REMEDIAL INVESTIGATION/ FEASIBILITY STUDY INTERIM REMEDIAL MEASURES WORK PLAN

Dec 6, 1999

Ron Hill Dry Cleaners Site
(Registry No. 1-30-071)
71 Forest Avenue
Glen Cove, Nassau County, New York

December 6, 1999

Prepared for:

Mr. Richard Sills

Prepared by:

ROUX ASSOCIATES, INC.
1377 Motor Parkway
Islandia, New York 11788

ROUX

SIL74701Y.103/CV

CONTENTS

1.0 INTRODUCTION 1

2.0 SITE BACKGROUND 3

3.0 REGIONAL AND BACKGROUND INFORMATION 4

4.0 REMEDIAL INVESTIGATION/INTERIM REMEDIAL MEASURE (RI/IRM) SCOPE OF WORK 5
- 4.1 Investigation Tasks 6
  - 4.1.1 Task 1: Background Information Review 6
  - 4.1.2 Task 2: Aerial Photograph Review 7
  - 4.1.3 Task 3: Geophysical Survey 7
  - 4.1.4 Task 4: Ambient Air Sampling 7
  - 4.1.5 Task 5: Soil Vapor Survey 9
  - 4.1.6 Task 6: Shallow Soil Investigation using Geoprobe™ 9
  - 4.1.7 Task 7: Deep Soil Borings 11
  - 4.1.8 Task 8: Vertical Ground-Water Profiling 12
  - 4.1.9 Task 9: Install Downgradient Wells 13
  - 4.1.10 Task 10: Gamma Logging of New and Existing Wells 14
  - 4.1.11 Task 11: Sampling of New and Existing Monitoring Wells 15
  - 4.1.12 Task 12: IRM Evaluation 16
  - 4.1.13 Task 13: Remedial Investigation and IRM Evaluation Report 16
  - 4.1.14 Task 14: Implementation of the IRM 18
- 4.2 Decontamination 18
- 4.3 Investigation Derived Wastes 19

5.0 ESTIMATED IMPLEMENTATION SCHEDULE 20

FIGURES

1. Site Location Map
2. Site Plant With Existing Groundwater Monitoring Wells and Existing Vapor Extraction Wells
3. Proposed Soil Gas Sampling and Shallow Soil Boring Locations
4. Proposed Deep Soil Boring and Vertical Ground Water Profile Location
5. Monitoring Well Location

APPENDICES

A. Quality Assurance Project Plan
B. Site-Specific Health and Safety Plan
C. Dvirka and Bartilucci RI/FS Work Plan

1.0 INTRODUCTION

Roux Associates, Inc. has been retained by Mr. Richard Sills to conduct a Remedial Investigation (RI), Feasibility Study (FS), and Interim Remedial Measures (IRM) Study, at the Ron Hill Dry Cleaners Site (Registry No. 1-30-071) located at 71 Forest Avenue, Glen Cove, Nassau County, New York (Site). Mr. Sills was a subleasee and operator of the former dry cleaning business at the Site which has subsequently been identified by the New York State Department of Environmental Conservation (NYSDEC) as a potential source for chlorinated organic carbon compounds detected in ground water in the vicinity of the Site.

Based on the detection of tetrachloroethylene (PCE) and related compounds in ground water and soil at the site, the NYSDEC have initiated the development of an RI and Feasibility Study (FS) Work Plan by one of its stand-by environmental contractors (Dvirka & Bartilucci Engineers [D&B]). The RI/FS initiated by the State was intended to delineate conditions at the Site, determine the extent of contamination offsite, and evaluate and identify a remedy to address all impacted media. The D&B Work Plan provided the necessary scope of work to implement the RI/FS and was finalized and was in the process of being formally approved by the NYSDEC in July 1999.

In August 1999, Mr. Sills agreed to assume responsibility for implementation of the RI/FS. It was agreed that:

- The original RI/FS Work Plan scope with modifications would be implemented by Roux Associates;
- The RI scope would be completed in a phased manner with the initial phase focusing on delineation of all onsite soil contamination and the completion of a single ground-water monitoring transect relatively close to the site to begin the process of delineating the VOC plume. Additionally the initial RI phase would include an evaluation of the existing IRM (a four well SVE system) and an upgrade of the IRM to an air sparging system, if appropriate; and
- The second phase of the RI would include investigation of the off-site VOC plume and potential upgradient sources. The FS will be conducted following the second phase of the RI.

This document is a revision to the D&B Work Plan and includes the tasks for the initial project activities (i.e., Background Information Review, Air Photo Review), investigation of on site soil contamination and IRM evaluation and upgrade. The D&B Work Plan is included in Appendix C. A supplement to this Work Plan will be prepared for the Phase Two RI and FS.

In developing this revision to the D&B Work Plan, Roux Associates has incorporated all of the technical activities from the original Work Plan (with the exception of the Fracture Trace Analysis) and, in some cases, field efforts have been expanded. Tasks, in some cases, have been combined in an attempt to streamline the organization of the project. This document includes all of the sections from the original but where appropriate the D&B Work Plan has been cited rather then repeat text that is unchanged.

2.0 SITE BACKGROUND

To avoid redundancy, the reader is referred to the Site background section of the initial RI/FS work plan developed by D&B. A copy of the D&B Work Plan is provided in Appendix C of this work plan.

3.0 REGIONAL AND BACKGROUND INFORMATION

To avoid redundancy, the reader is referred to the Regional and Background section of the initial RI/FS work plan developed by D&B. A copy of the D&B Work Plan is provided in Appendix C of this work plan.

4.0 REMEDIAL INVESTIGATION/INTERIM REMEDIAL MEASURE (RI/IRM) SCOPE OF WORK

This RI/IRM Scope of Work includes 14 discrete tasks that will be performed in a logical and sequential manner. The proposed tasks will be performed to satisfy the following objectives:

- determine the source(s) and extent of PCE contamination in onsite soil;
- assess the exposure potential for human and environmental receptors at the Site;
- delineate the three dimensional extent of the PCE plume in one transect located downgradient from the site;
- evaluate the suitability of the existing IRM to effectively address current environmental conditions in the subsurface at the Site;
- document the findings from the RI, and IRM evaluation in a comprehensive summary report; and
- implement the plans for an IRM upgrade, if appropriate.

The 14 tasks are described in the following sections.

This work plan also includes the attached Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) to provide additional details of the field activities and methodologies proposed for the various Site activities that are described below. The HASP and the QAPP are provided in Appendixes A and B, respectively. The objectives, field methodologies and analytical parameters (as appropriate), which will be performed for each task are outlined below. The following two tasks will be implemented prior to initiating subsequent field activities.

- Task 1: Background Information Review; and
- Task 2: Aerial Photograph Review.

The RI field and reporting activities will consist of the following tasks:

- Task 3: Geophysical Survey;
- Task 4: Ambient Air Sampling;
- Task 5: Soil Vapor Survey;

- Task 6: Shallow Soil Investigation Using Geoprobe™;
- Task 7: Deep Soil Investigation;
- Task 8: Vertical Ground-Water Profiling;
- Task 9: Install Downgradient Monitoring Wells;
- Task 10: Gamma Logging of New and Existing Wells;
- Task 11: Sampling of New and Existing Monitoring Wells;
- Task 12: IRM Evaluation;
- Task 13: On-Site Remedial Investigation and IRM Evaluation Report; and
- Task 14: Implementation of the IRM.

As stated previously, the scope of the on-site RI/IRM tasks had been developed based on a review of existing information and had previously been defined in the NYSDEC-approved comprehensive RI/FS Work Plan.

4.1 Investigation Tasks

The 14 tasks that constitute the scope of work (as listed above) are described in detail below.

4.1.1 Task 1: Background Information Review

This task will involve obtaining and reviewing Site background information including building plans, as-built drawings, underground utilities, sewer connections, etc. Requests for this information will be submitted to local, state and federal agencies through the Freedom of Information Act (FOIA). The City of Glen Cove, and local utility companies will also be contacted to identify and obtain, if possible, additional Site-specific background information. The purpose of this task is to identify potential subsurface migration pathways and potential impediments to subsequent intrusive investigations. The results and findings from this task will be used to develop an understanding of subsurface features which may have been related to

potential releases and/or migration of potential surface or subsurface releases at the Site. The findings from this task will be used to guide selections of subsequent subsurface sampling locations.

4.1.2 Task 2: Aerial Photograph Review

Roux Associates will obtain and review available aerial photographs showing the layout of the property and surrounding area prior to operations of the Ron Hill Dry Cleaners through the ensuing periods to near-present. The aerial photographs obtained will be reviewed to identify activities and structures, land use practices, and potential waste disposal locations at the Site and surrounding properties. Depending on the scale of the photographs, enlargements of select photographs may be obtained during the course of the RI. A summary of the review and interpretation of each aerial photograph will be included in the RI report. The results of this task will be used to help focus subsequent investigation tasks.

4.1.3 Task 3: Geophysical Survey

A geophysical survey of the Site will be performed to identify and confirm the locations of existing subsurface utilities that may have acted as preferential pathways for contaminant migrations and or impede intrusive activities. The geophysical survey will be performed using a magnetometer (to the extent practicable) and ground-penetrating radar (GPR) and include the asphalt-covered parking lot, driveway," and areas surrounding the building. The geophysical survey will rely primarily on the results of the GPR, as GPR technology can 'see' to greater depths than the magnetometer and is less prone to interference.

The GPR survey will entail traversing the paved surfaces, as well as the vegetated surfaces (if suitable to the GPR). The results will be plotted on a scaled site map showing known locations of existing utilities.

4.1.4 Task 4: Ambient Air Sampling

A total of four ambient air samples will be collected in and around the building formerly operated as the Ron Hill Dry Cleaners. Currently, the facility is operated by a Payless Shoe Retail Store. The intent of the air sampling and analysis program is to confirm the air quality inside the building is not being degraded by chlorinated volatile organic components of solvent

used at the site while it was operated as a dry cleaner. The contents of the store will be inventoried for products and material that could be sources of VOCs. The solvent commonly used at dry cleaners during cleaning operations is tetrachloroethene (PCE) and typically contains minor amounts of related chlorinated VOCs.

To evaluate the ambient air quality, air samples will be collected at a total of four locations using sorbent tubes containing coconut-shell charcoal or other suitable sorbent material. Three of the four locations will be located within the store and one location will be located at the air intake outside the building. One air sample will be collected at each in-store location. The sorbent tubes will be placed approximately five feet above the floor. The outside monitoring location will serve as a control for ambient concentrations (if any) outside the building. The actual sampling locations will be selected after review of floor plans for the building in its current layout and the layout when it was operated as a dry cleaners.

The air monitoring program described below was developed following the USEPA guidance "Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Sorbent Tubes with Subsequent Analysis by Gas Chromatography." The samples will be analyzed using National Institute of Occupational Safety and Health (NIOSH) analytical methods as described below. The ambient air sampling and analysis will be performed by North Atlantic Laboratories, Inc. of Bayshore, New York.

Overview of Air Monitoring Program

The sorbent tubes are packed with a material that absorbs VOCs. In brief, a known volume of air will be drawn through the sorbent tube using an air pump. The pump draws air through the canister at a rate of approximately 0.1 liter per minute over a period of approximately 2 to 3 hours. After this period the pump tubing is disconnected and the sample tube is capped, sealed and placed in a cooler containing ice in preparation for shipment to North Atlantic Laboratories, Inc. of Bayshore, New York for analysis. During analysis by the laboratory, the VOCs adsorbed to the carbon (if any) are eluted using liquid carbon disulfide (CS_2). The CS_2 eluent is injected directly to a GC/MS with electron capture detector (ECD), flame ionization detector (FID)

and/or other suitable detector. The samples will be analyzed for PCE, TCE, dichloroethene (DCE), dichloroethane (DCA), vinyl chloride and their respective isomers. In addition, two field blanks and one duplicate sample will be collected.

The samples will be analyzed using NIOSH Method 1003 (halogenated hydrocarbon compounds), Method 1007 (vinyl chloride), and Method 1022 (trichloroethylene).

4.1.5 Task 5: Soil Vapor Survey

A soil vapor survey will be performed to identify "hot spots" and to identify potential exposure risks from vapors. The soil vapor survey will be conducted at approximately 15 sampling points throughout the Site (i.e., 4 sampling points along the perimeter and 11 within the Site). The proposed sampling locations are shown on Figure 3. Prior to conducting the soil gas screening, the on-site soil vapor extraction system will be turned off. Samples will be collected from a depth of four feet below land surface (ft bls) through a hollow, stainless steel rod driven to depth using direct push, truck-mounted Geoprobe™ equipment. Once the rod is at the desired depth, the rod will be retracted approximately 0.5 feet to create a void allowing the soil vapor to accumulate and be sampled for the collection of soil vapor. The annulus around the top of the rod will then be sealed using hydrated bentonite to prevent outside air from being drawn into the borehole along the outside of the soil gas sample probe. This step will be performed to eliminate artificial dilution of volatile organic compounds (VOCs) concentrations (if any) in the soil gas by ambient air introduced as a result of the sample collection technique.

After the soil vapor sampling rod is driven to depth Teflon™ tubing will be lowered through the bottom of the rod and soil vapor will be extracted and screened using a photoionization detector (PID). The result of this task will be used to determine locations of hot spots (if any), the lateral extent of shallow surface soil (i.e., to an approximate depth of 8 ft bls) contamination, and to refine the proposed soil boring and monitoring well locations.

