Revised Draft

Remedial Investigation Work Plan

February 15, 2008

Proposed for:

Levey Property Site
Copiague, New York
Brownfield Cleanup Program Site Code # C152201

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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Albany, New York

IE Project # 06-013

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1. INTRODUCTION

This Remedial Investigation Work Plan documents the tasks scoped for the continued investigation of the hazardous substance release that occurred at the Levey Property Site ("Site") to satisfy the requirements of the New York State Department of Environmental Conservation (NYSDEC) under the Voluntary Cleanup Plan. This Remedial Investigation Work Plan is specified under the provisions of the Brownfield Cleanup Program agreement between the New York State Department of Environmental Conservation (NYSDEC) and the Volunteer, Saint James Crescent Group LLC.

The purpose of the proposed activities presented herein, is to develop a conceptual planning process that will facilitate the characterization of site-specific conditions relating to the nature and extent of contamination emanating from the Site. Evaluation of the data obtained from these investigations will be used to support future investigative and remedial decisions.

The methodologies and procedures presented in this work plan are based upon the following documents: the New York State Department of Environmental Conservation Draft DER-10, Technical Guidance for Site Investigation and Remediation; the New York State Department of Environmental Conservation 6 NYCRR Part 375 Environmental Remediation Programs; Subpart 375-3 and 375-6; the United States Environmental Protection Agency's (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, dated October 1998; the USEPA Compendium of Superfund Field Operations Methods, dated September 1987; and the USEPA Standard Operating Safety Guides, dated June 1992.

2. Site Characteristics and Conceptual Site Model

2.1 Site Location and Topography

The site is located at 1305 South Strong Avenue, Copiague, Suffolk County, New York, and is designated by the Suffolk County Tax Assessors Office as District 100; Section 198, Block 2, Lot 29 (see **Figure 1:** Site Location Map).

The site is approximately 45,400 square feet. It contains one multi-story masonry building (one-story on western and central portion, two-story on eastern portion, a former partial basement at northeastern corner) with an approximate footprint of 20,000 square feet. The surface area of the site consists of asphalt pavement, concrete pavement, exposed soils, and vegetative landscaping. The site exhibits low topographic relief (less than three percent slopes).

The on-site building was constructed in 1951. The site was historically used for manufacturing of tools, machines and metal manufacturing under D. T. Brown, Inc. Subsequently, this site was used as a small wallpaper production with three printing presses, and motor vehicle parts storage. In 2001, this site operated as a car and boat repair business, along with storage and assembly of bronze sculptures. The site has been vacant since 2003. The site was connected to sewer in 1990s. Prior to that, the site maintained on-site sanitary systems (cesspools) for more than 40 years.

The Site is planned for redevelopment as residential condominiums.

2.2 Regional Geology and Hydrogeology

The geology of Long Island consists of thick deposits of unconsolidated, water bearing sediments resting upon a relatively impermeable, crystalline bedrock surface. The sequence of events that shaped Long Island's geology is not known with certainty, but it probably began with the formation of the original basement rocks in early Paleozoic to Precambrian time more than 400 million years ago. These basement rocks were heated and compressed (metamorphosed) by folding and faulting, producing a rugged, mountainous topography. During the subsequent period ending with the late Cretaceous Epoch 100 million years ago, erosion reduced the land to a nearly planer surface that gently tilted to the southeast.

During the late Cretaceous Epoch (60-100 million years ago), streams brought sediments from the north and the west to the Long Island area on the continental margin, forming a permeable sand layer (Lloyd Sand Member of the Raritan Formation) and overlying clay member (clay member of the Raritan Formation) upon the bedrock surface. After a short period of erosion or non-deposition, thick, permeable beds of river delta clay, sand, and gravel were deposited on the Raritan Formation; these deposits comprise the Magothy Aquifer. Toward the close of the Late Cretaceous period (approximately 60 million years ago), a sand and clay unit (Monmouth Group) of low permeability was deposited in shallow marine waters in the area that now constitutes Long Island's south shore.

A long period of non-deposition, or possibly deposition followed by erosion, occurred after the Cretaceous era. Geologic activities during this time left few sedimentary traces, but streams flowing across Long Island cut deep valleys into the Magothy. It was not until late Pleistocene (Wisconsinian) glaciation- some 20 to 200 thousand years ago- that there were any significant additions to Long Island's geologic record. Valleys were filled and the other deposits were almost completely buried by glacial deposits. Prior to the southward movement of the Pleistocene ice sheets to Long Island, an extensive clay unit (Gardiners Clay) was deposited in shallow marine and brackish waters along the shores of what is now Suffolk County. This unit rested upon the Magothy and Monmouth Group, and acted as a confining layer. The northern portions of the Gardiners were subsequently eroded by advancing ice and glacial meltwaters, and Gardiners Clay beds are now discontinuous in areas of northern and central Long Island.

The Pleistocene glaciation created the hilly Ronkonkoma moraine along Long Island's "spine" and south fork, and the Harbor Hill Moraine along the North shore and the North fork. Erosion of these morainal deposits (as the glacier melted away from Long Island) created extensive outwash plains of sand and gravel in the intermorainal area and south to the Atlantic Ocean. These highly permeable deposits comprise the upper glacial aquifer and represent the majority of Long Island's surficial sediments. Some local confining clay units were also formed from glacial materials in intermorainal lakes and tidal lagoons. Since the end of glaciation, about 12,000 years ago, Holocene beach and marsh deposits have been formed along the marine edge, and within stream corridors and ponds.

2.3 Site Geology and Hydrogeology

Geological data obtained from the previous remedial investigations identified that the soil was consistent with a glacial till outwash and generally included medium sand and gravel within the unsaturated soils. The water table is encountered at approximately 10-ft below grade at the Site.

The Suffolk County Water Authority (SCWA) Lambert Avenue public well field is located approximately 500 ft northwest of the site. Well S113006 was screened 504 ft to 554 ft below grade. The SCWA report showed that the site is outside the contributing area to the well.

The Site is located within Hydrogeologic Zone VII, South Shore Shallow Flow System (Nassau-Suffolk 208 Study - Water Management Zones in Nassau and Suffolk). Zone VII is characterized by generally shallow and horizontal flowing groundwater. Regional groundwater flow direction in the area of the site is toward the south. Limited information has been generated as part of previous remedial investigations concerning the site-specific hydrogeology within the deep saturated zones.

