundwater Scientists and Engineers
National Ground Water Association
Connecticut Groundwater Association

Continuing Education
"Statistics for Environmental Professionals," EPOC seminar, 1998
"EPOC Review Course for CT LEP Licensing Exam," 1997
"Principles of Vadose Zone Hydrology," NGWA Seminar, 1994
"IBM-PC Applications in Ground Water Pollution and Hydrology," NWWA seminar, 1991
"Site Remediation and Closure," Fluor Daniel GTI seminar, 1991
"Sampling Program Management Course," IT Corporation seminar, 1990
"Corrective Action for Containing and Controlling Ground Water Contamination," NWWA Seminar, 1990
"How to Manage Projects," Skill Path, Inc. seminar, 1990
"Groundwater Pollution and Hydrology," Groundwater Associates of Princeton seminar, 1990
"Ground Water Technology Course," IT Corporation seminar, 1989
"Hazardous Waste Safety and Spill Course," Massachusetts Firefighting Academy, 1988

Publications and Presentations
Primary author; speaker; "Comparison of Soil Vapor Extraction Pilot Study Interpretation Methods"; N. A. Hastings, RPG; A. E. Proctor, PE; D. Bass, ScD - Fluor Daniel GTI; P. L. Kasbohm - Chevron U.S.A. Products Co.; D. H. Mohr, PhD - Chevron Research and Technology Co.; Geological Society of America - 30th Annual Northeastern Section; Hartford, Connecticut; March 1995.

Primary author; speaker; "Comparison of Predicted vs. Operating Data for a Multi-Phase Remediation Project"; N. A. Hastings, RPG; A. E. Proctor, PE; D. Bass, ScD - Fluor Daniel GTI; P. L. Kasbohm - Chevron U.S.A. Products Co.; D. H. Mohr, PhD - Chevron Research and Technology Co.; Water Environment Federation 67th Annual Conference; Chicago, Illinois; October 1994.

Richard A. Hixon, RPG
Senior Hydrogeologist

EDUCATION

MS, Geology, Rensselaer Polytechnic Institute, 1988
BS, Geology, State University of New York (SUNY) at Albany, 1977

PROFESSIONAL PROFILE

Mr. Hixon has significant experience in hydrogeologic assessment, data quality assurance and quality control (QA/QC) planning and review, technology evaluation, pilot testing, remediation system design, and remedial action implementation on projects for utility, electronics, chemical, and petroleum bulk storage industries. Mr. Hixon has also negotiated innovative strategies for site remediation and closure under the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and voluntary cleanup programs with EPA and state regulatory agencies in New York, Vermont, Maine, and Texas.

Mr. Hixon was previously employed by the New York State Department of Environmental Conservation (NYSDEC), where he performed geophysical evaluations of proposed polychlorinated biphenyl (PCB) storage sites, geotechnical assessments for dam feasibility studies, and soil and chemical investigations of inactive hazardous waste sites (IHWS). He also developed an EPA-funded database and software program to inventory groundwater resources in New York.

PROJECT EXPERIENCE

Project Manager, RI/FS and RD/RA at an Electronics Manufacturing Plant, Mid-Hudson Valley, NY
Developed work scope to complete a remedial investigation and feasibility study (RI/FS) at a manufacturing site listed on New York's Superfund Registry. The site was listed based on detection of chlorinated solvents in soil and groundwater adjacent to the facility. The RI/FS was focused on compiling previous work and performing limited sampling to fill data gaps. The FS included pilot testing to demonstrate that *in situ* air sparging and soil vapor extraction (SVE) technologies would provide a more effective and significantly less costly alternative than the option initially favored by NYSDEC. This alternative was adopted in the remedial action plan and Record of Decision (ROD). The remedial design and remedial action (RD/RA) installation was completed below budget. The successful operation of the system resulted in NYSDEC reclassifying the site to "properly closed" within 7 months of startup.