4.1.6 Task 6: Shallow Soil Investigation using Geoprobe™

A maximum of 30 shallow soil borings will be performed using Geoprobe™ drilling equipment to identify hot spots and potential source areas (if any) in shallow soil (i.e., approximately 8 ft bls) across the Site. The proposed shallow borings are shown on Figure 3, however, the actual

locations will be selected in the field based the results of Tasks 1 through 4. Approximately three to five borings will be angled borings along the north and west building walls. The angled borings will be performed in an attempt to characterize soils beneath the former earthen trenches. Generally, all of the borings will be positioned to provide adequate coverage of the areas of the Site where contamination is most likely to be encountered, as well as to determine the areas of the Site which have not been impacted.

Soil borings will be advanced using direct-push Geoprobe™ equipment. A continuous soil core will be collected from ground surface to a depth of eight feet below ground surface using a four-foot-long, stainless steel tube lined with a dedicated polyethylene liner. If extensive subsurface obstructions (e.g., glacial boulders, buried concrete, etc.) that prevent the advancement of the boring to 8-ft bls then an alternative soil boring location will be selected in the field.

Two soil samples will be collected from each two-foot interval. One sample will be placed in a sealable plastic bag or a clean glass sample jar that will then be sealed using aluminum foil. The second sample will be placed in a laboratory-supplied sample jar, sealed, labeled, and placed in a cooler for storage. The soil samples in the sealed plastic bag or the jar sealed with aluminum foil will be allowed to stand for approximately one-minute, to allow VOCs in the soil to collect in the headspace of the bag or jar. The headspace will then be screened in the field for VOCs using an organic vapor analyzer equipped with a PID. Soil from the interval with the highest PID reading will be selected for shipment to an analytical laboratory for analysis of VOCs. If no VOCs are detected, a sample from the four to six foot interval will be sent to the lab for a confirmatory analysis. Confirmatory samples will be omitted in areas where no contamination is likely to be encountered. The sample jars containing soil from the intervals which were not selected (i.e., did not have the highest PID reading) will be discarded. Soil samples will be analyzed for VOCs using ASP Method 95-1. The analytical results for VOCs in the soil samples will be compared to the ground-water protection soil cleanup criteria listed in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046.

In addition to the field screening of the soil samples for VOCs (as described above) the soil lithology will be described and will also be evaluated for physical evidence of contamination (i.e., odor, staining, separate-phase product, etc.). All field measurements and field observations and measurements will be recorded in a bound notebook.

4.1.7 Task 7: Deep Soil Borings

Up to four soil borings will be performed onsite to evaluate the vertical extent of impacted soil and groundwater, if any is encountered, relative to the potential source area. Three borings will be located in the source area and one boring will be located near existing well W-3. Exact boring locations will be determined subsequent to completion of Tasks 1 through 6. Preliminary locations are shown on Figure 4. Soil borings will be advanced to the saturated zone using a hollow-stem auger rig. However, based on historical operations at the Site and information from previous subsurface investigations, alternative drilling methods may be necessary if conditions warrant (i.e., encountering large glacial boulders, repeated auger refusal, etc.). The alternative will be either air-rotary or mud-rotary drilling methods.

Soil samples will be collected continuously using a two-foot-long split-spoon sampler from ground surface to the water table. During continuous sampling, a standard 140 pound drop hammer will be used to drive the split-spoon sampler and blow counts will be recorded for each six inches of advancement. Soil samples will be collected, screened in the field for VOCs, evaluated for physical evidence of contamination, and described lithologically, as described above in Task 6.

A maximum of four soil samples will be collected for laboratory analysis from each deep soil boring. Selection of samples will be based on PID results. In soil borings in which no elevated PID readings are observed, samples will be collected from 20, 40, and 60 ft bls as well as at the water table to confirm the absence of contamination. In soil borings with elevated PID readings, one soil sample will be collected from the intervals exhibiting the highest PID reading and the respective intervals above and below the apparently contaminated horizon.

Up to three soil samples per boring will be selected for analysis by an analytical laboratory. Selection of soil samples for laboratory analysis will be based on PID readings and field observations. Soil samples will be analyzed for VOCs using ASP Method 95-1.

In addition to the soil samples, two ground-water samples will be collected from each borehole using a Hydropunch™. Ground-water grab samples will be collected at five and fifteen feet below the top of the saturated zone. These data will be used to evaluate the vertical extent of VOCs in ground-water and assist in evaluating the potential for the presence of residual PCE as dense non-aqueous phase liquid (DNAPL) in the source area.

Upon completion of soil and ground-water sample collection, the boreholes will be tremie-grouted to approximately 0.5-feet below ground surface with a bentonite/cement grout. Once the grout has set, the borehole will be finished with the appropriate surface material (i.e., concrete, asphalt, soil).

4.1.8 Task 8: Vertical Ground-Water Profiling

Vertical ground-water profiling will be performed along a transect located approximately 200-400 feet downgradient from the Site's perimeter. The results from this task will be used to select the location of deep wells in the following task (i.e., Task 9). The data generated in this task will be used in conjunction with the data from Task 7 to evaluate the horizontal and vertical expression of the contaminant at the downgradient (i.e., south and west) Site boundaries.

Vertical ground water profiling will be accomplished by advancing four soil borings to the saturated zone along a transect at the downgradient Site boundary. Proposed soil boring and sample locations are shown on Figure 4. Using a Hydropunch™ sampler, three ground-water samples will be collected from discreet depths at each boring. Specifically, ground-water samples will be collected at approximate depths of 5, 25, and 50 feet below the water table. These depths approximately correlate to 90, 115, and 145 ft bls. It is anticipated that a low-permeability unit will be encountered at or near 150 ft bls. Accordingly, after collection of a ground-water sample from the 145 ft bls interval, the soil boring will be advanced and soil samples will be collected continuously using a split-spoon sampler until the low-permeability layer is encountered.

If evidence of separate-phase product is observed in soil perched on or above the low permeability layer, a soil sample from the most apparently contaminated one-foot interval will be collected for submission to an analytical laboratory for analysis. The soil will be screened for VOCs using the headspace method described above (Task 6). A soil sample will be collected from the interval that exhibits evidence of separate-phase product (if any) for analysis of VOCs. Ground-water samples will be analyzed for VOCs using ASP Method 95-1.

Upon completion of ground-water sampling, boreholes will be tremie-grouted as described above under Task 6.

4.1.9 Task 9: Install Downgradient Wells

Up to four ground-water monitoring wells will be installed along a transect parallel to the downgradient side of the Site's perimeter (up to approximately 200 to 400 feet downgradient from the Site Boundary, access permitting) and perpendicular to the apparent migration pathway as determined from the results of Tasks 5, 6, 7, and 8. The results from this task will be used to evaluate the shape of the plume and its migration pathway in the immediate downgradient vicinity of the Site. The data from Tasks 6 and 7 will be used as an aide to determine the number and the placement of the monitoring wells. The well locations will be selected to bracket the plume both horizontally and vertically to provide a monitoring well network which adequately identifies the plume as it migrates away from the source area.

In addition to the groundwater samples, soil samples will be collected continuously from the top of the saturated zone to final depth. These soil samples will be screened in the field for VOCs using a PID. The soil samples will be used in conjunction with the gamma logs generated during Task 9 to delineate the lithology present in the water-table aquifer.

Boreholes for the proposed monitoring wells will be advanced using hollow-stem augers or other appropriate method (e.g., mud or air rotary) depending on the geologic conditions at the drilling location. Note that if subsurface conditions prevent advancement of the soil borings to final depth then alternate drilling methods such as mud or air rotary will be used. Alternative drilling methods will be deployed only after receiving concurrence from the NYSDEC. Monitoring

wells will be constructed of 2-inch, Schedule 40, polyvinyl chloride (PVC) riser and screen. Monitoring wells will be screened using 15-foot-long screens. Silica filter-sand will be placed in the borehole annulus around the well screen to minimize migration of fine-grained sediment into the well. A bentonite seal will be placed above the filter-sand and the remainder of the borehole annulus will be tremie-grouted with a cement/bentonite grout to approximately one foot below grade. Wells will be completed with a locking, flush-mount cover or locking, protective steel riser as appropriate.

The newly installed monitoring wells will be developed to promote hydraulic communication with the surrounding formation and to remove fine sediment that may have settled in the well during installation. Monitoring wells will be developed through the use of a surge block and pumping water from the well using a submersible pump. If mud rotary drilling is performed, the wells will be developed as soon as practicable following well installation. After each well volume is pumped from the well, the field parameters temperature, pH, conductivity, and turbidity will be measured with a portable ground-water quality meter (e.g., Aquacheck™). Development will continue until turbidity readings are <50 nephelometric turbidity units (NTUs) for three consecutive measurements. If the turbidity of the ground water in the wells cannot be reduced to that level, the field geologist, in consultation with the NYSDEC, will document the problem, record the turbidity measurement achieved and deem the well to be developed. Purge water will be contained onsite for future disposal.

All newly-installed monitoring wells will be surveyed by a New York State licensed surveyor to locate the wells horizontally and establish elevation reference points at each well. Water-level measurements will be obtained and converted into ground-water elevation data in order to construct accurate ground-water contour maps.

4.1.10 Task 10: Gamma Logging of New and Existing Wells

Down-well gamma logging will be performed at the new and existing wells to assist in identifying and confirming the subsurface stratigraphy. Specifically, results of the gamma logging will be used to identify low permeability layers (e.g., clay, silt, etc.) that may act to prevent, impede, and or redirect the vertical migration of fluid in the vadose zone resulting from a potential surface release(s). A portable gamma logging unit with a gamma probe capable of

fitting inside a 2-inch diameter well will be lowered into each well. The probe will interface with a data logger cable of recording a real-time data and generating real-time plots of the gamma data with depth. Two logs will be performed on each well, one while the gamma probe is lowered into the well and one while the gamma probe is withdrawn out of the well.

Interpretation of the gamma logging results will include comparison of the gamma logs with the lithology encountered during well installation, as shown in the soil boring logs.

4.1.11 Task 11: Sampling of New and Existing Monitoring Wells

Ground-water samples from new and existing monitoring wells will be collected and analyzed to evaluate water quality in the plume as it migrates from the source area. The data will be used in conjunction with the data from Tasks 7, 8, 9, and 10.

Ground-water samples will be collected by a field hydrogeologist; who will maintain the related sampling documentation including chains of custody. Prior to purging and sampling the static ground water level in each well will be measured using a electronic water level probe. The well depth and the depth to water will be used to calculate the well volume in each wells. Three to five well-casing volumes will be purged from each well using a submersible centrifugal pump prior to the collection of ground-water samples. Purging will be performed until field parameters (pH, temperature, conductivity, and turbidity) have stabilized. Purge water will be handled in the same manner as the well development water. Ground-water samples will be collected using new, clean disposable Teflon™ bottom-loading bailer suspended by new polypropylene cord. Ground-water samples will be transferred directly from the bailer to the laboratory-supplied sample bottles containing necessary preserving agents, sealed, labeled, and immediately placed in a cooler containing ice for shipment to an analytical laboratory. Ground-water samples will be analyzed for VOCs using ASP Method 95-1.

One duplicate sample and one field blank will also be collected during ground-water sampling. The duplicate sample will be assigned a different sample identification number than the monitoring well from which it is collected. The field blank will be prepared with deionized water provided by the analytical laboratory. The water will be poured into a decontaminated

bailer and will be transferred into laboratory prepared sample bottles. Both the duplicate sample and the field blank will be analyzed for VOCs. A laboratory prepared trip blank will accompany the samples and will also be analyzed for VOCs.

4.1.12 Task 12: IRM Evaluation

At the completion of the field investigation, Roux Associates will evaluate the existing IRM, a four well soil vapor extraction system. The evaluation will include a review of the construction specifications and all of the available operational data. This information will be reviewed in relation to the distribution of PCE in soil both above and below the water table that was established during the RI. The primary objectives of the evaluation will be to assess the effectiveness of past system operation and what system improvements would be required to complete the remediation of PCE in soil at the site.

The quantitative evaluation will include a review of system performance criteria including vacuum pressures and flow rates and an estimation of the pneumatic effective radii of influence (EROI) that the system was capable of developing. A comparison of the estimated EROIs for the four SVE well screens versus the detected distribution of PCE currently will establish whether system improvements are necessary to complete the unsaturated zone portion of the soils remediation.

Assuming PCE is detected in soils below the water, Roux Associates will design an air sparge well network with the appropriate blower motors to provide full sparge coverage. The design basis for this addition to the IRM will be presented for NYSDEC review and approval so that it can be incorporated in the Task 13- IRM Implementation.

4.1.13 Task 13: Remedial Investigation and IRM Evaluation Report

The primary objective of the RI/IRM report is to integrate all data and analyses, and present descriptions, evaluations, assessments, conclusions and recommendations regarding the Ron Hill Dry Cleaner Site investigation.

Upon completion of the preliminary and field investigation activities, all soil and groundwater analytical data, which shall be accompanied by an ASP Category B deliverables packages, will be reviewed, evaluated and summarized. The initial review of the analytical data will focus on the number of samples and their respective location, medium, and analyses. Formal validation of the data will be performed by an independent third party using USEPA Region II CLP Organics Data Review and Preliminary Review (SOP No. HW-6 Revision #8) and the Evaluation of Metals Data for the Contract Laboratory Program (SOP No. HW-3 Revision #11). During the data validation process, a thorough review shall be made of the following:

- field and laboratory methodologies utilized for documenting sampling procedures;
- sample preservation and packaging;
- chain-of-custody procedures;
- potential sample degradation prior to analyses;
- analytical methods verification and calibration procedures; and
- QA/QC methodologies.

All analytical data shall be reviewed in order to determine whether or not the data are reasonable and consistent and whether or not there are either noticeable trends or grossly divergent results. Any deviations from QA/QC criteria shall be identified and addressed. All outlier data points shall be identified and evaluated. Any procedural problems associated with data collection shall be documented, and the potential impact on the results shall be assessed. All data shall either be considered valid or, if any uncertainties are identified, then they shall be taken into consideration before formulating any conclusions.