The NYSDEC Well Completion Logs for the Lambert Well Field located to the northwest of the Site will be reviewed to determine the presence and depth of any clay layer(s). Additional information obtained from EC logging (see section 3.4.1) and soil characterization boring (see section 3.4.2) will also be utilized to interpret the presence and depth of any clay layer(s).

Based on the Site Investigation Report (SIR), dated September 2006 prepared by the NYSDEC, the groundwater flow direction is to the south-southwest. The groundwater flow direction map from the SIR is included in the report as **Figure 2**.

2.4 Nature and Extent of Contamination

From August 2001 to March 2003, site investigation was conducted by the Suffolk County Department of Health Services (SCDHS). On September 11, 2002, SCDHS installed five monitoring wells on the site. Tetrachloroethene (PCE) and its breakdown products appeared to be migrating onto the site. 1,1,1-trichloroethane (TCA) appeared in downgradient wells, but not in up-gradient wells, suggesting the presence of an onsite TCA source. On March 4, 2003 vertical profile wells on the site were sampled. The increase in TCA concentration suggested that contaminant source was still present on the site.

In February 2006, a Phase I Environmental Site Assessment (ESA) was conducted by Impact Environmental. During the onsite inspection, petroleum staining was observed around the fill port of a fuel oil UST located on the northeastern corner of the site. Said UST was reportedly inactive. Review of NYSDEC spill database revealed that an open spill incident (#03-12252) was associated with said UST. Chemical storage was observed in the northwestern portion of the building. An underground hydraulic lift was observed to the south of the building. The observations identified from the Phase I ESA are referenced on **Figure 3**.

In September 2006, a Site Investigation (SI) was conducted by Environmental Resources Management (ERM) under the auspices of the NYSDEC. Nineteen soil borings were installed during the SI to create a vertical profile of soil quality beneath the Study Area. A total of 38 soil boring samples were collected. All volatile organic compounds (VOCs) were below their applicable guidance values. The constituents observed in soil, and their concentrations were not consistent with those observed in the groundwater analytical results. Elevated concentrations of chlorinated volatile organic compounds (CVOCs) were detected in groundwater, while the soils contained mostly aromatic VOCs. Previous investigations make note of abandoned cesspools located in the northeast and southeast portions of the site in the areas where higher concentrations of CVOCs were detected in groundwater during this investigation. However, the geophyisical survey conducted on the site failed to identify the location of the abandoned on-site sanitary systems. Ten groundwater borings were installed on the site. CVOCs were detected in groundwater at all on-site sampling locations. TCA, PCE, and trichloroethene (TCE) are the most prominent compounds. Groundwater samples obtained in the vicinity of abandoned cesspools exhibited the highest concentrations.

3. REMEDIAL INVESTIGATION PLAN

The work proposed in this plan will be performed in accordance with NYSDEC procedures. The purpose of this work plan is to propose the procedures necessary to further characterize site-specific conditions and the extent of contamination to understand potential contaminant pathways. The information generated as part of this work plan will be used to support informed decisions regarding additional investigative activities and/or remedial alternatives. The site investigation activities will be performed in accordance with the Site Health and Safety Plan included in **Appendix A**. The NYSDEC will be notified prior to commencement of the field activities for the purpose of observing site work and splitting samples.

The objectives of the remedial investigation are: 1) to identify the locations of potential contaminant sources; 2) to obtain site-specific geological data; 3) to delineate the horizontal and vertical extent of the on-site contaminant plume; and 4) to provide necessary data for evaluating alternative remedial options in choosing of appropriate remedial method. The primary tasks scoped in this work plan include the installation of test pits (exploratory), subsurface soil sampling of potential source areas, installation of soil profile borings and groundwater profile sampling. Additional remedial investigation activities will be performed based on the results of the site characterization activities proposed under this plan; including installation of permanent monitoring wells and determination of site-specific groundwater flow direction.

3.1 Topographic Survey

The proposed soil boring/monitoring well locations will be surveyed using sub-meter accuracy Global Positioning Satellite (GPS) Survey equipment. The GPS surveying techniques are based upon interferometric observations of radio signals from a network of orbiting satellites. These signals are processed to compute station positions by trilateration; the positions of the satellites and computed ranges are used to determine the antenna position. These positions are computed in an Earth-centered Earth-Fixed (ECEF) Cartesian coordinate (x, y, z) system, which can be converted to geodetic curvilinear coordinates (latitude, longitude, and ellipsoidal height). With the additional use of traditional survey techniques, relative elevations can be computed. The GPS survey system to be utilized for this study is the Trimble® R8 and Trimble® 5800 system. Said system includes a dual-frequency, RTK, GPS and WAAS/EGNOS receiver. Horizontal distances were to the nearest 100^{th} of a foot for wells and the nearest 10^{th} of a foot for other features tied into the NYS Plane coordinate system. This data will be used to develop a hydrostratigraphic map of the Site.

A traditional survey of the site also will be performed to collect elevation data for existing/future wells. Survey standards include vertical elevations on wells to the nearest 100th of a foot and ground and surface features to the nearest 10th of a foot. Traditional survey will continue to be used for benchmarks, monitoring wells, and other locations where more exacting survey standards are required.

3.2 Test Pit Investigation

According to the SCDPW reports, the site was connected to the Southwest Sewage District (SWSD) in 1990. A rough sketch submitted to SCDPW indicates that there were four cesspools abandoned and backfilled on the site. Three of said cesspools were located at the northeast corner of the site and one was located at the southeast corner. No historic site plans are available from the local building department depicting the exact location of the cesspools.

Test pits will be installed using a hydraulic backhoe at locations on the Site. The locations will be based on the results of the geophysical survey conducted as part of the Site Investigation by ERM. The survey identified 4 anomalies on the Site suspected to represent potential underground structure such as tanks or components of the former sanitary systems. The test pits will be installed in these locations from grade to approximately 20 ft below existing grade, which is the approximate depth to the water table, to confirm the presence of any contaminant sources related to the former cesspools on the Site. Soil samples will be collected in 2 ft intervals for field screening purposes. A minimum of 2 soil samples will be preserved from each test pit for laboratory analysis (1 of the samples will be preserved from the bottom of each test pit). The test pits will be performed following the standard procedures referenced in Section 4.2 of the QAPP.