Project Manager, RFI and ICM Implementation at a Research and Development Facility, Mid-Hudson Valley, NY
A multiple-phase project at a research and development facility was undertaken as a requirement of the facility's Hazardous Waste Storage Permit. Project phases included completion of a RCRA facility investigation (RFI), corrective measures study (CMS) implementation, and closure of regulated waste storage areas and tanks. RFI performed at the facility's hazardous waste storage unit to delineate areas of petroleum and solvent release impacts was negotiated, reviewed, and approved by both EPA and NYSDEC. Recommendations for corrective measures proposed were supported by risk assessment. An ICM (*in situ* and *ex situ* bioremediation) was also implemented at an active bulk storage terminal at the facility, resulting in significant cost savings during treatment of petroleum-impacted soil.

Project Manager, Site Investigation and IRM Evaluation at Former MGP Sites, Long Island, NY
Project manager for investigation work scope and interim remedial measure (IRM) evaluations at two former manufactured gas plant (MGP) sites in Long Island. Used innovative techniques to minimize community impacts and concerns during work scope implementation, including vibratory angle drilling to investigate areas under buildings. IRMs to remove surface tar and contain subsurface residuals are being evaluated.

Technical Director, PSA and IRM Study at a Former MGP Site, Upstate NY
Provided technical direction and oversight during completion of a preliminary site assessment (PSA) work scope for a former MGP site in upstate New York. Environmental samples were collected to delineate MGP waste and source material (purifier box wastes, pure tars) and residuals in soil, surface water, and groundwater. The work scope supported human and environmental exposure analysis and preliminary evaluation of remediation alternatives. Evaluated IRMs to remediate surficial tar materials at the site.

Technical Director, Site Assessment and Remedial Measures Evaluation at a Former MGP Site, ME
Directed development and implementation of an investigation work scope for a former MGP site in Maine. An environmental sampling program was designed to delineate MGP waste and residuals in soil and groundwater. A "No Action" scenario is being prepared for presentation to the state agency based on leachability test results and groundwater monitoring, to demonstrate that MGP residuals are not being transported to the harbor and impacting aquatic populations.

Project Director, Site Assessment at Multiple Municipal Landfills, Upstate NY
Assessed methane gas migration from several municipal landfills in accordance with Part 360 closure requirements. A definitive procedure for sampling and tracking gas-transmissive zones was developed that was subsequently included in a NYSDEC guidance memorandum.

Project Manager, Statistical Evaluation of Groundwater Monitoring Data, Paper Sludge Landfill, Upstate NY
Historical and operating data from a paper sludge (monofill) solid waste landfill were evaluated to determine if significant increases in analytical parameters had occurred as a result of operations. As a result of the analysis and subsequent negotiation with the regulator, several monitoring parameters were dropped resulting in an annual savings of more than $30,000 to the customer.

Project Manager, Groundwater and Soil Remediation, Emergency Vapor Abatement, Central VT
A hydrocarbon spill at a municipal service center forced evacuation of several adjacent residences. Remedial response actions focused on extracting and treating hydrocarbon vapor and fugitive liquid-phase petroleum (SVE, groundwater and petroleum recovery). A residential air sampling program was completed with associated QA/QC and risk-assessment components, permitting reoccupancy of the residences.

SPECIAL QUALIFICATIONS

Health and Safety Training

OSHA 40-Hour Hazardous Waste Activities Training
OSHA 8-Hour Refresher for Hazardous Waste Activities (annual)
OSHA 8-Hour Management/Supervisory Training

Registrations and Certifications
Professional Geologist, Arkansas

Academic and Professional Affiliations
National Ground Water Association
Association of Groundwater Scientists and Engineers
National Safety Council
Town of Clifton Park Environmental Conservation Commission, Chairman

Continuing Education
Remediation Technology Training, Fluor Daniel GTI, October 1992, August 1994
Team Leader Training Program, Organizational Dynamics, Inc., August 1992

Thomas D. Antonoff
Project Geologist

EDUCATION

BA, Geology, State University of New York at Oswego, 1981

PROFESSIONAL PROFILE

Tom Antonoff is a Project Geologist in Fluor Daniel GTI's Northeast District. Mr. Antonoff designs and implements subsurface investigations, such as determining local geology, contaminant extent, contaminant transport pathways, and remedial options. He is also responsible for preparing and tracking project budgets and work plans, as well as coordinating field activities. He formerly served as Operations Manager of the Company's Buffalo office, where his responsibilities included general management of western New York operations. He also supervised a staff of scientists and technicians in the development and implementation of a variety of environmental assessment and remediation projects.