The RI/IRM Report shall contain a characterization of the Site, a summary of the data collected, and conclusions integrating all RI activities. The IRM evaluation will be fully documented including the design basis for any new IRM components. The report shall include but not be limited to the following:

- executive summary;
- objectives of the RI;

- Site description, including the environmental setting of the Site and a location map of off-site ground-water wells;
- geologic and hydrogeologic conditions;
- nature and extent of any soil, or ground-water contamination;
- analytical data;
- supporting data such as well logs, well construction diagrams, etc.;
- presentation of the IRM evaluation
- conclusions and recommendations.

4.1.14 Task 14: Implementation of the IRM

Subsequent to completion of Tasks 1 through 12, recommended and NYSDEC-approved IRM improvements and modifications may be implemented, as appropriate. At the present time it is envisioned that this will include the addition of new air sparge wells, associated new blowers, piping, electrical connections and system control equipment. It may also include upgrades to the existing SVE system based on the results of the IRM evaluation.

4.2 Decontamination

Decontamination of various field equipment (including drill augers, split spoon samplers, etc.) will be performed throughout the course of the RI field activities. Accordingly, a portable decontamination pad will be set up by the drilling contractor to decontaminate all drilling and sampling equipment. Drilling equipment (augers, drilling rods, etc) will be decontaminated with a power steam washer and decontamination water will be contained on the decontamination pad. On at least a daily basis, accumulated water will be pumped from the pad into a polyethylene tank staged near the decontamination pad.

Other equipment such as split-spoon samplers, stainless-steel sampling spoons, etc., will be washed between samples in a detergent/potable water wash, rinsed in potable water, followed by a distilled water rinse. Equipment will be allowed to air dry prior to uses. As with the decontamination-pad water, waste water from this process will be placed in the polyethylene tank.

4.3 Investigation Derived Wastes

The field investigation described above will generate drill cuttings (soil), decontamination water, well development water, and purge water. All drill cuttings will be handled in a manner consistent with the NYSDEC TAGM 4032, disposal of drill cuttings. Drill cuttings will be containerized in 55-gallon drums and staged in a fenced area at the City of Glen Cove Department of Public Works garage (as specified by the NYSDEC Project Manager). Drill cuttings from on-site activities will be presumed contaminated and analyzed for VOCs. If proven contaminated, the drummed material will be removed by a licensed waste hauler and disposed at a licensed waste disposal facility. Drill cuttings from off-site sources will be presumed clean unless field screening with a PID indicates the presence of VOCs. If VOCs are detected using the PID, the off-site drill cuttings will be containerized, analyzed for VOCs, and disposed of accordingly. Drillers will containerize clean drill cuttings in drums and transport them on a regular basis to an appropriate staging location (as arranged by the NYSDEC), or to a nearby location designated to receive clean soil for immediate use as clean fill (as arranged by the NYSDEC).

Decontamination, development, and purge water will be discharged to the City of Glen Cove or Nassau County sanitary sewer system (subject to City or County approval) if "clean," or treated on site using a portable liquid-phase granular-activated carbon (GAC) system.

5.0 ESTIMATED IMPLEMENTATION SCHEDULE

The Estimated Schedule of Implementation for the RI/IRM activities at the Ron Hill Dry Cleaners Site is summarized below. The schedule presents a 10.5 month duration for project activities from the time the Work Plan is submitted. Major milestone dates are as follows:

- RI/IRM Work Plan Submission to NYSDEC/NYS AG – October 1, 1999;
- NYSDEC/NYS AG Review – October 1, 1999 - November 1, 1999;
- Pre-Investigation Activities (Tasks 1 and 2) - December 1, 1999 - January 15, 1999;
- Initiation of Field Investigation - January 15, 2000 - March 30, 2000;
- Submission of RI/IRM Report – May 15, 2000;
- NYSDEC/ NYS AG Report Review - May 15, 2000 - July 15, 2000;
- Construction of IRM Upgrade – August 15, 2000 - October 15, 2000;
- IRM System Startup - October 15, 2000; and
- Second Phase RI/FS (TBD).

This schedule assumes that Mr. Sills and Nixon Peabody, LLP, will require five days for review of all submissions and the NYSDEC and the NYS Attorney General's office will require 30 days for review and approval of the RI/IRM Work Plan and 60 days to review the RI/IRM report.

QUADRANGLES LOCATION

SOURCE:
USGS; 1975. Mamaroneck, Bayville, 1979. Sea Cliff and Hicksville, New York 7.5 Minute Topographic Quadrangles

N

0 2000'

Title:

SITE LOCATION MAP

RONHILL DRY CLEANER SITE
GLEN COVE, NEW YORK

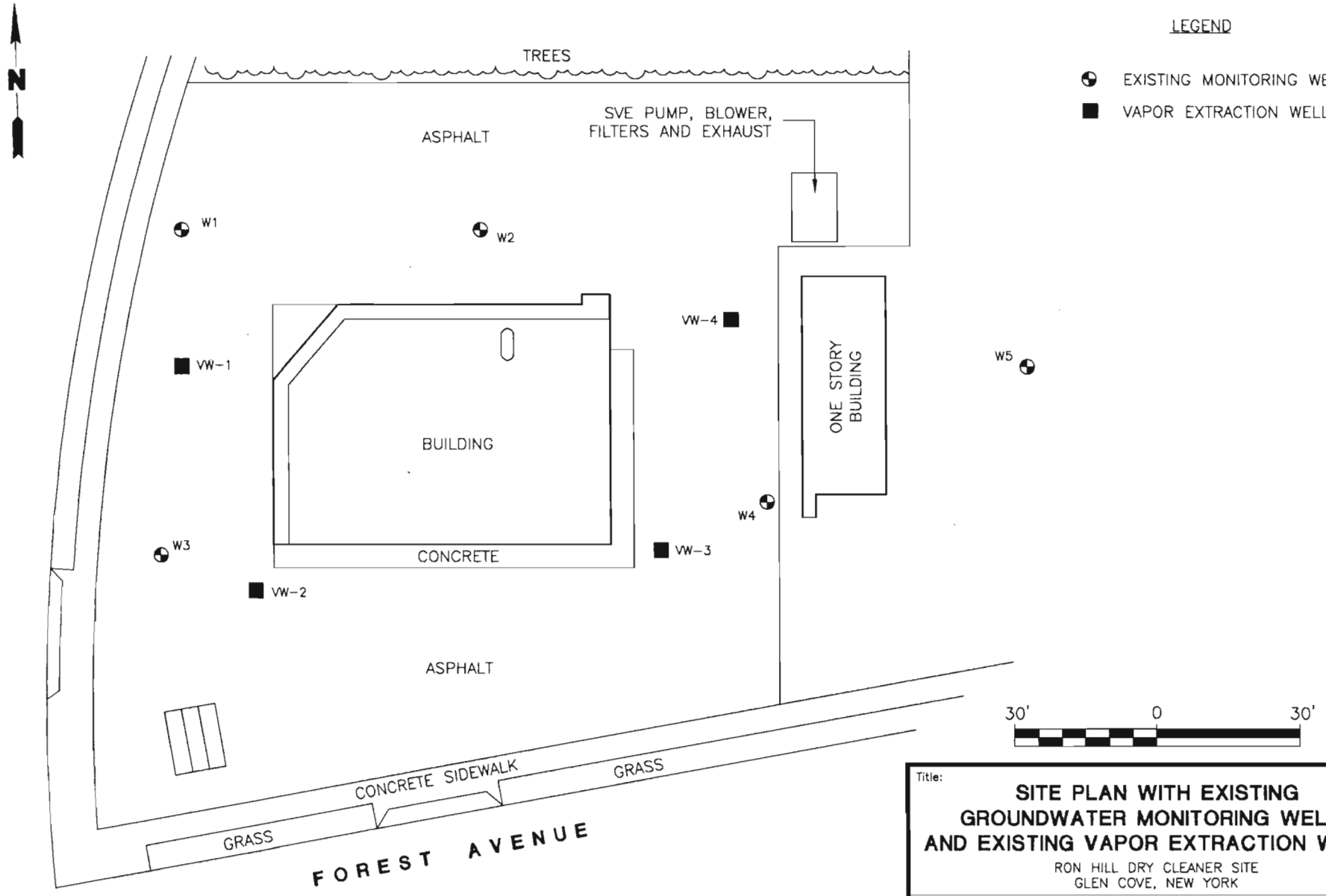
Prepared for:
RICHARD SILLS

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: T.D.	Date: 26 AUG 99	FIGURE
Prepared by: R.R.	Scale: 1"=2000'	1
Project Mgr.: T.D.	Office: NY	
File No.: SIL0110201.CDR	Project No.: 74701Y	

N:\PROJECTS\SIL\74Y\SIL01Y\102\SIL0110201.CDR

N:\PROJECTS\SIL747Y\SIL01Y\102\SIL0110202.DWG



LEGEND

- EXISTING MONITORING WELL
- VAPOR EXTRACTION WELL

Title:

SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELLS AND EXISTING VAPOR EXTRACTION WELLS

RON HILL DRY CLEANER SITE
GLEN COVE, NEW YORK

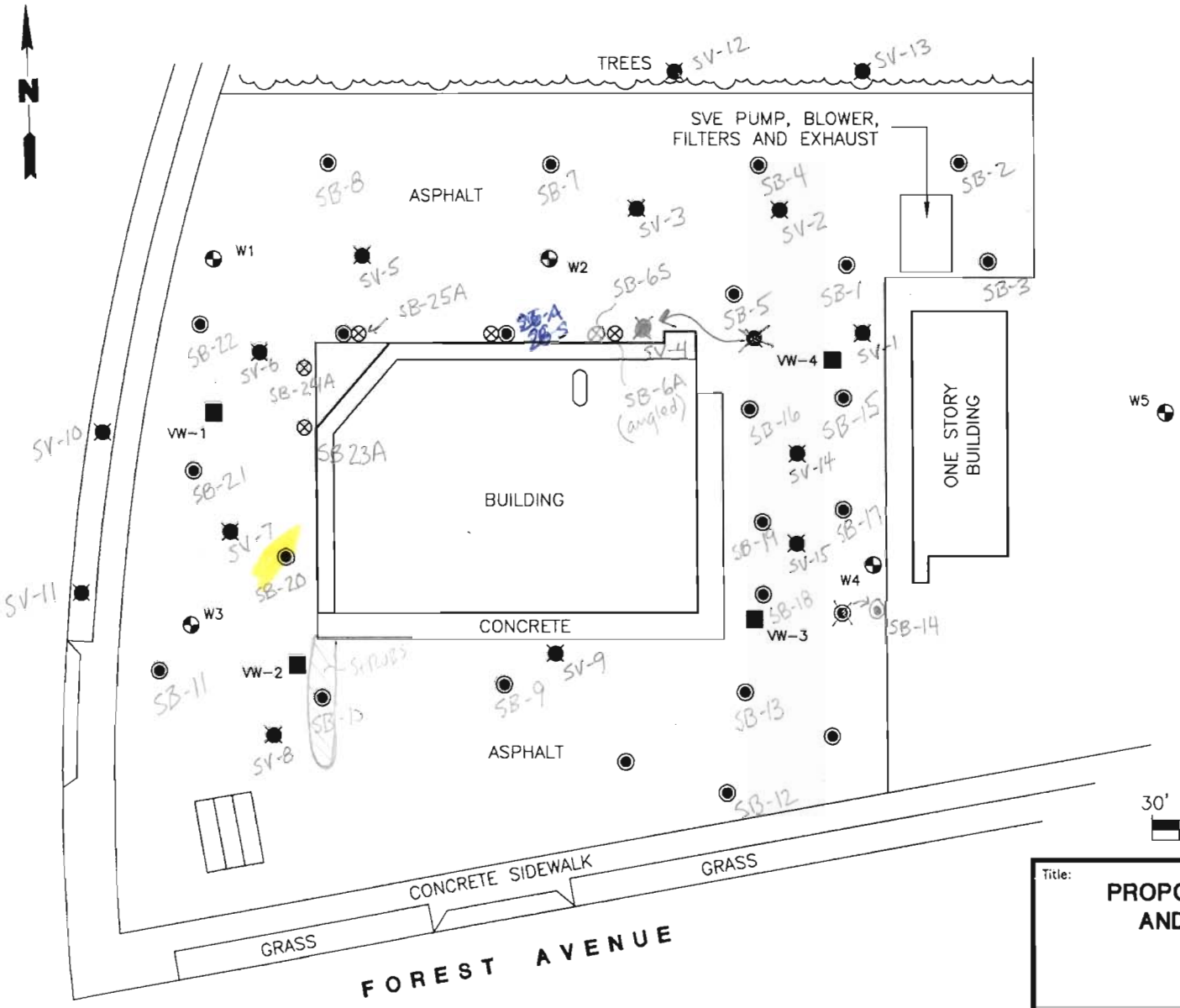
Prepared For:

RICHARD SILLS

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: T.D.	Date: 13 SEPT 99	FIGURE
Prepared by: R.R.	Scale: AS SHOWN	2
Project Mgr: T.D.	Office: NY	
File No: SIL0110202.DWG	Project: 74701Y	

N:\PROJECTS\SIL747Y\SIL01Y\103\SIL0110301.DWG



LEGEND

- EXISTING MONITORING WELL
- VAPOR EXTRACTION WELL
- PROPOSED SOIL GAS SAMPLING LOCATIONS
- PROPOSED SHALLOW SOIL BORING TO BE PERFORMED USING GROPROBE™
- PROPOSED SHALLOW SOIL BORING TO BE PERFORMED AT AN APPROXIMATE 45° ANGLE BENEATH THE BUILDING USING GROPROBE™

Title:

PROPOSED SOIL GAS SAMPLING AND SHALLOW SOIL BORING LOCATIONS

RON HILL DRY CLEANER SITE
GLEN COVE, NEW YORK

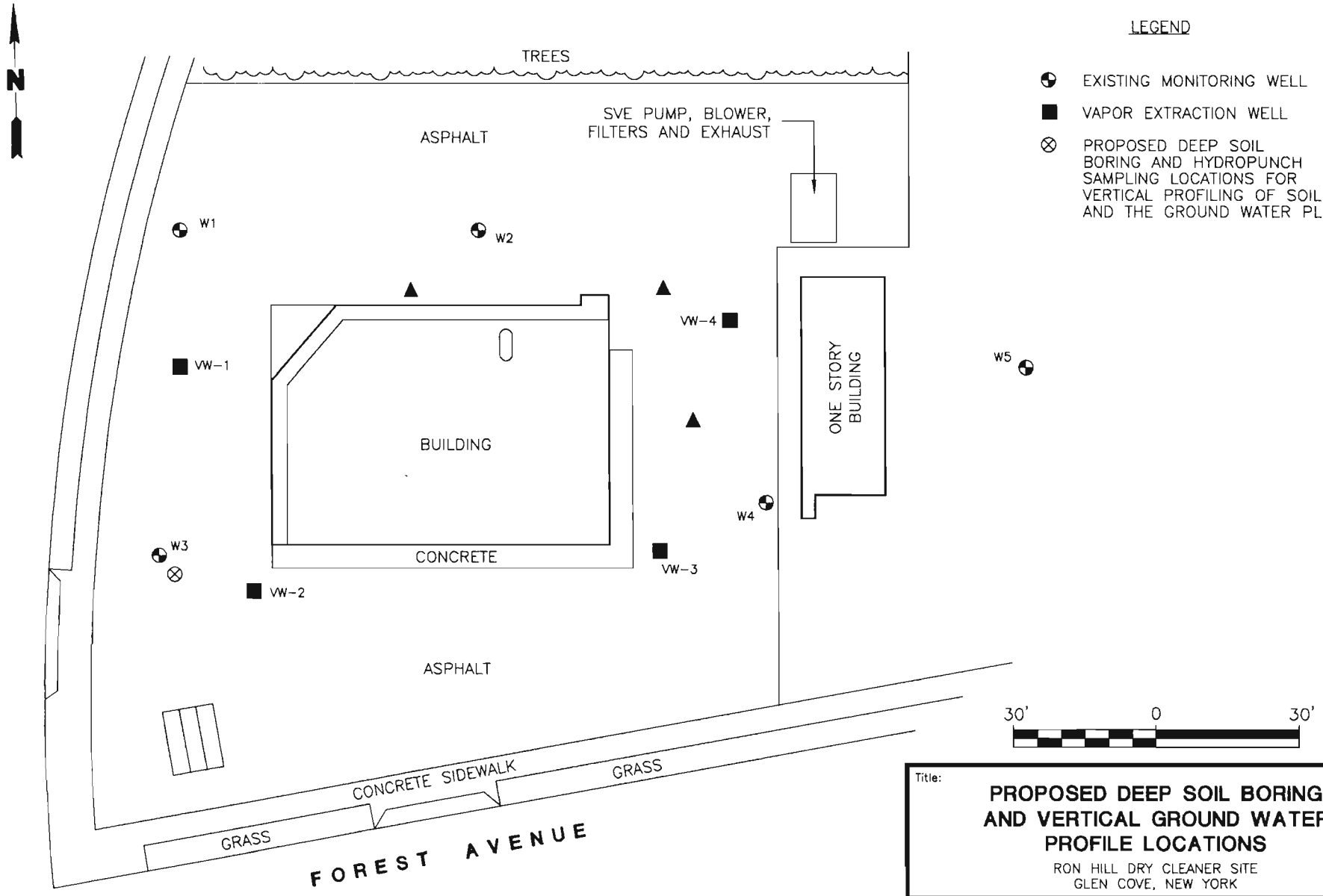
Prepared For:

RICHARD SILLS

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: T.D.	Date: 29 NOV 99	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: T.D.	Office: NY	
File No: SIL0110301	Project: 74701Y	

N:\PROJECTS\SIL747Y\SIL01Y\103\SIL0110302.DWG



LEGEND

- EXISTING MONITORING WELL
- VAPOR EXTRACTION WELL
- PROPOSED DEEP SOIL BORING AND HYDROPUNCH SAMPLING LOCATIONS FOR VERTICAL PROFILING OF SOIL AND THE GROUND WATER PLUME.

Title:

PROPOSED DEEP SOIL BORING AND VERTICAL GROUND WATER PROFILE LOCATIONS

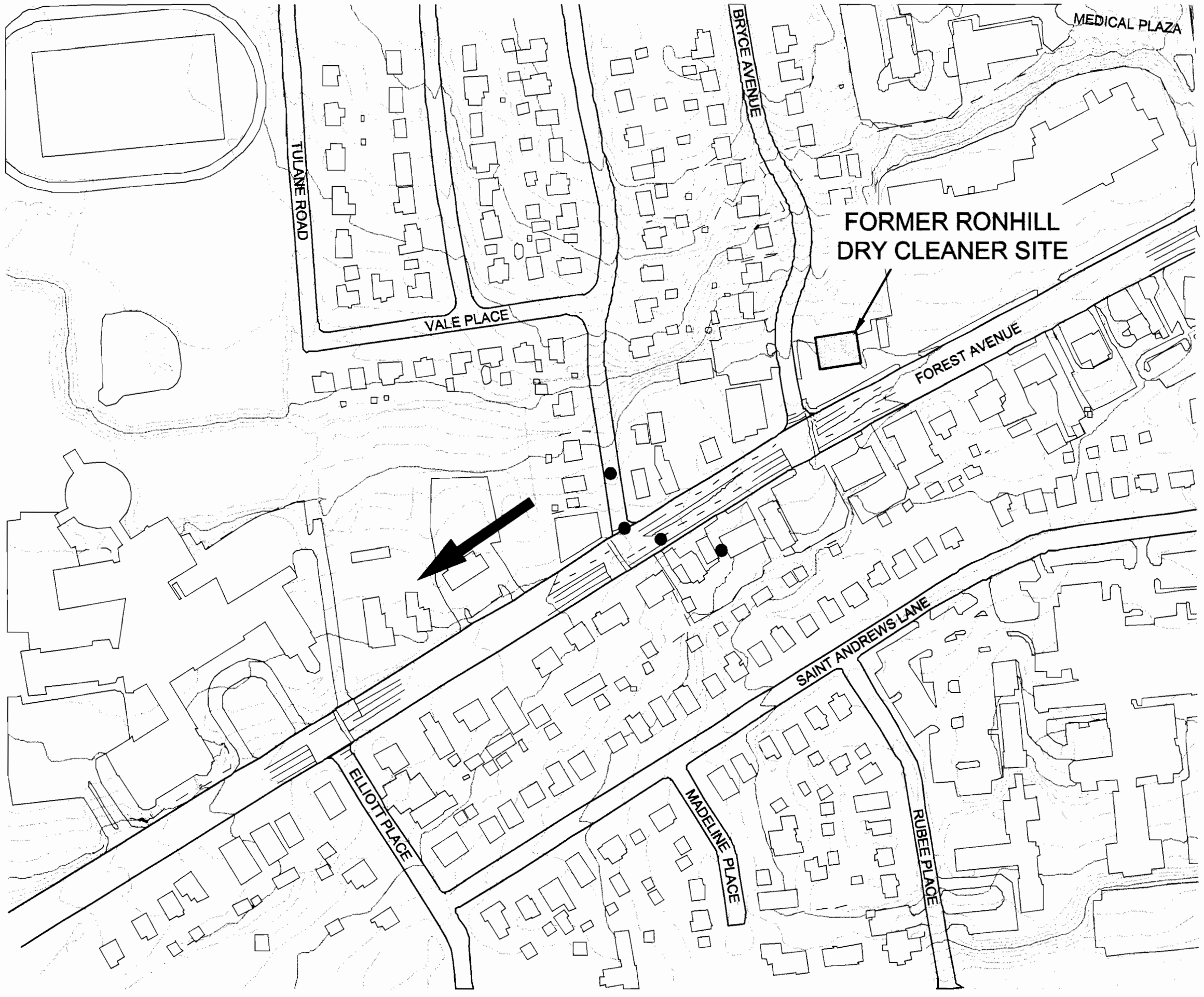
RON HILL DRY CLEANER SITE
GLEN COVE, NEW YORK

Prepared For:

RICHARD SILLS

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: T.D.	Date: 29 NOV 99	FIGURE
Prepared by: R.R.	Scale: AS SHOWN	4
Project Mgr: T.D.	Office: NY	
File No: SIL0110302	Project: 74701Y	



LEGEND

- PROPOSED DEEP HYDROPUNCH™ SAMPLE LOCATIONS AND DEEP MONITORING WELL LOCATIONS
- APPROXIMATE GROUND-WATER FLOW DIRECTION

200' 0 200'

APPROXIMATE

Title:

OFF-SITE DEEP WELL LOCATIONS

RONHILL DRY CLEANERS SITE
GLEN COVE, NEW YORK

Prepared For:

RICHARD SILLS

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: N.O.	Date: 9/99	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	5
Project Mgr: N.O.	Office: NY	
File No: SIL0110303	Project: 74701Y	

N:\PROJECTS\SIL7477\SIL01Y\103\SIL0110303.DWG

APPENDIX A

Quality Assurance Project Plan

CONTENTS

1.0 PROJECT DESCRIPTION 1
1.1 Introduction 1
1.2 Site History/Background Information 1
1.3 Past Data Collection Activity/Current Status 2
1.4 Project Objectives and Scope 2
1.5 Sample Network Design and Rationale 3
1.6 Parameters to be Tested and Frequency 3
1.7 Data Quality Objectives 3
1.8 Project Schedule 4

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 5

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA 7
3.1 Accuracy, Precision, and Sensitivity of Analysis 7
3.2 Completeness, Representativeness and Comparability 8

4.0 SAMPLING PROCEDURES 9

5.0 SAMPLE CUSTODY 10
5.1 Field Chain of Custody Procedures 10
5.1.1 Field Procedures 10
5.1.2 Field Logbooks/Documentation 11
5.1.3 Transfer of Custody and Shipment Procedures 12
5.2 Laboratory Chain of Custody Procedures 13

6.0 CALIBRATION PROCEDURES AND FREQUENCY 14
6.1 Field Instruments/Equipment 14
6.2 Laboratory Instruments 15
6.3 Standards/Calibration Solutions Preparation 16

7.0 ANALYTICAL PROCEDURES 17
7.1 Laboratory Parameters 17
7.2 Field Parameters 17
7.3 Analytical Quality Control 18
7.4 Proposed Analytical Laboratories 18
7.5 Rationale for Analytical Method Selection 18

CONTENTS (Continued)

8.0 DATA REDUCTION, VALIDATION AND REPORTING 21
8.1 Data Reduction 21
8.1.1 Field Data Reduction 21
8.1.2 Laboratory Data Reduction 22
8.2 Field Data Validation 23
8.3 Laboratory Data Validation 23
8.4 Data Reporting 24

9.0 QUALITY CONTROL CHECKS 25
9.1 Field Generated Quality Control Checks 25
9.1.1 Internal Field Checks 25
9.1.2 External Field Checks 27
9.2 Laboratory Generated Quality Control Check Samples 27
9.2.1 Internal Laboratory Checks 28
9.2.2 External Laboratory Checks 31
9.3 Standards Preparation 31
9.4 Reagents Preparation 32
9.5 Calibration Checks 32
9.6 Control Charts 34
9.7 Database/Electronic Media Quality Control Checks 35

10.0 QUALITY ASSURANCE AUDITS 36
10.1 Management Audits 36
10.2 Data Quality Audits 37
10.3 Technical Systems Audits 38
10.3.1 Field Audits - Internal 38
10.3.2 Field Audits - External 39
10.3.3 Laboratory Audits - Internal 39
10.3.4 Laboratory Audits - External 39
10.4 Performance Evaluation Audits 39

11.0 PREVENTATIVE MAINTENANCE PROCEDURES 41
11.1 Field Equipment/Instruments 41
11.2 Laboratory Instruments 41
11.3 Documentation 42

12.0 SPECIFIC AND ROUTINE PROCEDURES TO ASSESS DATA QUALITY OBJECTIVES 43
12.1 Specific Assessment Parameters 43
12.2 Management of DQO Assessment 46

CONTENTS (Continued)

13.0 CORRECTIVE ACTIONS 47
13.1 Field Corrective Action 47
13.2 Laboratory Corrective Action 49

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT 50
14.1 Specific Quality Assurance Reports 50
14.2 Quality Assurance Report Management 50

15.0 REFERENCE 51

TABLES

A-1. Sample Types/Analyses by Task, RonHill Dry Cleaner Site, Glen Cove, New York
A-2. Projected Number of Field Samples, RonHill Dry Cleaner Site, Glen Cove, New York
A-3. Project Quality Control Summary, RonHill Dry Cleaner Site, Glen Cove, New York
A-4. Field Quality Control Sample Frequency, RonHill Dry Cleaner Site, Glen Cove, New York
A-5. Laboratory Quality Control Sample Frequency, RonHill Dry Cleaner Site, Glen Cove, New York
A-6. Preservation, Holding Times and Sample Containers, RonHill Dry Cleaner Site, Glen Cove, New York
A-7. Field Equipment Calibration Requirements and Maintenance Schedule, RonHill Dry Cleaner Site, Glen Cove, New York

FIGURE

A-1. Field Organization Chart

ATTACHMENTS

A-1. Analytical Laboratory Quality Assurance Plan (to be included)
A-2. Data Validator's Qualifications Statement
A-3. Field Change Request Form

1.0 PROJECT DESCRIPTION

The objectives of the Remedial Investigation (RI) are to identify and characterize the nature and extent of contamination for all media of concern at the former RonHill Dry Cleaners, Glen Cove, New York (Site). Information generated as part of the RI will be used to evaluate alternatives for remediation and to provide the technical basis for choosing a preferred remedial alternative, if necessary.