The soil samples to be collected for ELAP certified laboratory analysis will be preserved in the field with ice, properly transported to the selected laboratory and analyzed in accordance with USEPA Test Method 8260 for volatile organic analytes, USEPA Test Method 8270 for semi-volatile organic analytes, and USEPA Test Method 6010 for heavy metals and inorganic analytes (including titanium). The laboratory analysis results will be reported with NYSDEC Analytical Sampling Protocol (ASP) B deliverables.

3.3 Contaminant Source Investigation

Soil borings are proposed to be installed in areas identified as potential contaminant sources on the Site. The soil boring locations may be modified in the field based on the findings of the test pit investigation. These potential areas include the abandoned leaching structures, the former chemical storage areas inside the building, former drains inside the building, the suspected discharge pipe on the northern side of the building, former fuel oil tanks, the underground hydraulic lift identified to the south of the building, and the abandoned drums to the northwest of the building. Approximately 26 soil borings are expected to be installed as part of the contaminant source investigation on the site. Subsurface soil samples will be collected from grade to the soil-groundwater interface, which is approximately 10-ft below existing grade (BEG) in 2-ft intervals to the terminating depth. Selection of soil samples for laboratory analysis will be based on the results of field screening activities.

Additional soil boring locations may be warranted based on an evaluation of field data. The installation of any additional soil borings will be performed in consultation with the NYSDEC. The soil sample collection procedures that will be followed are referenced in Section 4.2 of the QAPP.

Based on the field sample classification and observations, soil samples collected from the soil borings will be analyzed by a laboratory. The soil samples to be collected for ELAP certified laboratory analysis will be preserved in the field with ice, properly transported to the selected laboratory and analyzed in accordance with USEPA Test Method 8260 for volatile organic analytes, USEPA Test Method 8270 for semi-volatile organic analytes, and USEPA Test Method 6010 for heavy metals and inorganic analytes (including titanium). The laboratory analysis results will be reported with NYSDEC Analytical Sampling Protocol (ASP) B deliverables.

Another site inspection will be conducted inside the building at the time of the RI field work to identify any additional (previously unidentified) potential contaminant sources or pathways (i.e. drains). Debris and garbage within the building will be removed prior to the inspection. Any steel drums or paint cans on the site will be removed and disposed of off-site to prevent potential hazard leakage and/or spills.

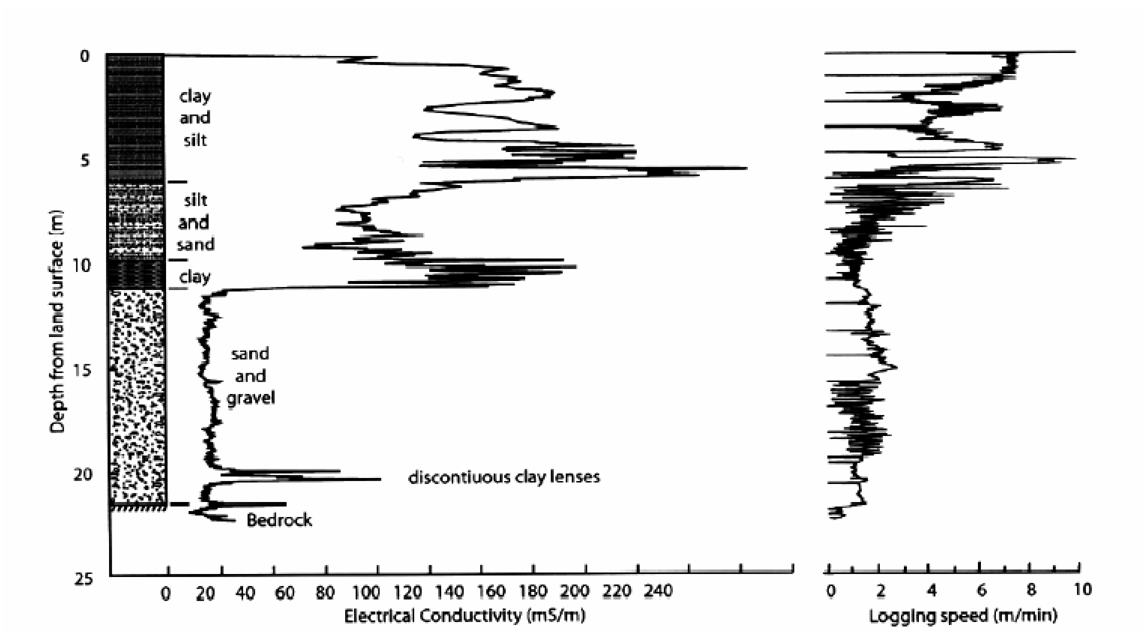
3.4 Site Hydrogeological Characterization

3.4.1 Hydrostratigraphic Survey

Direct-push electrical conductivity (EC) logging will be conducted on the Site to map the lateral continuity of layers with non-negligible clay content and to further define contaminant flow and transport at the Site. The electrical conductivity of unconsolidated materials is a function of the moisture content of the material and the conducting properties of the pore fluids and sediments. In the saturated zone, where variations in moisture content are small, fluid and matrix properties are the major factors. In formations where variations in ground water chemistry are small, differences in sediment size and type are the dominant control on electrical conductivity. The electrical conductivity associated with sedimentary materials varies with particle size and mineral species. Silt and sand-sized particles of covalently bonded minerals, such as quartz, mica, and feldspar, are generally nonconductive. For this reason, electrical conductivity in sand and gravel aquifers primarily reflects variations in concentrations of dissolved constituents. Clay-sized particles, such as phyllosilicates, humic substances, and iron and manganese oxides and oxyhydroxides, tend to be highly conductive due to their extremely small size, relatively high surface area per unit volume, and charge characteristics. Thus, in formations where clay-sized particles are present, both lateral and vertical variations in lithology may be assessed using EC logs.