Before joining Fluor Daniel GTI, Mr. Antonoff worked for Trahan Petroleum, Inc. of Ellington, New York, as an exploration and production geologist. He was responsible for reservoir maintenance and development of a 200 well field in western New York, regional geologic studies in New York and Illinois, and economic appraisal of properties considered for acquisition.

PROJECT EXPERIENCE

Project Management
Management responsibilities include preparing proposals, remedial action plans, and coordinating professional and technical resources for more than 30 environmental projects in western New York. Management and consulting services also include liaison services with officials of the local offices of the New York State Department of Environmental Conservation (NYSDEC).

Direct management of 300 gallon per minute (gpm) groundwater and liquid-phase petroleum recovery system for a petroleum refinery in Buffalo, New York. Work involved managing a multidisciplinary team from assessment through detail design and installation.

Management of 45 petroleum remediation projects in western New York at facilities ranging from privately owned retail service stations to petroleum refineries that are several acres in area. Also includes the management of New York State's first NYSDEC-permitted commercial bioremediation treatment facility for petroleum impacted soils.

Remediation
Remediation project experience includes the design and installation of various remediation technologies, including groundwater recovery and treatment, soil vapor extraction (SVE), air sparging, and bioremediation.

Technology Application
Designed and created a computer system to calculate efficiencies in SVE systems using analytical laboratory and field data.

Project manager of an investigation and remediation project at a 3-acre manufactured gas plant (MGP) site in western New York. The project involved preparation of a work plan for off-site containment investigation, remediation technology screening, pilot testing and implementation.

Environmental assessment work in New York has included numerous projects involving delineation and quantification of impacts at petroleum refineries, bulk storage facilities and retail stations; chemical processing plants and bulk storage facilities; and various industrial facilities. The assessment work included investigation for a variety of chemicals including metals, polychlorinated biphenyls (PCBs), chlorinated organic compounds, and petroleum products.

Project management of multi-site environmental real estate assessment due-diligence projects commonly involving 10 or more international industrial facilities. Projects involve Phase I/Phase II investigations, and compliance audits usually completed within 3 weeks of assignment. Portfolios typically included $10 to $40 million acquisitions of manufacturing businesses in the US, South America, Europe, Australia, and Asia.

SPECIAL QUALIFICATIONS

Health and Safety Training
OSHA 40-Hour Hazardous Waste Activities Training
OSHA 8-Hour Refresher for Hazardous Waste Activities (annual)
OSHA 8-Hour Management/Supervisory Training
OSHA Confined Space Entry Training
Managers Health and Safety Training

Continuing Education
Geophysics, Evansville, Indiana
Improving Management Skills, IPE, Washington, DC
RCRA Regulations, AMA, Orlando, Florida
Tough Positive Management, AMA, Washington, DC
Quality Action Teams, Organizational Dynamics, Inc., Boston, MA
Remediation Specialist Training, Fluor Daniel GTI, Albuquerque, NM

Academic and Professional Affiliations
Buffalo Association of Professional Geologists
American Association of Petroleum Geologists
American Institute of Professional Geologists
Western New York Construction Users Council
National Ground Water Association
Greater Buffalo Partnership

Stephanie A. Commerford
Staff Geologist

EDUCATION

BS, Geology, State University of New York (SUNY) at Albany, 1993
AAS, Chemical Technology, Hudson Valley Community College, 1990

PROFESSIONAL PROFILE

Stephanie Commerford is a Staff Geologist in IT Corporation's Albany, NY Office. Ms. Commerford is responsible for daily project management activities, data assimilation, and proposal preparation. With almost six years of environmental experience, her areas of expertise include Phase I and II environmental site assessments, UST closures, and state and federal government work.