This Quality Assurance Project Plan (QAPP) outlines the measures that will be taken to ensure that the data generated are of quality sufficient to meet the data quality objectives of precision, accuracy and completeness.

1.1 Introduction

This QAPP presents the organization, objectives, functional activities and specific quality assurance (QA) and quality control (QC) activities for the Site. This QAPP also describes the specific protocols which will be used to control the following sampling, sample handling, and storage, chain of custody, and laboratory and field analysis activities.

All QA/QC procedures have been developed and implemented in accordance with applicable professional technical standards, United States Environmental Protection Agency (USEPA) requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP was prepared in accordance with USEPA QAPP guidance documents, with content and format based upon the "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations" (EPA QA/R-5), and the "Guidance for the Data Quality Objectives Process" (EPA QA/G-4).

1.2 Site History/Background Information

The RI/IRM Work Plan provides the Site history, physical features, hydrogeology, and ground-water resources at the RonHill Dry Cleaner's Site.

1.3 Past Data Collection Activity/Current Status

A discussion of the past data collection activities and current status is provided in the RI/IRM Work Plan Sections 2.0 and 3.0, respectively.

1.4 Project Objectives and Scope

Overall objectives for data generated as part of this investigation are described in the RI/IRM Work Plan. The RI/IRM Work Plan objectives which require collection of field data include the following:

- supplement previous investigations performed at the Site to characterize environmental conditions;
- investigate previously unexamined areas of the Site; and
- assess the potential for constituents to migrate from the Site to downgradient areas.

The field investigation will include the following activities:

- geophysical survey;
- ambient indoor air sampling;
- soil vapor survey;
- shallow soil investigation;
- deep soil investigation;
- vertical ground water profiling;
- installation of downgradient monitoring wells;
- sampling of new and existing wells; and
- implementation of IRM.

Soil and ground-water samples will be analyzed for volatile organic compounds (VOCs) using ASP Method 95-1. Analysis of soil and ground-water samples will be performed by Accutest Laboratories, Inc. (Accutest) of Dayton, New Jersey. Accutest is a New York State Department of Health (NYSDOH) approved laboratory under the Analytical Services Protocol (ASP)/Contract Laboratory Program (CLP). Ambient indoor air samples will be collected and

analyzed by North Atlantic Laboratories, Inc. of Bayshore, New York. Waste characterization will be performed on development/evacuation water. This sample will be analyzed for Resource Conservation and Recovery Act (RCRA) characteristics (i.e., ignitability, corrosivity, reactivity and toxicity).

1.5 Sample Network Design and Rationale

The sample network design and rationale for sample locations is described in detail in the RI/IRM Work Plan.

1.6 Parameters to be Tested and Frequency

The projected sample matrix, analytical parameters and frequencies of field sample collection are provided in Tables A-1 and A-2.

1.7 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements used to develop a scientific and resource effective sampling design. As stated in the Guidance for the Data Quality Objectives Process (EPA QA/G-4), DQOs are derived from the outputs of each step of the DQO process that:

- classify the study objective;
- define the most appropriate type of data to collect;
- determine the most appropriate conditions from which to collect the data; and
- specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the decision (USEPA, 1994).

The objectives of the sampling at the Site is to further assess soil quality conditions in areas not fully delineated, and assessing the direction and behavior of the contaminant plume.

A non-probabilistic (judgmental) sampling approach will be used to select the specific sampling locations for potential areas of concern.

Total study error is the combination of sampling and measurement error. Total study error is directly related to decision error. These decision errors can be controlled through the use of hypothesis testing. For this sampling, the null hypothesis (baseline condition) is that the parameter of interest exceeds the action level. This decision has the smallest degree of decision error. In addition, measurement error is reduced by analyzing individual samples using more precise laboratory methods. Analyses will be performed using USEPA and New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol methods.

1.8 Project Schedule

A project schedule which includes the schedule for sampling, is provided in the RI\IRM Work Plan.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The overall management structure for field activities is presented in Figure A-1. A general summary of the responsibilities of the technical staff is provided below.

Project Manager. The Project Manager (PM) bears the primary responsibility for the successful completion of the work assignment within budget and schedule. Provides overall management for the execution of the Work Plan and directs the activities of the Field Manager and technical staff. Performs technical review of all field activities, data review and interpretation and the preparation of the Work Plan. Works closely with the analytical laboratory, data validation contractors, drillers and surveyors during the execution of the field program. Activities of the PM are supported by senior management, the Project Quality Assurance Coordinator, and support staff.

RI Project Manager. The RI Project Manager (referred to as Field Manager [FM]) bears the primary responsibility for the successful execution of the field program. Directs the activities of technical staff in the field and assists in the interpretation of all physical and chemical data, and report preparation. Responsible for the management of technical staff including hydrogeologists and technicians, and subcontractors such as drillers and surveyors. In addition, works closely with the Site Health and Safety Officer (SHSO) to ensure compliance with the Health and Safety Plan (HASP).

Field Technical Staff. Field technical staff consists of hydrogeologists and technicians who will perform activities such as geologic logging and soil sampling, and preparation of any field documentation which may be necessary.

Site Health and Safety Officer. The SHSO will be responsible for the implementation of the HASP. The SHSO will revise the HASP, if required, based upon the results of the Site investigation. Any necessary revision to the HASP will be submitted to the Health and Safety Manager for approval.

Project Quality Assurance Coordinator (PQAC). Provides technical quality assurance assistance; prepares, reviews, and approves the QAPP; oversees any contractor quality assurance activities to ensure compliance with contract specifications; monitors field investigations and prepares QAPP reports, if necessary. Works closely with senior management and technical reviewers, Document Control Manager, and Laboratory/Data Validation Manager.

Laboratory Quality Assurance Officer. Identified at each laboratory contracted for analysis and preparation of the data package. The Laboratory Quality Assurance Officer will evaluate analytical results to ensure that the laboratory maintains a good performance.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain of custody, laboratory analysis, and reporting that will provide results which maximize the likelihood that the data are collected, analyzed and documented such that it is defensible. Specific procedures for sampling, chain of custody, laboratory instruments calibration, laboratory analysis, data reporting, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP. The purpose of this section is to address the project specific objectives for precision, accuracy, representativeness, completeness, and comparability, known as the "PARCC" parameters.

3.1 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols.

Accuracy, precision and completeness requirements will be addressed for all the data generated. Accuracy, the ability to obtain a true value, is monitored through the use of field and method blanks, spikes, and standards, and compared to federal and state regulations and guidelines. This will reflect the impact of matrix interferences. Precision, the ability to replicate a value, is monitored through duplicate (replicate) samples. It is assessed for each matrix. Corrective actions and documentation for substandard recoveries, or substandard precision, must be performed by the laboratory. These parameters will be based on Analytical Services Protocol (ASP)/Contract Laboratory Program (CLP) criteria for ASP/CLP analyses, or modified criteria for non-ASP/CLP analyses.

Instrument sensitivity must be monitored to ensure the data quality through constant instrument performance. Method detection limits depend on instrument sensitivity and matrix effects. Monitoring of instrument sensitivity is performed through the analysis of reagent blanks, near detection limit standards and response factors.

Quality control criteria for laboratory and field analyses are provided in Table A-3. Required field and laboratory QC samples and frequencies are summarized in Tables A-4 and A-5,

respectively.

3.2 Completeness, Representativeness and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratory will provide data meeting QC acceptance criteria for 95 percent or more for all samples tested using the ASP/CLP Routine Analytical Services (RAS) methods and 90 percent for other methods. Following completion of the analytical testing, the percent completeness will be calculated by the following equations:

$$\text{completeness (percent)} = \frac{\text{(Valid Data Obtained)}}{\text{(Total Data Planned)}} \text{ X } 100$$

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of Site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, and physical setting and processes. The rationale of the sampling network is discussed in detail in the Work Plan. Representativeness will be satisfied by ensuring that the Sampling and Analysis Plan (SAP) is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed in part by the analysis of field duplicate samples.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

4.0 SAMPLING PROCEDURES

Detailed sampling procedures in the Work Plan describe the sampling and data gathering methods. For the planned task (i.e., soil sampling), the Work Plan includes the following:

- description of the source matrix and sampling procedures;
- description of containers, preservation, holding times, etc., used in sample collection, transport, and storage;
- procedures for decontamination of equipment; and
- chain of custody procedures.

Table A-6 presents a summary of sample containers, preservation, and holding times.

5.0 SAMPLE CUSTODY

The possession and proper transfer of samples and sample-related information must be traceable from the time the samples are collected until the data have been accepted for analysis. The Work Plan describes the procedures for sample custody from the point where the sample is collected through the laboratory analysis. The following sections summarize the general aspects of custody and how they will be applied and managed during the course of the project.

A sample or sample-related information (sample or evidence file) is under your custody if it:

- is in your possession;
- is in your view, after being in your possession;
- is in your possession and you place them in a secured location; or
- is in a secured, designated place.

5.1 Field Chain of Custody Procedures

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact. The protocols for specific sample numbering and other sample designation documentation are included in the Work Plan.

5.1.1 Field Procedures

a) The field sampler is responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

b) All bottles will be labeled with the appropriate sample numbers and locations.

c) Sample labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ball-point pen would not function in freezing weather.

d) The Field Manager will review all field activities to determine whether proper custody procedures were followed during the field work and decide if additional samples are required.

5.1.2 Field Logbooks/Documentation

Field logbooks will be used to document all data collecting activities performed in the field. As such, entries will be described in sufficient detail such that persons going to the Site could reconstruct a particular situation without reliance on memory. A summary of field documentation requirements is presented below.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control area when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- person to whom the logbook is assigned;
- logbook number;
- project name;
- project start date; and
- end date.

At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered into the field book. The names of visitors to the Site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink (if possible) and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark and initialed by the person making the correction. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration. Samples will be collected following the sampling procedures documented in the SAP. The equipment used to collect samples will be noted, along with the time of sampling,

sample description, depth at which the sample was collected, sample volume and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description (in the field log books but not the chain of custody).

5.1.3 Transfer of Custody and Shipment Procedures

a) Samples will be accompanied by a properly completed chain of custody form. The sample numbers and locations will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

b) Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate, signed custody record enclosed in or on each sample box or cooler. Shipping containers will be locked and secured with strapping tape and USEPA custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

c) Whenever samples are split with another source (i.e., a government agency), a separate sample receipt is prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.

d) All shipments will be accompanied by the chain of custody record identifying the contents. The original record will accompany the shipment, and the pink and yellow copies will be retained by the sampler for returning to the sampling office. Photocopies of the original record should be made before shipment, if possible, to ensure that clean copies can be made later.

e) If the samples are sent by common carrier, a bill of lading (airbill) must be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside or on the outside of the sample cooler and the custody seals remain intact.

5.2 Laboratory Chain of Custody Procedures

Laboratory custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data are described in the laboratory QA plan in Attachment A-1. All laboratory handling and custody procedures must conform to the ASP/CLP Statement of Work (SOW) or alternate USEPA requirements. A brief summary of the required laboratory custody and sample handling procedures is presented below.

The laboratory's QA officer will ensure that chain of custody records are filled out upon receipt of the samples and will note questions or observations concerning sample integrity. The laboratory's QA officer will also ensure that sample-tracking records are maintained. These records will follow each sample through all stages of laboratory processing. The sample tracking records must show the date of sample extraction or preparation and the date of instrument analysis. These records will be used, in part, to determine compliance with holding time requirements.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy of all measurements and measuring equipment which are used for conducting field tests and laboratory analyses. All equipment must be calibrated prior to each use and on a periodic basis.

6.1 Field Instruments/Equipment

Field instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. The calibration and use of field instruments are described in the Work Plan.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Backup instrumentation will be sent into the field where possible. Two thermometers will be sent to sampling locations where measurement of temperature is required, including those locations where a specific conductance probe/thermometer is required. Preventive maintenance will be conducted for equipment and instruments to ensure the accuracy of measurement systems, and to verify the availability of spare parts and backup systems (see Section 11.0).

Calibration of field instruments is governed by the specific SOP for the applicable field analysis method, and such procedures take precedence over the following general discussion.

Calibration of field instruments will be performed at the intervals specified by the manufacturer or more frequently as conditions dictate. Field instrumentation may include an Organic Vapor Analyzer (OVA) or photoionization detector (PID), gamma ray detector, particulate monitor and combustible gas meter for soil screening and air sampling. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be removed from service until the problem is resolved.

6.2 Laboratory Instruments

The ASP/CLP calibration procedures and frequencies are specified in the NYSDEC ASP procedures and CLP inorganic SOWs. In all cases where analyses are conducted according to the NYSDEC-ASP/USEPA-CLP protocols, the calibration procedures and frequencies specified in the applicable ASP/CLP RAS SOW will be followed.

Calibration of laboratory equipment for non-ASP/CLP analyses will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audits. For all instruments, the laboratory will retain a factory-trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of laboratory calibration will be kept as follows:

- if possible, each instrument will have a record of calibration permanently affixed with an assigned record number;
- a label will be affixed to each instrument showing description, manufacturer, model numbers, date of last calibration, by whom calibrated (signature), and due date of next calibration. Reports and compensation or correction figures will be maintained with the instrument;
- a written stepwise calibration procedure will be available for each piece of test and measurement equipment; and
- any instrument that is not calibrated with the manufacturer's original specification will display a warning tag to alert the analyst that the device carries only a "Limited Calibration."