3.4.2 Direct-Push EC Logging

Direct-push EC logging is similar to other electrical logging methods in which the apparent electrical conductivity of an interval is calculated as an imposed current passes through it. However, the direct-push method does not require a preexisting well or borehole. Thus, high-resolution information can be obtained without the bias produced by borehole fluids or changes in borehole diameter. In direct-push EC logging, a sensor attached to the end of a steel probe rod is driven into the subsurface using a percussion hammer and a hydraulic slide. As the EC probe is advanced, a current is applied to the two outer electrodes and voltage is measured across the two inner electrodes. Given the applied current and the measured voltage, electrical conductivity is calculated to produce a log of electrical conductivity versus depth. The small electrode spacing allows the sensor to resolve thin units and sample a small lateral radius (5 to 10 cm). Data are collected every 0.015 m and a potentiometer mounted on the mast of the direct-push unit tracks the depth and speed of advancement of the probe. Previous work has shown that direct-push electrical conductivity (EC) logging can provide information about site hydrostratigraphy at a scale of relevance for contaminant transport investigations in many unconsolidated settings. The following graphs provide an example of the data output for EC logging using the Geoprobe FC4000 field instrument.



Series of direct-push EC logs can be used to map the lateral continuity of layers with non-negligible clay content. Logs of electrical conductivity, however, can be significantly affected by a variety of additional factors, most notably fluid chemistry and moisture content. Supplementary information, such as cores and water samples, must therefore be used to help interpret EC logs at a particular site.

3.4.3 EC Logging Frequency and Locations

Direct-push EC logging will be conducted using a Geoprobe hydraulically powered probing tool. A total of 2 EC logging probes are proposed to be installed on and off the Site (EP-1 and EP-2). If feasible, the EC logging probes will be installed to a depth that is interpreted to represent a potential confining layer. The EC logging probes will be positioned in the same locations as the proposed permanent monitoring wells. The proposed locations of the EC logging probes can be referenced with **Figure 4**.

3.4.4 Grouting Bore Holes

Subsequent to the completion of each EC probe installed during the remedial investigation (prior to retracting), bottom-up grouting of the borehole will be conducted to grade using expendable dipole probes in conjunction with a pressurized grouting. The grouting system is designed specifically for direct push applications. With powerful reciprocating (piston) pumps, the Geoprobe Grout pump will deliver a standard grout slurry through 1.25-inch diameter Geoprobe probe rods. The pump is rated at 1000 psi with flow rates from 0.9 to 2.3 gpm.

3.5 Soil Characterization Boring

At the completion of the EC Logging process, two soil characterization borings are proposed to be installed in vicinity to EP-1 and EP-2 to confirm the result of the EC logging. Soil borings will be identified as SP-1 and SP-2. **Figure 4** depicts the proposed location of these borings on the Site. These soil borings will be installed prior to the installation of the permanent monitoring wells. The collection of subsurface soil samples will be performed utilizing discrete sampling techniques with a Geoprobe 6600. Subsurface saturated soil samples will be collected in depth intervals every 10-ft starting from depths of approximately 10-ft (soil-groundwater interface) to a depth extending to a confining layer. Sampling depths may be modified in the field based on the EC logging results. Additional soil boring locations may be warranted based on an evaluation of field data. The installation of any additional soil borings will be performed in consultation with the NYSDEC. The soil sample collection procedures that will be followed are referenced in Section 4.2 of the QAPP. The soil borings will be backfilled from the bottom-up with cement/bentonite grout. The bentonite cement/bentonite grout will consist approximately 94 lbs of cement, 3 to 5 lbs of bentonite and 6.5 gallons of clean water.

The subsurface soil samples collected from the soil borings will be classified in the field in accordance with the Unified Classification System. The classification of soils in the field will support well construction specifications. In addition, soil samples may be selected for index analysis (grain size) to verify visual classifications.

Based on the field sample classification and observations, saturated soil samples collected from the soil borings may be analyzed by a laboratory. If saturated soil samples are collected for ELAP certified laboratory analysis, they will be preserved in the field with ice, properly transported to the selected laboratory and analyzed in accordance with USEPA Test Method 8260 for volatile organic analytes. In addition, these soil samples may be selected for index analysis (grain size) to verify visual classifications and percent moisture content. The laboratory analysis results will be reported with NYSDEC Analytical Sampling Protocol (ASP) B deliverables.

3.6 Discrete Groundwater Sampling

The installation of 9 groundwater profile borings is proposed at locations identified as GP-1 through GP-9 to vertical extent of contamination in the groundwater. **Figure 4** depicts the proposed location of these borings on the Site. Discrete groundwater samples will be secured from depths of approximately 10-ft BEG in intervals every 20-ft to a depth extending to a confining layer or where discrete water samples indicate groundwater quality is within delineation criteria. The groundwater samples will be analyzed by an ELAP certified laboratory with an expedited turnaround to facilitate field decisions. The laboratory analysis will consist of USEPA Test Method 8260 for volatile organic analytes, USEPA Test Method 8270 for semi-volatile organic analytes, and USEPA Test Method 6010 for heavy metals and inorganic analytes (including titanium).

The collection of discrete groundwater samples will be performed using a temporary well point Geoprobe SP-15 stainless steel screen in conjunction with the soil borings. The discrete water sampling depths may be slightly modified in the field based on an evaluation of the soil boring data (i.e. above apparent clay layers). The groundwater sampling procedures are referenced in Section 4.2 of the QAPP.

The soil borings will be backfilled from the bottom-up with cement/bentonite grout. The bentonite cement/bentonite grout will consist approximately 94 lbs of cement, 3 to 5 lbs of bentonite and 6.5 gallons of clean water.

3.6.1 Hydrostratigraphic Mapping

The results of the soil borings and discrete water sampling will be utilized for mapping the lateral continuity of any significant confining unit(s) or layer(s) within the underlying aquifer(s) at the Site. The data obtained during the investigation will be presented on two-dimensional contour maps.

3.7 Groundwater Monitoring Wells

A permanent groundwater well network will be installed at the Site for monitoring contaminant fate and transport; and determination of site-specific groundwater flow direction. The wells will be installed based on results of the site characterization activities referenced in Section 3.3. The placement and specifications of the wells will proposed in a subsequent monitoring well plan.

4. Quality Assurance Procedures Plan

The quality assurance procedures plan for the Site is intended to establish specific procedures that will be followed during the remedial investigation to ensure the quality and reliability data. The procedures outlined in this plan are specific to the activities proposed within this remedial investigation work plan. Additional quality assurance procedures may be provided in the future relating to activities outside the scope of this plan.

4.1 Organizational Responsibility

The following table provides a list of personnel related to the project that will be involved with the quality assurance procedures plan.