PROJECT EXPERIENCE

__Project Management__

Regional Project Manager - Phase I Environmental Site Assessment (ESA)
Responsibilities include coordinating technical and professional resources nationwide for retail petroleum site portfolios; management and assignment of internal resources performing the Phase I ESAs field investigations; provide quality control of reporting and assurance of on-time completion of deliverables.

Most recent portfolio included 17 Phase I ESAs in the State of Utah with a 3-week turn-around timetable. The requested deliverables were provided to the client by the established due date.

Site Manager - Solvent Recycling Facilities
Responsibilities include managing internal and external resources in order to maintain proper operation of on-site remediation systems; wastewater and air effluent compliance; and preparing remediation system operation and groundwater monitoring reports.

Project Manager - Real Estate Transfer Assessments
Managed and prepared over 30 Phase I ESAs at commercial and industrial nationwide facilities for an existing real estate investment trust.

Site Manager - PCB-Disposal Site
Assisted in the development and implementation of the preliminary site assessment (PSA) at a PCB impacted site; involving soil boring installation, depth-discrete immunoassay testing of soils at NYSDEC-specified locations, and collection of sediment and surface water samples from an adjacent creek.

__Remediation/Field Activities__

Remediation/Subsurface Investigations
Experience includes the design and inspection of monitoring well installation, collection of groundwater and soil samples, interpretation of field data, and the preparation of reports. In addition, assisting with the design and installation of various remediation technologies, including groundwater recovery and treatment, soil vapor extraction, air sparging, and bioremediation.

Underground Storage Tank (UST) Removals
Supervised UST Removals for major petroleum corporations, private companies, and New York State Office of General Services.

SPECIAL QUALIFICATIONS

Health and Safety Training
OSHA 40-Hour Hazardous Waste Activities Training
OSHA 8-Hour Refresher for Hazardous Waste Activities
OSHA 8-Hour Management/Supervisory Training
OSHA Confined Space Training [for Competent Entrant, Attendant, and Entry Supervisor Training]
OSHA Excavation and Trenching Safety Training
American Red Cross: First Aid
American Heart Association: CPR

David F. Scheuing, PG, CG, CPG
Staff Geologist

EDUCATION

PhM, Geology, Columbia University, 1990
MA, Geology, State University of New York at Buffalo, 1990
BA, Geology, State University of New York at Buffalo, 1985

PROFESSIONAL PROFILE

David Scheuing, PG, CG, CPG, is a Staff Geologist for IT Corporation's Schenectady, New York, office. Entering the environmental industry in 1990, Mr. Scheuing is an experienced professional responsible for conducting remedial investigations for industrial, petroleum, and government sites. This involves collecting field samples, analyzing data, installing monitoring wells, and performing aquifer pump tests to determine the extent of contamination and potential migration pathways of contaminant plumes. Following field work, Mr. Scheuing analyzes and interprets data and prepares reports based on analytical and testing results. Based on field data and analysis, Mr. Scheuing works alongside the project team to develop cost-effective, site-specific remediation strategies.

Before joining IT Corporation in 1998, Mr. Scheuing worked for TAMS Consultants, Inc. as a Project Manager and Staff Geologist. During his employment with TAMS, he served such clients as the EPA, US Army Corps of Engineers (USACE), the Air Force Center for Environmental Excellence (AFCEE), New York State Department of Environmental Conservation (NYSDEC), and Browning-Ferris Industries.

PROJECT EXPERIENCE

Project Manager and Staff Geologist, TAMS Consultants, Inc.

- **Project Manager, Design Support Testing, Municipal Wells, NY**
  Managed NYSDEC Design Support Testing (DST) of an aquifer contaminated by three separate chlorinated solvent plumes. Responsibilities included project management; planning and implementation of source and hydrogeologic investigation, including pumping tests, monitoring/pumping well installations, surface and subsurface sediment and groundwater sampling; Conceptual Remedial Design (CRD) development; coordination and preparation of DST and CRD reports.