More detailed information on the calibration of laboratory equipment is presented in Section 9 of this QAPP and in the laboratory QA plan included as Attachment A-1.

6.3 Standards/Calibration Solutions Preparation

The standards/calibration solutions preparation will be performed in accordance with the ASP/CLP SOWs, if applicable, and using good laboratory practice (GLP) in all cases. More specific information on standards and reagent preparation is provided in Sections 9.3 and 9.4 of this QAPP.

7.0 ANALYTICAL PROCEDURES

Analytical procedures for this project have been selected to generate data meeting the DQOs required for the scope of work. A summary of the methods chosen and the rationale for each method selected is presented below. These methods are summarized in Table A-3. Sampling methods and procedures applicable to health and safety (e.g., personnel monitoring) are described in the HASP (Appendix B).

7.1 Laboratory Parameters

Methods published by USEPA will be used as the basis for all analyses for which such methods exist. The laboratory will follow methods detailed in the ASP/SOW for organic analyses and the CLP SOW for inorganic analyses for the analysis of parameters by ASP/CLP protocols. The methods specified in Table A-3 shall be followed for non-CLP analytical parameters. These methods have been chosen based on applicability to the investigation and the level of data quality provided by the method.

7.2 Field Parameters

The procedures for field measurement of pH, specific conductance, temperature and organic vapors (PID), and for field measurement of soil-gas VOCs are described in the SOPs in the Work Plan. Method references are included in Table A-2.

Portable probes operated according to the manufacturer's instructions and the Roux Associates' SOPs will be used for specific conductance, temperature, and pH. For these field measurements, ground water will be collected and transferred into clean containers. The separate conductivity and temperature/pH probes will be inserted into the containers and allowed to equilibrate prior to recording the readings.

7.3 Analytical Quality Control

The analytical measurement QC for field and laboratory analyses will generally address the parameters of precision and accuracy. The required QC sample types, frequency and acceptance criteria for the laboratory and field measurements are summarized in Table A-3. Assessment of data quality based on the QC results is part of the data validation process and is discussed in Sections 8, 9, 10, and 12.

7.4 Proposed Analytical Laboratories

All analytical laboratories used for this work will meet the requirements of the respective laboratory QA plan and any other requirements for performing analyses to meet the required DQOs. The laboratory qualifications statement(s) and/or QA plan are included in Attachment A-1.

7.5 Rationale for Analytical Method Selection

All analytical methods selected for use during this project have been chosen based upon the following criteria:

- ability of the method to meet the established data quality objective for the parameter;
- validity and reproducibility of the method;
- ability to report detection limits below the ASP/CLP RAS Contract Required Quantitation Limit (CRQL) for compounds with action levels below the CRQL;
- conformance of the method to standard USEPA methods and practices; and
- cost comparison between the method alternatives (if applicable).

After reviewing these criteria, the analytical methods summarized in Table A-3 were chosen for this project. The rationale for choosing the specific analysis method is presented below for field and laboratory analyses.

Physical Analysis of Water Samples

Water samples requiring analyses for pH, temperature, specific conductance, etc., will be analyzed using Roux Associates' SOPs which are based upon the published USEPA methods for water. These analyses will be performed to provide supplementary and background data for off-site laboratory analyses and to assist in the overall water-quality characterization. Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

Chemical Analysis of Water Samples

Water samples for organics (VOCs) will be analyzed using ASP methods. This analysis will be performed to provide information regarding the Site characterization, remedial alternatives, and risk assessment. The RCRA characteristics, and COD, DO, coliform and chloride will be analyzed using the Test Methods for Evaluating Solid Waste (SW-846), and methods for chemical analysis of water and wastes. Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

Chemical Analysis of Soil Samples

Soil samples requiring chemical analyses for TAL metals/cyanide using CLP protocols, and TCL organics (VOCs, SVOCs and pesticides/PCBs) will be analyzed using ASP procedures. The ASP/CLP analyses will be performed to provide information regarding Site characterization, remedial alternatives, and risk assessment. Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

Chemical Analysis of Air Samples

Soil-gas samples requiring chemical analyses for VOCs will be analyzed using a gas chromatograph (GC) with a PID and electron capture device (ECD) following a modified Method 8010 to quantify chlorinated compounds, and a GC with a flame ionization detector (FID) to detect petroleum and non-halogenated compounds using a modified Method 8020. These analyses will provide information regarding where confirmatory soil samples should be collected. Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

8.0 DATA REDUCTION, VALIDATION AND REPORTING

Applicable methods/procedures will be required for the reduction, validation and reporting of data generated during all phases of this project. Please note that unless requested by the NYSDEC, an independent validation will not be performed. Both the field and laboratory data will be subjected to a level of data validation commensurate with the required data quality level. If required, all data will be validated using either the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994), USEPA Region II CLP Organics Data Review and Preliminary Review (SOP No. HW-6, Revision 8), USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) and/or the Evaluation of Metals Data for the Contract Laboratory Program (SOP No. HW-2, Revision #11) or the same guidelines modified for non-CLP analyses. The level of complete transcription checks (raw data to reporting for calculation checks) shall nominally be 10 percent, but this percentage may be increased or decreased depending on the nature and significance of the individual results.

8.1 Data Reduction

Data reduction involves the generation, interpretation and calculation of results from the field and laboratory analyses performed as part of the data gathering effort. In order to make the appropriate decisions, it is necessary to verify that the reported values are correct, both in the way they have been generated (instrument calibration, etc.) and the way they are calculated and reported. Due to the different quantities of documentation and the different quality levels of data generated in the field and the laboratory, somewhat different levels of effort are required for reduction verification for these different data sources.

8.1.1 Field Data Reduction

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be documented in the report. All measurement data recorded in field logbooks or field forms will be reviewed by the Project Manager for completeness and clarity. Any discrepancies noted will be resolved by the Project Manager. All calculation equations shall also be verified by the Project Manager and individual calculations will be verified at a minimum frequency of 10

percent by the PQAC.

8.1.2 Laboratory Data Reduction

The off-site laboratory will perform in-house analytical data reduction and validation under the direction of the Laboratory QA Officer. The Laboratory QA Officer is responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other notations which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- raw data produced by the analyst is turned over to the respective area supervisor;
- the area supervisor reviews the data for attainment of QC criteria as outlined in ASP/CLP protocols and/or established USEPA methods and for overall reasonableness;
- upon acceptance of the raw data by the area supervisor, a computerized report is generated and sent to the Laboratory's QA Officer;
- the Laboratory's QA Officer will complete a thorough audit of reports at a frequency of one in ten, and an audit of every report for consistency;
- the Laboratory's QA Officer and area supervisors will decide whether any sample reanalysis is required; and
- upon acceptance of the preliminary reports by the Laboratory's QA Officer, final reports will be generated and signed by the Laboratory's Project Manager. The laboratory package shall be presented in the same order in which the samples were analyzed.

Data reduction reporting procedures will be those specified in the ASP/CLP SOW, and SOW for inorganic and organic analyses.

Laboratories will prepare and retain full analytical and QC documentation the same as (ASP/CLP analyses) or similar to that (non-ASP/CLP analyses) required by the Analytical Services Protocols and Contact Laboratory Program.

The laboratory will report the data in chronological order along with all pertinent QC data. Laboratories will provide the following information to the prime contractor in each analytical data package submitted.

1. Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis.

2. Tabulated results of inorganic and organic compounds identified and quantified.

3. Analytical results for QC samples, spikes, sample duplicates, initial and a continuing calibration verification standards and blanks, standard procedural (method) blanks, laboratory control samples, and Inductively Coupled Plasma (ICP) interference check samples.

4. Tabulation of instrument detection limits determined in pure water.

5. Raw data system printouts (or legible photocopies) identifying: date of analyses, analyst, parameter(s) determined, calibration curve, calibration verifications, method blanks, sample and any dilutions, sample duplicates, spikes and control samples.

6. Sample preparation/extraction/analysis logs including weights, volumes and dilutions.

8.2 Field Data Validation

Field data assessment will be accomplished by the efforts of the PQAC and/or Project Manager. The data assessment by the Project Manager or his designee will be based on the criteria that the sample was properly collected and handled according to the SAP and Section 5.

8.3 Laboratory Data Validation

Validation of laboratory generated data will be performed by a Roux Associates' subcontractor, as requested by the NYSDEC. The qualifications of this firm are provided as Attachment A-3. The Contractor data reviewer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate and blank results provided by the laboratory. An evaluation of data accuracy, precision, representativeness and completeness, based on criteria in Section 3, will be performed and presented in the summary report.

The data reviewer will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

Data validation for laboratory data will be performed in accordance with the USEPA functional guidelines for evaluating organic analyses for all samples analyzed using ASP/CLP methodology. Non-ASP/CLP analysis data will also be validated using the functional guidelines, but use of the guidelines will be modified according to the applicable method and required QA/QC. It is anticipated that all laboratory data will be validated (i.e., complete transcription checks, calculation checks, etc.).

8.4 Data Reporting

All data generated for the Site will be computerized in a database format organized to facilitate data review and evaluation. The computerized data set will include the data flags provided in accordance with the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses and Inorganic Analyses, as well as additional comments of the data reviewer for ASP/CLP analyses. For non-ASP/CLP analysis, the data will include appropriate flags based on the data validation functional guidelines. The data flags will include such items as: 1) concentration below required detection limit, 2) estimated concentration due to poor recovery below required detection limit, 3) estimated concentration due to poor spike recovery, and 4) concentration of chemical also found in laboratory blank. Selected data reviewer comments will also become part of the database in order to indicate whether the data are usable as a quantitative concentration, usable with caution as an estimated concentration, or unusable due to out-of-control QC results.

The Site data set(s) will be available for controlled access by the Project Manager, and authorized personnel. The complete data set(s) will be incorporated into the report.

9.0 QUALITY CONTROL CHECKS

The following sections describe the QC checks that are commonly applied to investigations and their definition and purpose. There are two main areas of the data gathering process which may be checked: the field procedures and the laboratory procedures. A summary of the various field and laboratory QC checks applicable to this project and their required frequencies are provided in Tables A-4 and A-5, respectively.

9.1 Field Generated Quality Control Checks

Field generated QC checks are samples sent to the laboratory from the field by either the field sampling team (internal) or by a third party (USEPA, state agency). These types of samples serve as checks on both the sampling and measurement systems, and assist in determining the overall data quality with regard to representativeness, accuracy and precision. The number and type of field QC samples submitted varies with the intended data use and the level of contamination (i.e., sample analyte concentrations) expected.

9.1.1 Internal Field Checks

Trip blank

Trip blanks generally pertain to volatile organic samples only. Trip blanks are prepared by filling a sample container with analyte-free water prior to the sampling event. The trip blanks are then transported to the field and are kept with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and sent for analysis. There should be one trip blank included in each sample shipping container for shipments with aqueous samples. The samples are used to determine if any cross-contamination between sample containers occurs. At no time after their preparation are the trip blank sample containers opened before they reach the laboratory.

Field Blank

Field blanks (also called decontamination rinsate blanks) are defined as samples which are obtained by running analyte-free water through sample collection equipment (bailer, pump, auger, etc.) after decontamination, and placing it in the appropriate sample containers for analysis. These samples are used to determine if decontamination procedures are adequate.

Duplicates

Field duplicates (also called replicates or collocates) are individual portions of the same (replicates) or essentially the same (collocated) field sample. Collocates are independent samples collected in close proximity to one another such that they are essentially an equal representation of the parameter(s) of interest at a given point in space and time. Examples of collocated samples include: samples from two air quality analyzers sampling from a common sample manifold, two water samples collected at essentially the same time and place from the same source, and side-by-side soil core samples.

Collocated samples, when collected, processed, and analyzed by the same organization, provide intra-laboratory precision information for the entire measurement system including sample acquisition, homogeneity, handling, shipping, storage, preparation and analysis. Collocated samples, when collected, processed and analyzed by different organizations, provide inter-laboratory precision information for the entire measurement system.

Replicate samples are samples from the same sampling point that have been divided into two or more portions at some step in the measurement process after sample collection. An example of a field replicate sample would be a soil core sample that has been collected, split, and placed into two or more individual sample containers.

Duplicate samples can be used to estimate the overall precision of a data collection activity. Sampling error can be estimated by the comparison of collocated and replicated results from the same sample. If a significant difference in precision between the two subsets is found, it may be attributed to sampling design error.

Blinds

Blind samples can be either internal or external field QC samples. Internal blind samples are samples of known (performance evaluation, reference) or unknown (field sample replicates) concentration sent to the laboratory as routine field samples to test laboratory performance.

Splits

Split samples can be either internal or external field QC samples. Split samples are usually replicate samples sent to different laboratories and subjected to the same environmental conditions and steps in the measurement process. They serve as an oversight function in assessing the analytical portion of the measurement system (particularly inter-laboratory precision).

9.1.2 External Field Checks

Blinds

Blind samples can be either internal or external field QC samples. External blind samples are usually samples of known (performance evaluation, reference) concentration sent to the laboratory (usually by a regulatory agency) as routine field samples to test laboratory performance.

Splits

Split samples can be either internal or external field QC samples. External split samples are replicate samples sent to different laboratories and subjected to the same environmental conditions and steps in the measurement process. They serve as an oversight function in assessing the analytical portion of the measurement system (particularly inter-laboratory precision). External split samples may be generated for regulatory agencies, local resident oversight groups, or other interested/responsible parties.