Title	Name
Project Manager, Impact Environmental	Kevin Kleaka
Quality Assurance Officer, Impact Environmental	Wenqing Fang
Field Operations Leader, Impact Environmental	Hal Benjamin
Project Manager, NYSDEC	Chek Beng Ng

4.1.1 Project Manager

The Project Manager will be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project.
Specific duties will include:

- Coordinating the activities of subcontractors, to include informing them of the required PPE and insuring their signature acknowledging this Site Safety Plan;
- Selecting a Site Health and Safety Officer and field personnel for the work to be undertaken on site;
- Ensuring that the tasks assigned are being completed as planned and on schedule;
- Providing authority and resources to ensure that the Site Health and Safety Officer is able to implement and manage safety procedures;
- Preparing reports and recommendations about the project to clients and affected personnel;
- Ensuring that persons allowed to enter the site (i.e., EPA, contractors, state officials, visitors are made aware of the potential hazards associated with the substances known or suspected to be on site, and are knowledgeable as to the on-site copy of the specific site safety plan;

- Ensuring that the Site Health and Safety Officer is aware of the provisions of this site safety plan and is instructing all personnel on site about the safety practices and emergency procedures defined in the plan;
- Ensuring that the Site Health and Safety Officer is making an effort to monitor site safety, and has designated a Field Operations Leader to assist with the responsibility when necessary.

4.1.2 Quality Assurance Officer

The Quality Assurance Officer (QAO) is an employee of the same consulting firm generating the work plan and acts in conjunction with the project manager to develop a site-specific quality assurance plan.

The QAO will assist the project manager in the development of the sampling and analytical portion of the Quality Assurance Project Plan. The QAO or his/her designee shall conduct periodic field and sampling audits, interface with the analytical laboratory to make requests and resolve problems, interface with the data validator and develop a project-specific data usability report.

4.1.3 Field Operations Leader

The Field Operations Leader will be responsible for field operations and safety. Specific duties will include, but are not limited to:

- Managing field operations;
- Executing the work plan and schedule;
- Enforcing safety procedures;
- Coordinating with the Site Health and Safety Officer in determining protection levels;
- Enforcing site control;
- Documenting field activities, including sample collection;
- Serving as liaison with public officials where there is no Public Affairs official designated.

4.2 Field Procedures

The sampling that will be conducted on the site will consist of soil and groundwater sampling. The activities associated with the remedial investigation will be performed by or under the auspices of a Quality Assurance Officer. The sample staff (samplers) will possess a minimum of a BA Degree in the Earth, Space or Biological Sciences or a BS Degree in Engineering. Samplers will have a minimum of one (1) year experience in environmental/geological fieldwork. Additionally, all samplers will have received mandatory forty-hour Occupational Safety and Health Administration (OSHA) training on working with potentially hazardous materials and appropriate Hazard Communication Program and "Right-To-Know" training.

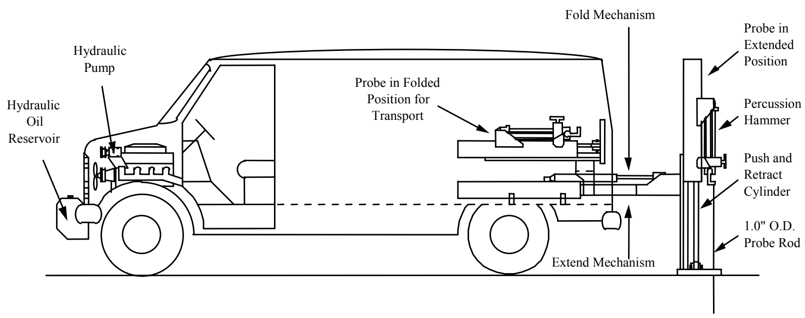
4.2.1 Decontamination Procedures

Prior to arrival on the Site and between boring/ well locations, all sampling tools relating to auger or drilling equipment will be decontaminated using the following methods: 1) remove all adherent soil material with stiff bristle brush; 2) wash with a laboratory grade glassware detergent or Alconox; 3) steam clean interior and exterior of the screened auger sampler and all associated augers; 4) allow to air dry. Decontamination waste water will be contained, tested and passed through a granular activated carbon treatment system (if possible) and tested prior to disposal. A decontamination pad will be constructed on the Site for this purpose.

4.2.2 Subsurface Probe Installation

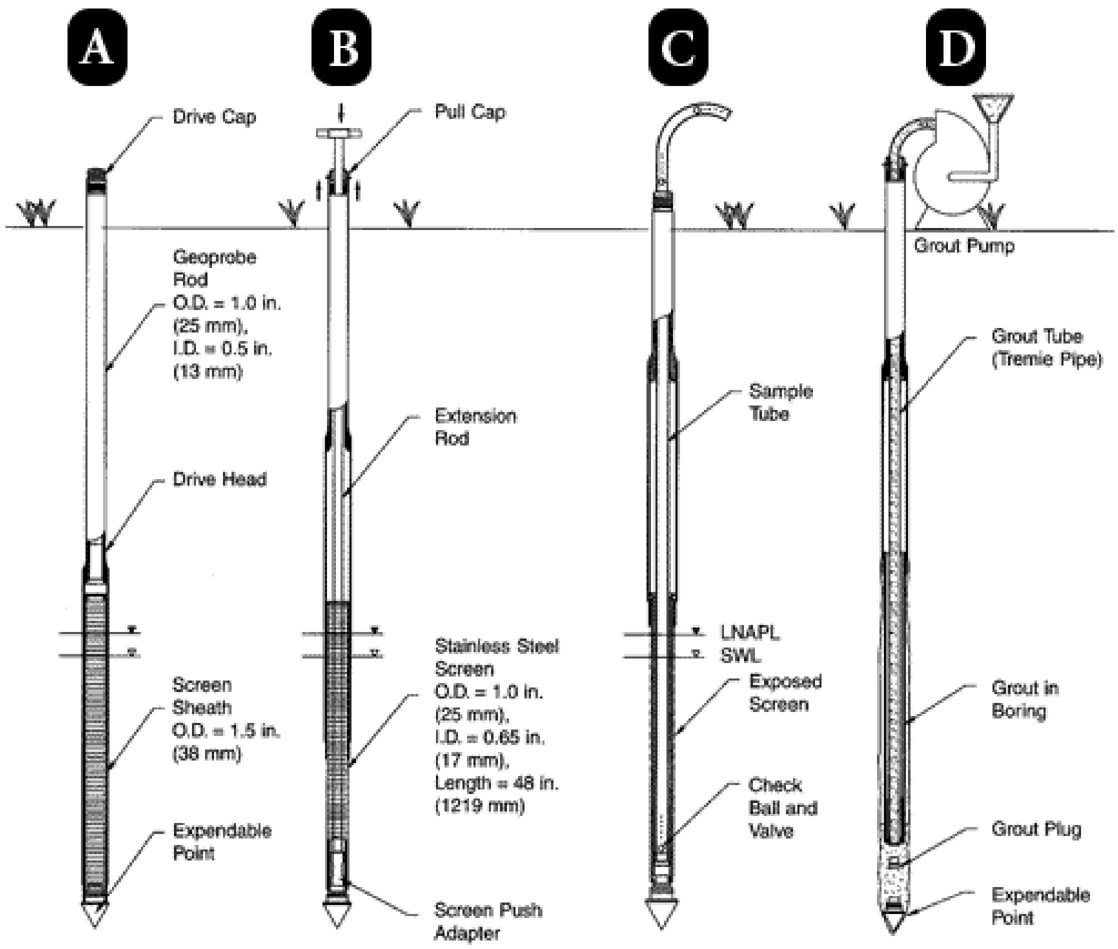
Subsurface probes will be installed using a Geoprobe hydraulically powered probing tool. Mechanized, vehicle mounted probe systems apply both static force and hydraulically powered percussion hammers for tool placement (static down forces up to 18,000 pounds combined with percussion hammers of eight horsepower continuous output). Recovery of large sample volumes will be facilitated with a probe-driven sampler. The probe-driven sampler consists of a hollow probe that opens via a remote control mechanism at the selected sampling depth in the soil profile to allow soil to enter as it is advanced. Discrete media samples will be secured at the desired depths and will be contained within a non-reactive transparent plastic sleeve that lines the hollow probe. The plastic sleeves will be removed for subsequent inspection and sample aliquot acquisition. Field measurements will be secured for each split spoon sample prior to collection to ensure accurate sample depths.