- **Field Team Leader, RI/FS, Municipal Landfill, NY**
  Led NYSDEC investigation of the extent of PCB contamination to soil and groundwater at a former transformer scraping facility. Responsibilities included coordination of field activities with client and drilling, and surveying subcontractors; installation, development, and sampling of monitoring wells; and coordination and preparation of Remedial Investigation Report.

- **Field Operations Leader, RI/FS, Hudson River, NY**
  Led EPA investigation concerning the extent and degree of PCB contamination over a 200-mile reach of the Hudson River. Responsibilities included extensive sampling of river bottom sediments; water column sampling; oversight of side-scan sonar, subbottom and bathymetric profile data collection; ecological sampling; reduction of analytical data; and assistance in the preparation of Sampling and Analysis Plans for each effort, as well as report writing.

- **Site Manager, Remedial Design Investigation, Industrial Facility, NY**
  Involved in EPA investigation of a chlorinated solvent plume in bedrock and overburden aquifers. Responsibilities included assisting in preparation of the work plan; coordination of field activities with drilling subcontractor, well installation, and development; subsurface sediment sampling; implementation of 10 pump and recharge tests; pump test data reduction; and report writing.

- **Project Hydrogeologist, PRP Oversight, Industrial Landfill, NY**
  Served as Project hydrogeologist for EPA at a PRP-directed cleanup of a dense non-aqueous phase liquid (DNAPL) contaminant plume emanating from an industrial landfill. Responsibilities included oversight of the PRP's consultant for the installation of extraction and monitoring wells for a DNAPL containment system.

- **Project Hydrogeologist, UST Investigation, Municipal Garage, NJ**
  Performed investigation of a leaking UST for the New Jersey Department of Environmental Protection (NJDEP). Responsibilities included the performance of several slug tests followed by test data reduction and interpretation.

- **Environmental Specialist, Site Closure, Lowry Air Force Base, CO**
  Assisted in Air Force Center for Environmental Excellence (AFCEE) directed closure of the once-active airbase. Responsibilities included construction oversight for the removal of underground and aboveground storage tanks, oil–separators and grease traps; oversight of contractor-performed electromagnetic and ground-penetrating radar (GPR) surveys; and daily reporting to the client.

- **Project Geologist/Environmental Scientist, Siting Study, Airport, IL**
  Supported an Illinois and Indiana joint commission study on the feasibility of five alternative sites for a new regional airport in the Chicago area. Responsibilities included logging geotechnical soil borings at each site; and design and implementation of field surveys on each site in order to identify known and potential hazardous waste concerns.

- **Project Geologist, Siting Study, Landfill, MA**
  Assisted in performing landfill siting study for private client. Responsibilities included well installation and development; groundwater sampling; and the oversight of a 24-channel seismic refraction study.

SPECIAL QUALIFICATIONS

Health and Safety Training
OSHA 40-Hour Hazardous Waste Activities Training, 1990
OSHA 8-Hour Refresher for Hazardous Waste Activities (annual)
OSHA 8-Hour Management/Supervisory Training, 1991

Registrations and Certifications
Professional Geologist (PG), Pennsylvania, No. PG-000405-G
Certified Geologist (CG), Maine, No. GE394
Certified Professional Geologist (CPG), American Institute of Professional Geologists, No. 9776
Certified Subsurface Evaluator, New Jersey UST Program, No. 0015223

Academic and Professional Affiliations
American Institute of Professional Geologists
National Ground Water Association
American Geophysical Union
Geological Society of America
New York State Council for Professional Geologists
Hudson-Mohawk Professional Geologists Association

Professional Training
Contaminant Hydrogeology in Fractured Bedrock, Geological Society of America short course, 1996
Regulatory Training in Underground Storage Tanks, Rutgers University, 1995
Hydrogeochemistry, Geological Society of America short course, 1994
Ground Water Management, Wright State University, 1994
Ground Water Hydrology, Wright State University, 1993