9.2 Laboratory Generated Quality Control Check Samples

Laboratory generated QC check samples are samples generated at the analytical laboratory by the laboratory personnel from the same (internal) or a different (external) laboratory. These types of samples serve as checks on the laboratory sampling and measurement systems and assist in determining the data quality with regard to laboratory accuracy and precision. The number and type of laboratory QC check samples varies with the intended data use and the level of contamination (i.e. sample analyte concentrations) expected.

Laboratory QC check samples may measure either method and/or instrument performance.

Method (preparation) performance check samples collectively measure the entire laboratory analytical data generation process, from sample allocating in the laboratory through the analysis and data reduction. Instrument (analysis) check samples measure the laboratory performance from the point where analysis begins, generally excluding any preparation/extraction affects, through the analysis and data reduction.

9.2.1 Internal Laboratory Checks

Method Blank

Method blanks (also called preparation blanks) are usually aliquots of analyte free water which are processed through all procedures, materials, reagents, and labware used for sample preparation and analysis. However, a method blank may be an aliquot of a known low level analyte matrix (such as washed sand) in order to more appropriately match the matrix of interest. Method blanks are used to determine if contaminants are present in the reagents, laboratory preparation, or analysis systems.

Reagent Blank

A reagent blank is prepared in the same manner as a method blank but is not subjected to the preparation procedures (digestion and/or extraction). Reagent blanks are used to determine the purity of the reagents used in the preparation/extraction and to isolate other contamination present in the analysis system.

Matrix Spike Blanks

Matrix spike blanks (MSBs) are aliquots of reagent water spiked with known quantities of specific compounds and subjected to the entire analytical procedure. MSBs are used to determine the appropriateness of the spiking solution used for the MS/MSDs.

Duplicates

Laboratory duplicate samples fall into two basic categories: samples run through the entire sample allocating, preparation and analysis method (method or matrix duplicates) and samples run through only the analysis method (analysis or instrument duplicates). In either case a "duplicate" is a second, additional aliquot of the same sample generated at either the pre-preparation or post-preparation step of the method and carried from that point on through the rest of the method as a routine sample. Duplicate samples are used to define either method (preparation plus instrument) or instrument precision. In some organic methods, two additional duplicate aliquots of the same sample are prepared and spiked (matrix spike and matrix spike duplicate) in lieu of a normal matrix duplicate.

Spikes

Laboratory spike samples fall into two basic categories: samples run through the entire sample allocating, preparation and analysis method (method or matrix spikes) and samples run through only the analysis method (analysis or instrument spikes). In either case a "spike" is a second, additional aliquot of the same sample generated at either the pre-preparation or post-preparation step of the method which is spiked (fortified) with a known quantity of analyte and carried from that point on through the rest of the method as a routine sample. Spiked samples are used to define either method (preparation plus instrument) or instrument accuracy.

System Monitoring Compounds

System monitoring compounds are similar to matrix spikes and generally apply only to organic parameters. System monitoring compounds are added to all samples and are used to measure the effect of the sample matrix on specific compound recoveries. System monitoring compounds generally do not effect the routine sample results since the surrogate compounds are isotopically labeled. Surrogates are used to help define accuracy.

Internal Standards

Internal standards are similar to analysis spikes and generally apply only to organic parameters and inorganic analyses by ICP. Internal standards are added to all samples (after preparation/extraction) and are used to determine the amount of variance in a measurement system due to transport, spectral, and other affects. Since the internal standard is a known quantity of analyte(s) generally not found in the environment, the results of the other analytes may be corrected for measurement system effects based on the percent recovery of the internal standard.

Control Samples

Laboratory control samples fall into two basic categories: samples run through the entire sample allocating, preparation, and analysis method (method or matrix controls) and samples run through only the analysis method (analysis or instrument controls). In either case, control samples are samples of known or certified concentration which are introduced at either the pre-preparation or post-preparation step of the method and carried from that point on through the rest of the method as a routine sample. Control samples are used to define either method (preparation plus instrument) or instrument accuracy. Examples of laboratory control samples are standard reference materials (SRMs), performance evaluation (PE) samples, laboratory control samples (LCSs), and method control samples (MCSs).

Analytical Batch

An analytical batch is a group of field and associated QC samples which are prepared (and preferably analyzed) concurrently using the exact same method, techniques, materials, reagents, labware, etc. Generally, a laboratory analytical batch is defined as twenty or fewer field samples of the same matrix prepared and processed at the same time. All associated QC samples should be prepared concurrently, and in addition to, the twenty or fewer field samples.

9.2.2 External Laboratory Checks

Round Robin Samples

Round robin samples are samples generated at one laboratory and sent to other laboratories for confirmation analysis. The "true" sample concentration is determined based on the statistical analysis of the various results reported by each laboratory. These samples are usually used to gauge accuracy. Examples of these types of samples include inter-laboratory confirmation samples, proficiency analytical testing samples (PATs), and in some cases PE samples (in order to assign "true" values for the PE sample).

Performance Evaluation Samples

Performance evaluation (PE) samples are samples of known or assumed (based on round robin analyses) known concentration which are submitted to the laboratories by certifying (e.g., American Industrial Hygiene Association) or contracting agencies (e.g., CLP). PE samples are used to test the laboratory's competence in sample analysis and/or data package documentation and assembly. In terms of data quality, the PE sample is used to measure accuracy.

9.3 Standards Preparation

Calibration standards are prepared in the laboratory by dissolving or mixing a known amount of nominally pure analyte in the appropriate matrix using volumetric containers. Calibration standards must be prepared from a standard source which is traceable to a certified primary reference material (National Institute of Standards and Technologies or other certifying agency). All calibration standards must be prepared so that the types and concentration of the reagents used in the standard preparation are equivalent to the types and concentration of the reagents used in preparing the samples to be analyzed. Calibration curves are then generated to quantify the field sample results by comparison of the field sample response against the calibration standard response.

9.4 Reagents Preparation

All reagents used for analysis must be documented to be free of significant analyte concentration (i.e., all analytes to be measured are present below required detection limits) during or prior to the use of the reagents for sample preparation or analysis. Reagent blanks or method blanks (as required by the specific method) and other associated QC samples must be prepared using the same reagent lot(s) used for the actual field sample preparation. All reagent lots used for sample and standard preparation and analysis must be documented so that any resulting contamination problems can be traced to the specific standards and samples which were prepared using the reagent lot(s).

9.5 Calibration Checks

Once the calibration of an analysis system has been established using calibration standards, it is necessary to check the analysis system initially and periodically to verify correct standard preparation and system performance. Important elements to verify before and during the course of sample analysis include the accuracy of the calibration across the range of concentrations to be measured, the sensitivity of the instrument during the specific analysis run, and other transient changes in instrument performance, such as drift and linearity. To accomplish this verification task, analytical protocols require the analysis of calibration QC samples which serve as instrument checks and as triggers for necessary corrective action.

Initial Calibration Verification Standards

The initial calibration verification standard (ICV) is usually prepared in the concentration range of greatest interest, using an agency supplied standard or an alternate standard source (i.e., a different standard manufacturer) than that used for the calibration standards. The ICV must be prepared utilizing the same reagents and reagent concentration used for both the calibration standards and field samples. The purpose of this standard is to verify the accuracy of the initial calibration before any samples are analyzed.

Continuing Calibration Verification Standards

The continuing calibration verification standard (CCV) is prepared in the same manner as the ICV, except that it generally may be from either the same source, or from an alternate source as the calibration standards. The purpose of the CCV is to provide a periodic check on the accuracy of the calibration curve during sample analysis.

Initial Calibration Blank

An initial calibration blank (ICB) is a reagent blank prepared utilizing the same reagent(s) and reagent concentration used for both the calibration standards and the field samples. The purpose of the ICB is to verify that the sensitivity of the instrument meets the required limit of quantification before any samples are analyzed.

Continuing Calibration Blank

The continuing calibration blank (CCB) is prepared in the same manner as the ICB. The purpose of the CCB is to verify both the lack of baseline drift and the instrument sensitivity during analysis.

Near Detection Limit Standard

This standard is a calibration standard prepared to be at or near the required limit of quantitation (detection limit) for the measurement system (typically at the required detection limit or two times the required detection limit). The purpose of this standard is to provide a gauge of the accuracy of the instrument/instrument calibration at or near the required limit of quantification.

Linear Range Verification Standard

The linear range verification standard is a calibration standard prepared at a concentration greater than any of the calibration standards. The purpose of this standard is to verify accuracy of the analytical system at analyte concentrations greater than the highest calibration standard. This standard is generally only applicable to analytical systems with wide ranges of linearity (typically three or more orders of magnitude), such as ICP, where calibration across the entire linear range is cumbersome or impractical.

Interference Check Sample

The interference check sample (ICS) is a standard material prepared by spiking (fortifying) a solution of analytes of interest (in the concentration range of interest) with interfering analytes of a much higher concentration. The purpose of this sample is to verify that the analytical system is free from interferences due to the interfering analytes at the concentrations of interfering analytes and analytes of interest present in the ICS.

9.6 Control Charts

Control charts are used to determine if acceptable method performance has been achieved. In general, control charts are developed for methods where a standard level of performance has yet to be established and/or set limits of performance have not been validated through multiple analyses and statistical manipulation.

The basis of a control chart is to determine an accepted mean result and the allowable variance around the accepted mean. Typically, the allowable variance is measured in terms of the "level of confidence" in a particular result. Based on a statistical analysis of the results obtained over a period of time, the mean and standard deviation of the measurements can be determined. Once these values are known, a control chart can be established using the mean as the "true" value and some multiple of the standard deviation (confidence level) as the allowable variance. For most control charts, the allowable variance is set at the 95 percent or 99 percent confidence level, meaning there is a 95 or 99 percent chance that the control sample value will fall within the range of the control window, if the method is performed correctly.

Where established limits of acceptability are not available for this project's analyses, a minimum criteria of ± 25 percent will be required for method accuracy in soil samples; and ± 35 RPD relative percent difference (RPD) for soil samples will be required for method precision. Completeness will be established at 95 percent for ASP/CLP analyses and 90 percent for non-

ASP/CLP analyses, based on the precision and accuracy criteria noted above. Table A-3 summarizes the required precision, accuracy and completeness requirements for the parameters anticipated for this project.

If no reference material with published acceptance limits meeting the criteria established above (for analyses without established limits of acceptability) is available for the specified analytical method, statistically valid control charts for the analytical method must be developed by the laboratory prior to analysis of any field samples. All field sample results reported from this analytical method must be concurrently prepared and analyzed with a laboratory generated control sample having a result within ± two standard deviations (95 percent confidence level) of the mean result established by the laboratory through the use of control charts.

9.7 Database/Electronic Media Quality Control Checks

For data entered into electronic media by laboratories and contractors other than Roux Associates, all electronic media will be verified through the data validation and authentication (if applicable) programs as described in Section 8. Hardcopy data from the laboratories and/or contractors will also be compared against the electronic media generated by these sources at the level and frequency specified in Section 8.

10.0 QUALITY ASSURANCE AUDITS

This section provides the types, frequencies and content of the various audits and audit functions to be applied to this project. Audits for the work generally consist of four types: management audits, data quality audits, technical systems audits and performance audits. These audits may be internal (performed by the same agency/organization generating the information) or external (performed by an outside agency/organization). The purpose of these audits is to establish and verify that the sampling and analysis activities are performed in accordance with the QAPP.

Project audits are intended to provide information regarding:

- on-going assessment of the data quality;
- identification of areas with a need for improvement;
- verification of QA program implementation;
- assessment of applied resources to complete the assigned tasks; and
- address changes and/or variances to procedures necessitated by the actual field or laboratory conditions.

Roux Associates is dedicated to confirmation of the specific and overall QA/QC objectives for this project through the use of management, performance and systems audits. The specific content and frequency of audits anticipated for this project are delineated below.

10.1 Management Audits

Management audits will be performed by Roux Associates personnel to determine whether the management functions and responsibilities related to environmental measurements are performed in accordance with Roux Associates' QA procedures. Management audits will include a review of the QAPP implementation for this project in order to evaluate:

- the level of management support;
- the field and analytical tracking systems;
- the procedures for developing the project DQOs;
- the procedures for developing, approving and reviewing the QAPP;
- the procedures for developing and approving SOPs; and

- the procedures and schedules for conducting audits.

Management audits are an on-going function of the Roux Associates' QA/QC procedures. Project-specific management audits for this project are the responsibility of the Project Manager and will be implemented as required for each management function. The Project Manager will review the management program and the other audit functions on a routine basis.

10.2 Data Quality Audits

Data quality audits will be performed by Roux Associates or Roux Associates' contractor personnel to determine whether data derived as part of the work are of known quality. Data quality audits will be supported by the data validation effort to determine whether or not sufficient information exists with the data set to support an assessment of data quality. Through the use of data validation and authentication (if applicable), information provided by Roux Associates and its contractors will be used to audit and evaluate:

- if a data set, or all the data sets of a particular project, met the DQOs;
- if the contractor collecting or reducing the data performed their own data quality assessment; and
- if the contractor identified deficiencies (if they existed) and corrected the cause(s), both technical and managerial.

For data generated by laboratories and contractors other than Roux Associates, all data will be verified through the data validation and authentication (if applicable) programs as described in Section 8. Hardcopy data from the laboratories and/or contractors will be checked for completeness and accuracy of data reduction at the level and frequency specified in this section. For data validation performed by Roux Associates' subcontractors, key data may be subject to additional Roux Associates validation based on its importance in decision making for the project.

All data quality functions will be subject to Roux Associates oversight to assure the accuracy and completeness of the data reduction and validation efforts. Data quality is the responsibility of the PQAC and will be implemented as required for each type of data generating activity. At a minimum, the PQAC will review the data validation effort, perform spot checks on the quality of the data validation effort, and document his/her findings.