Geoprobe Operating System



4.2.3 Temporary Well Point Sampling

The groundwater sampling system that will be used is the Screen Point 15 that is designed to accurately collect grab samples of groundwater. The Screen Point 15 uses a screen with a standard slot size of 0.004 inches that is sealed inside a 1.5-inch ID alloy steel sheath as it is driven to depth. The screen is sealed inside the sheath with Neoprene O-rings, which prevents infiltration of formation fluids until the desired depth is attained. When the screen has been driven to the depth of interest in the formation, extension rods are used to hold the screen in position as the driving rods are retracted approximately 4 feet. The 4-foot long sampler sheath forms a seal above the screen as it is retracted. A total of 41.5 inches of slotted screen is placed into contact with the formation. The Screen Point 15 groundwater sampler has a total boring diameter of 1.5 inches and the outside diameter of the screen is 1.0 inch. This provides for a maximum of 0.25 inches between the screen and the natural formation as the sampler sheath is retracted. These conditions approach the ideal for natural formation development that can be conducted when lower turbidity samples are required. Each groundwater sample will be collected from the sampler utilizing 3/8-inch in diameter disposable tubing equipped with a bottom check valve. The tubing is extended from the surface down to the sampler. The tubing is oscillated in a controlled manner to avoid excessive turbulence that would result in a loss of volatile analytes from the sample. The collection will continue until the check valve has trapped an adequate volume to expunge three bore hole volumes, to develop the temporary well, before the groundwater sample is collected for analysis. The tubing is then removed and the water is poured into appropriate sample vessels for subsequent laboratory analysis.



4.2.4 Sample Characterization

A visual inspection of the soil samples collected for the hydrogeological study will be conducted to classify the sample media and identify changes in lithology. Color classifications will be made in accordance with the Munsell Classification System. Gradation classifications will be made in accordance with the Unified Soil Classification System.

4.2.5 Field Headspace Analysis

Headspace analysis will be performed on each of the acquired soil samples utilizing a portable photo ionization detection meter to measure what, if any, volatile hydrocarbon concentrations were present in isolated portions of the secured samples. Calibration of the PID will be conducted prior to sampling using a span gas of known concentration. Headspace analysis will be conducted by partially filling a wide-mouth glass container with sample aliquot and sealing the top with aluminum foil, thereby creating a void. This void is referred to as the sample headspace. To facilitate the detection of any hydrocarbons contained within the headspace, the container will be agitated for a period of thirty (30) seconds. The probe of the vapor analyzer will then be injected through the foil into the headspace to measure the hydrocarbon concentrations present. A Photovac Micro-Tip, photo ionization detection meter (PID) will be the organic vapor analyzer selected for the headspace analysis. A PID utilizes the principle of photo ionization for detection and measurement of hydrocarbon compounds. A PID does not respond to all compounds similarly; rather, each compound has its own response factor relative to its calibration. For this investigation, the PID will be calibrated to isobutylene for the compounds of concern. Hydrocarbon relative response factors for a PID calibrated to isobutylene are published by the manufacturer.

4.2.6 Sealing of Confining Layer

It is not anticipated that a significant confining layer will be penetrated during the installation of the soil borings and/or monitoring well installations. However, if a confining layer is breached, the bore hole will be backfilled from the bottom-up with cement/bentonite grout. The bentonite cement/bentonite grout will consist approximately 94 lbs of cement, 3 to 5 lbs of bentonite and 6.5 gallons of clean water.

4.2.7 Grouting Boreholes

Subsequent to the completion of each soil and groundwater probe installed during the remedial investigation, bottom-up grouting of the borehole will be conducted to grade. The grouting system was designed specifically for direct push applications. With powerful reciprocating (piston) pumps, the Geoprobe Grout Machines will deliver standard ASTM grout materials through 1.5-inch diameter Geoprobe probe rods. The pump is rated at 1000 psi with flow rates from 0.9 to 2.3 gpm.

4.2.8 Investigative Derived Wastes

Any waste material generated as part of the remedial investigation activities (i.e. drill cuttings, development water, decontamination water) will be properly containerized, tested and disposed of in accordance with NYSDEC regulations. Proper permitting and testing of the development waste water will be performed in accordance with the requirements of the Suffolk County Department of Public Works prior to disposal. If applicable, the development waste waster may be passed through a granular activated carbon system.

4.3 QA/QC Procedures

4.3.1 Standards, Criteria and Guidance's

The Standards, Criteria and Guidance's (SCGs) that will be applied for comparison of contaminant levels for the remedial investigation consist of the NYSDEC, 6 NYCRR Part 375, Environmental Remediation Programs Restricted-Residential Use Soil Cleanup Objectives, the NYSDEC, Technical Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Limitations and NYSDOH, Guidance for Evaluating Soil Vapor Intrusion in New York State. The sample media and corresponding SCGs to be used for this investigation will be as follows.

Media	Applicable SCGs	Classification
Groundwater	NYSDEC Technical Operational Guidance Series (TOGS) 1.1.1.	Ambient Water Quality Standards and Guidance Values-Class GA
Soil	NYSDEC 6 NYCRR Part 375, Environmental Remediation Programs	Restricted-Residential Use Soil Cleanup Objectives
Indoor Air	NYSDOH, Guidance for Evaluating Soil Vapor Intrusion in New York State	Decision Matrix 2, EPA Databases

4.3.2 Data Validation

Data validation is the process used to determine if the available data satisfies the project Data Quality Objectives (DQOs). The frequency and scope of the data validation process may vary, but should always be consistent with project DQOs. Data validation and review will be conducted by the Quality Assurance Officer and presented within a NYSDEC Department of Environmental Remediation (DER) Data Usability Summary Report (DUSR). The DUSR will determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. The data packages will be evaluated by a third party according to the DER DUSR Guidelines, Revised 9/97. A resume of the third party is provided in **Appendix B**.

4.3.3 Analytical Deliverables

The laboratory analytical results will be reported in a Quarterly Monitoring Report to the NYSDEC with Analytical Sampling Protocol (ASP) B deliverables. In addition, the deliverables will be provided by the laboratory in accordance with EPA Region 1 in electronic data deliverable format.

4.3.4 Sample Frequency and Preservation

The following table summarizes the proposed sample matrix, frequency, USEPA Test Methods, QA/QC deliverables and preservatives for the proposed plan. The appropriate quantity of field blanks, trip blanks will be analyzed as part of the proposed plan.

Sample Matrix	Test Method	Parameters	Container	Preservation	Holding Times	Laboratory
Sub-Slab (air)-Analysis	TO-15	ELAP-ASP A	6-L Summa	Summa-NA	15 days	Accutest
Indoor/Outdoor Air-Analysis	TO-15	ELAP-ASP A	6-L Summa	Summa-NA	15 days	Accutest
Soil- Analysis	8260	ELAP-ASP B	2 or 4oz glass jar	Ice	7 days	Chemtech
	8270bn	ELAP-ASP B	2 or 4oz glass jar	Ice	14 days	Chemtech
	6010	ELAP-ASP B	2 or 4oz glass jar	Ice	30 days	Chemtech
Groundwater - Analysis	8260 w/ low MDL	ELAP-ASP B	40 mil glass voa	HCL/Ice	7 days	Chemtech
	6010	ELAP-ASP B	40 mil glass voa	HCL/Ice	14	Chemtech

4.3.5 Field Blanks

A field blank is a sample of analyte-free water transferred, at the project site, into an appropriate container for the purpose of distinguishing ambient air contamination from in-situ sample contamination. Field blanks are used to indicate potential cross contamination from sampling equipment as quality control of decontamination procedures. With regards to field sampling, one field blank will be collected for every work day. The procedure for obtaining a field blank sample are as follows:

- Collect two sets of sample vessels. One vessel shall contain analyte free water and the other is empty.
- Run the analyte free water through the decontaminated sampling equipment into the empty vessel. Analye the water of this collecting vessel for target analytes.

4.3.6 Trip Blanks

A trip blank is used to identify the presence of volatile compound contamination attributable to transfer across a sample container septum during shipping and storage of samples. A trip blank is a sample of analyte-free matrix that is transported from the laboratory to the sampling site with the sample containers. The trip blank is stored on-site with the sample containers and field samples and then transported back to the laboratory with the samples for analysis. The trip blank is received and processed as a sample by the laboratory. One trip blank shall be submitted per cooler from laboratory personnel. The holding time for the trip blank in the field shall be 7 days.

4.3.7 Duplicate Samples

Duplicate samples will be collected to verify QA/QC data accuracy at the selected laboratory. One duplicate sample will be analyzed for every twenty samples submitted to the laboratory.

4.3.8 Sample Transfer

Samples shall be containerized and immediately transferred within a cooler with minimal disturbance. Chain-of-custody forms will be completed at the time of sample collection and will accompany the samples inside a cooler for transfer from sample team to mobile laboratory representatives.

4.3.9 Sample Containers and Analytical Requirements

All sample vessels will be "level A" certified decontaminated containers supplied by a New York State Certified Commercial Laboratory. Samples analyzed for hydrocarbons will be placed in containers with Teflon lined caps. All samples will be preserved by cooling them to a temperature of approximately four degrees Celsius. If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur. Necessary preservatives will be placed in the sample bottles by the laboratory. The sample bottles will be handled carefully so that preservatives and glassware are not inadvertently spilled. All liquid samples will be put into 40-ml glass vials with Teflon liners.

4.3.10 Chain-of-Custody Protocol

The primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. Sample custody for samples collected during the investigation will be maintained by the field personnel collecting the samples. Field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are transferred to the laboratory.

4.4 Record Keeping and Documentation Procedures

4.4.1 Sampling Documentation

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

4.4.2 Sample Tracking System

In order to provide for proper identification in the field, and proper tracking in the laboratory, all samples must be labeled clear and in a consistent fashion using the procedures and protocols described below and with the following subsections. Sample labels will be waterproof and have a pre-assigned, unique number that is indelible. Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities shall be sequentially recorded at a later time. The notebook, along with the chain of custody form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time. Each sample shall have a corresponding notebook entry that includes:

- Sample ID number
- Well location and number
- Date and time
- Analysis for which sample was collected
- Additional comments as necessary
- Sampler's name

Each sample must have a corresponding notebook entry on a chain-of-custody form. The manifest entry for sampling at any one location is to be completed before sampling is initiated by the same sampling team at any other location. In cases where the samples leave the immediate control of the sampling team, the samples must be sealed.

4.4.3 Sample Identification System

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

Sample identifications shall contain a sequential code consisting of three segments. The first segment shall designate the project number. The second segment shall identify the location type. Location types shall be identified by a two-letter code. For example, MLW will be used for multi-level well. The third segment shall identify the specific sample location. The specific sampling location shall be identified using a three-digit number.

APPENDICES

APPENDIX A

HEALTH AND SAFTEY PLAN

APPENDIX B

THIRD PARTY DATA VALIDATION
RESUME

FIGURES

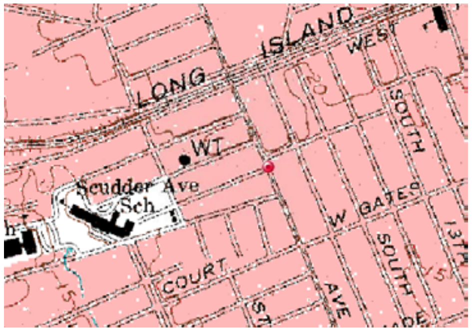
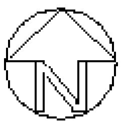


Figure 1: Site Location Map

BCP Site Code # C152201

1305 South Strong Avenue
Copiague, New York



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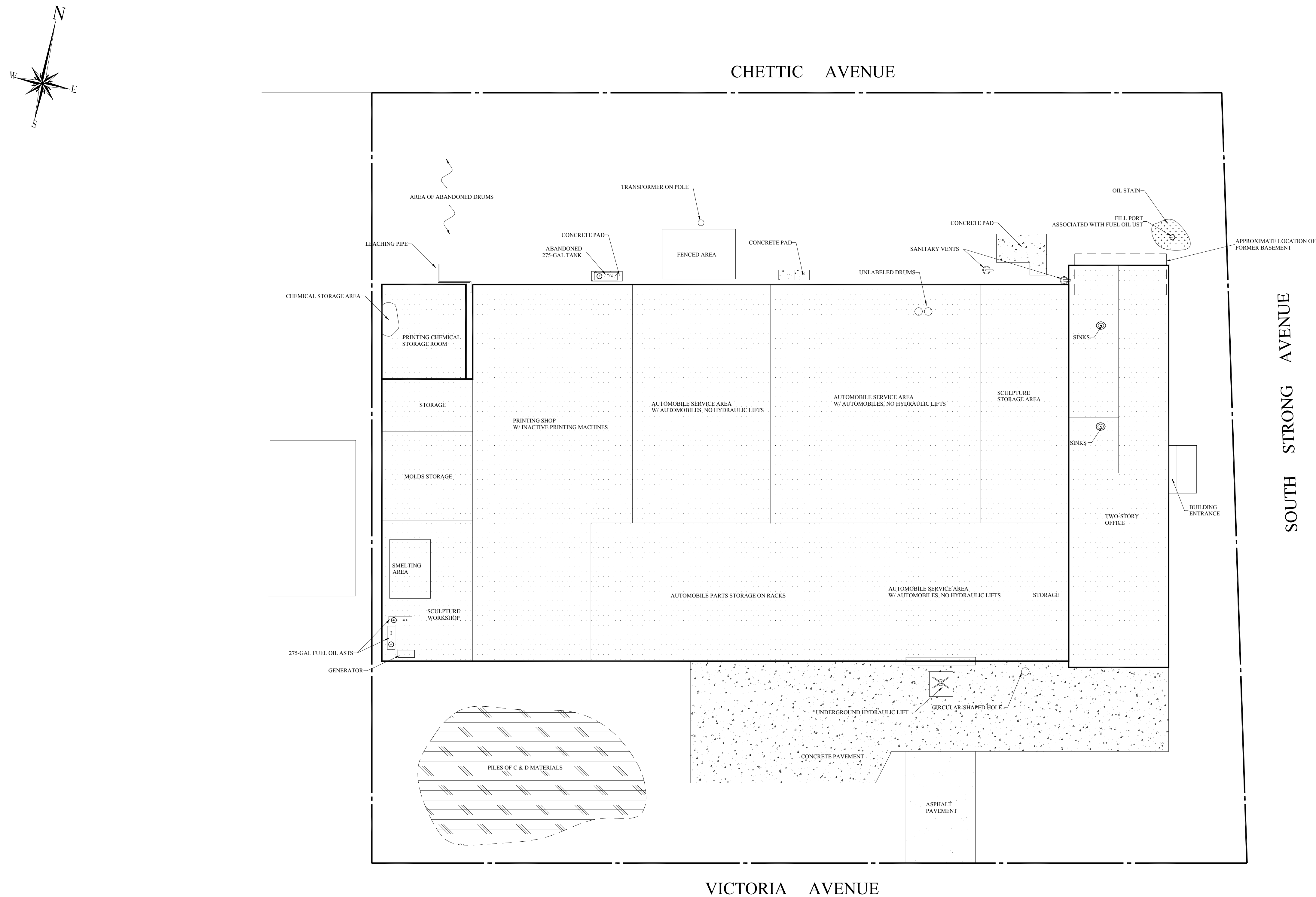
New York State Geographic Information System
2007 Half Foot Natural Color Long Island Zone

TITLE				
WATER TABLE CONTOUR MAP 1305 SOUTH STRONG AVE COPIAGUE, NY LEVEY PROPERTY				
PREPARED FOR NYSDEC SITE No. 1-52-201				
ERM Environmental Resources Management			SCALE 1"=40'	FIGURE 3-1
DRAWN: EFR/EMF	JOB NO.: 0039956	FILE NAME: 0039956-00-006	DATE 8/30/96	



PROJECT # 06-013

PLATE # 03

Scale in Feet: 10 5 0 10 20

TITLE: **Site Inspection Diagram**

1305 S. Strong Avenue
Copiague, New York

DRAWN BY:	WF
CHECKED BY:	KK
DATE:	2/3/2006
SCALE:	1" = 30'

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LEGEND

- Contaminant Source Probe
- EC Logging Probe
- Soil Profile Probe
- Temporary Groundwater Profile Well
- Approximate Location of Abandoned Cesspool (according to ERM report)

PROJECT # 06-013

PLATE # 04

Scale in Feet: 10 5 0 10 20

TITLE: **Sampling Acquisition Plan**

1305 S. Strong Avenue
Copiague, New York

DRAWN BY:	WF
CHECKED BY:	KK
DATE:	2/3/2006
SCALE:	1" = 30'

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