10.3 Technical Systems Audits

Technical systems audits will be performed to determine if the field and laboratory sampling and analytical systems specified in the SAP and QAPP are sufficient to generate data which will meet the stated DQOs. These audits will include the on-site examination of field and laboratory activities for quality and conformance to the SAP and QAPP. Both internal (performed by the same agency/organization generating the information) or external (performed by an outside agency/organization) audits will be performed for both the field and laboratory systems.

10.3.1 Field Audits - Internal

The internal field audits will include examination and review of field sampling records, field instrument operating records, sample collection, handling, packaging and shipping procedures, maintenance of QA procedures, chain of custody, etc. to determine conformity to the SAP and QAPP. Internal audits of field activities (sampling and measurements) will be conducted by the Roux Associates PQAC and/or Project Manager. Should any deficiencies be discovered during the course of the audit, the PQAC will have the authority to take any necessary action, including implementing a "stop work" order, to correct the deficiency.

These internal field audits will occur at the onset of the project to verify that all established procedures are followed. Follow-up audits to correct deficiencies, and to verify that QA procedures are maintained throughout the investigation, will be conducted on a routine basis. The specific contents of these audits will be based on Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) guidelines.

10.3.2 Field Audits - External

At this time it is not anticipated that external audits of the field activities will be necessary. However, if the internal audits determine that deficiencies exist which require an outside organization or agent to resolve the problem(s), Roux Associates will employ the services of an outside subcontractor to audit the field activities and make/suggest corrections to the problem.

10.3.3 Laboratory Audits - Internal

The internal laboratory system audits will be performed by the Laboratory QA Officer on at least an annual basis (at a minimum) and will include examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain of custody procedure, sample preparation and analysis, instrument operating records, etc. as described in the laboratory QA Plan (if applicable) or according to the guidelines set forth in the ASP/CLP Bid Package documentation regarding laboratory QA requirements.

10.3.4 Laboratory Audits - External

For this project it is anticipated that only laboratories currently meeting the criteria set forth for the ASP/CLP will be used for off-site sample analyses. These laboratories will have already been subject to a laboratory audit by USEPA personnel and it is not anticipated that an additional audit by Roux Associates or Roux Associates' subcontractor personnel will be required. However, should any laboratory be selected which has not been audited by the ASP/CLP, or an equivalent audit (state or other federal agency), in the last 12 months, Roux Associates or its contractor personnel will perform a laboratory audit using the guidelines set forth in the ASP/CLP Bid Package documentation prior to that laboratory performing any field sample analyses.

10.4 Performance Evaluation Audits

The internal performance audits of the laboratory(ies) will be conducted by the Laboratory QA Officer. The performance audits will be conducted on at least a quarterly basis. Blind QC samples will be prepared and submitted along with project samples to the laboratory for analysis throughout the project. The Laboratory QA Officer will evaluate the analytical results of these blind performance samples to ensure the laboratories maintain a good performance.

External performance audits of the laboratories selected for the project will have already been performed by the ASP/CLP for some or all of the analytes being tested. These performance evaluation audits may be supplemented by the use of field-generated blind QC samples (replicates) submitted by Roux Associates.

Internal performance evaluation audits of the field measurements performed by Roux Associates' personnel may be utilized if suitable reference solutions are available for the specific project activities. These types of checks could include analysis of "blind" calibration span gases for PID measurements, or analysis of USEPA Environmental Monitoring Systems Laboratory aqueous check samples for pH and specific conductivity.

For laboratory checks, tolerance limits for the performance evaluation samples will be based on the accepted values supplied with the check sample/standard. For the field checks, the tolerance limits will also be based on the accepted values supplied with the check sample/standard, but may be modified as necessary to take into account the less quantitative (screening) nature of the field analytical measurements.

11.0 PREVENTATIVE MAINTENANCE PROCEDURES

The preventative maintenance procedures described below are designed to prevent injury and loss of time and data due to faulty equipment/instrumentation. The purpose of preventative maintenance is to address potential problems before they occur and to help assure that equipment/measurement systems operate adequately when used for routine project activities.

11.1 Field Equipment/Instruments

The planned field instruments for this project include a PID and gamma logger. Specific preventative maintenance procedures to be followed for this and other field equipment are those recommended by the manufacturer and described in the applicable Roux Associates SOPs.

Table A-7 summarizes the relevant preventive maintenance procedures for specific pieces of field equipment to be used for sampling, monitoring, and documentation for this project.

Field instruments will be checked and calibrated before the start of the project. These instruments will be checked and calibrated in the field on a daily basis before and after use. Calibration checks will be performed and will be documented in the field logbook.

11.2 Laboratory Instruments

As part of their QA/QC Program, the laboratory will conduct a routine preventative maintenance program to minimize the occurrence of instrument failure and other system malfunctions.

These procedures will be documented in the laboratory QA Plan (Attachment A-1). Roux Associates will perform oversight of the laboratory maintenance program through the audit functions described in Section 10.

11.3 Documentation

Appropriate documentation of all equipment/instrument maintenance shall be maintained by the field and laboratory personnel and shall include what was done, date, time (if appropriate), next scheduled maintenance, equipment status, anomalies, and person performing maintenance. This documentation shall be entered into field logbooks, or into specific maintenance log forms for off-site maintenance activities.

12.0 SPECIFIC AND ROUTINE PROCEDURES TO ASSESS DATA QUALITY OBJECTIVES

This section will describe the specific methods and equations used to assess the quality of the data with regard to precision, accuracy and completeness. Previous sections in the QAPP have defined the terms of the PARCC parameters, described the methods of data reduction and validation, and described the types and frequencies of the various audit activities (see Sections 3, 8 and 10).

The procedures used to assess the DQOs as outlined in this QAPP were developed to generate data which meets the specific needs of the project. Through the use of a systematic method of data assessment, data of known quality will be produced and applied to the project needs based on the actual data quality.

By subjecting the data to standard calculations and validation guidelines, the usability of the data are enhanced when comparison against past, present or future data is necessary. Actual use of any data for specific project purposes will be determined by the Project Manager in coordination with the PQAC, based on the required data quality needs for a particular data set (i.e., matrix type, concentration level, intended data use, quantification accuracy and precision needs, etc.).

12.1 Specific Assessment Parameters

The following sections list the parameters which will be assessed and the calculations applicable to the specific measurement. The acceptable limits for the individual parameters (for both field and laboratory analyses) are discussed in Sections 3 and 9.

Accuracy:

Accuracy of laboratory results will be assessed using the analytical results of method blanks, reagent blanks, matrix spikes, field blanks, bottle blanks, near detection limit and linear range standards, etc. The percent recovery (%R) of analysis and matrix spike samples will be calculated using the following equation:

$$\%R = \frac{A - B}{C} X\ 100$$

Where: A = The analyte concentration determined experimentally in the spiked sample;

B = The analyte concentration determined by a separate analysis of the unspiked sample; and

C = The amount of analyte added in the spike.

Precision:

Precision will be assessed by calculating the relative percent difference (RPD) between the field and/or laboratory duplicate samples (e.g. field duplicates and/or splits, laboratory matrix spike/matrix spike duplicate [MS/MSD] for organic analysis, and laboratory duplicate analyses for inorganic analysis). The RPD will be calculated for each pair of duplicates using the following equation:

$$RPD = \frac{S - D}{(S + D)/2} X\ 100$$

Where: S = First sample value (original or MS value)

D = Second sample value (duplicate or MSD value)

Completeness:

Completeness measures of the amount of valid data obtained from a measurement system compared to the amount of data expected to be obtained under normal conditions. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$Completeness = \frac{Valid\ Data\ Obtained}{Total\ Data\ Planned} X\ 100$$

Representativeness:

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, and parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network for this project was designed to provide data representative of Site conditions. During development of the sampling network, consideration was given to past waste disposal practices, existing analytical data, and physical setting and processes.

Representativeness of the data will be assessed by the Project Manager and the PQAC through review and comparison of the applicable data (field and laboratory duplicates, splits, spikes, PE samples, etc.) and by verifying that the design set forth in the Work Plan was followed for all data generated during the project activities.

Comparability:

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends in part on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPP, are expected to provide comparable data for these project activities (i.e., intra-project comparison). These new analytical data, however, may not be directly comparable to existing data because of differences in procedures and QA objectives.

Assessment of statistical comparability will be based primarily on the use of field splits and internal and external PE samples.

Required Limit of Quantitation (Detection Limit):

The required limits of quantitation for the various analyses are found in Table A-3. For ASP/CLP analyses, these detection limits shall be arrived at using the methodology set forth in the specific statement of work for that parameter. For non-ASP/CLP analyses, the detection limit(s) shall be arrived at using either the ASP/CLP methodology (as applied to a particular analysis other than the ASP/CLP specified methods) or using a "standard" method based on the general guidelines presented below.

- The limit of quantitation shall be based on the variability of the blank response for the complete analytical procedure, or the variability for the signal-to-background response in a processed sample when there is not a detectable blank response. The detection limit will be established as three times the standard deviation of the blank or background response, adjusted for the amount of sample typically extracted and the final extract volume of the method (i.e., all dilutions and sample weight variables must be included in the calculation).

- Best professional judgment shall be used to adjust the limit of detection upward in cases where the transient occurrence of high instrument precision (i.e., low variability) results in a calculated limit of detection less than the absolute sensitivity of the analytical instrument. When no significant blank response is detectable, the limit of detection shall be estimated based on the standard deviation of low-level standard (concentrations at or near the expected instrument detection limit) responses.

12.2 Management of DQO Assessment

Assessment of the on-going ability to generate data of a known quality will be the primary responsibility of the PQAC and will be overseen by the Project Manager. As discussed previously in Sections 8 and 10, Roux Associates will be responsible for performing audits for technical systems and data quality on an on-going basis.

13.0 CORRECTIVE ACTIONS

Corrective action generally addresses the need to bring data generating systems back into conformance after some trigger or other criteria have shown the system to be out of conformance. The following paragraphs describe the mechanics of how corrective action will be managed and implemented during the course of this project.

Corrective actions may be required for two classes of problems: analytical and equipment functional problems, and noncompliance problems. Analytical and equipment functional problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review. The need for laboratory analysis corrective actions is based on predetermined limits for acceptability (Section 3). By conducting system and performance audits, the Laboratory QA Officer will determine if the overall data generating systems are acceptable (Sections 9 and 10).

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the PQAC and/or Project Manager. If the problem is analytical in nature, information on these problems will be promptly communicated to the Laboratory QA Officer and method specific corrective actions will be implemented.

13.1 Field Corrective Action

Corrective actions will be implemented by field personnel and documented in the field record book. No staff member will initiate corrective action without notification through the proper channels. If corrective actions are insufficient, a stop-work order may be issued by the Project Manager.

Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformance, or suspected deficiencies of any activity (or issued document) by reporting the situation to the Project Manager or designee. The Project Manager will be responsible for assessing the suspected problems in consultation with the PQAC and Project Manager, and for making decisions based on the potential for the situation to impact the quality of the data. If it is

determined that the situation warrants a reportable nonconformance and/or requires corrective action, then a nonconformance report will be initiated by the field personnel and submitted to the Project Manager for review.

The Project Manager will be responsible for ensuring that corrective action for nonconformances are initiated by:

- evaluating all reported nonconformances;
- controlling additional work on nonconforming items;
- determining disposition or action to be taken;
- maintaining a log of nonconformances;
- reviewing nonconformance reports and corrective actions taken; and
- ensuring nonconformance reports are included in the Site documentation project files.

If appropriate, the Project Manager will ensure that no additional work which is dependent on the nonconforming activity be performed until the corrective actions are completed.

Corrective action for field measurements may include the following:

- repeat the measurement to check the error;
- check for all proper adjustments for ambient conditions such as temperature;
- check the batteries;
- recalibration;
- check the calibration;
- replace the instrument or measurement devices; and
- stop work (if necessary).

The Project Manager or his designee is ultimately responsible for all Site activities. In this role, the Project Manager at times is required to adjust the Site programs to accommodate the Site program specific needs. The change in the program will be documented on the Field Change Request form (Attachment A-5) that will be signed by the initiators and the Project Manager or

designee. The Field Change Request shall be attached to the file copy of the affected document. The Project Manager and the PQAC must approve the change in writing or verbally prior to the field implementation, if feasible. If unacceptable, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices and appropriate action will be taken by the Project Manager to document the significance of the problem.

The Project Manager is responsible for the controlling, tracking, and implementation of the identified changes. Reports on all changes will be distributed to all affected parties.

13.2 Laboratory Corrective Action

Corrective action is required whenever an out-of-control event or potential out-of-control event is noted. The corrective action taken will be somewhat dependent on the analysis and the event. These actions are to be implemented in accordance with the Laboratory QA Plan in Attachment A-1 and the ASP/CLP SOWs, as appropriate and applicable.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reports serve the purpose of identifying, tracking and summarizing any field and laboratory activities which occur during the project. These reports provide a permanent record which addresses the adequacy of the QAPP, problems or deficiencies noted during audits, and resolution of the identified areas of concern. The following sections provide a summary of the report contents and frequency requirements for the writing and submission of QA reports.

14.1 Specific Quality Assurance Reports

In addition to the audit reports submitted to the Project Manager in accordance with Section 10, a QA progress report will be submitted periodically to the Project Manager by the PQAC which addresses the identification or resolution of all QA issues occurring over that time period. If a project lasts less than two months, only a final QA report will be submitted. The final QA report will be incorporated into the final project report and will contain QA progress report sections that summarize data quality information collected during the project.

Each periodic or final QA report will include the following types of information: purpose and scope of report, time frame covered, project status (overall and by task if applicable), results of any data quality or other audits conducted during the time period, problem identification/updates/resolution, QAPP changes, project-related training activities, visits by third party organizations, sources of additional information, and who receives the reports.

14.2 Quality Assurance Report Management

The Project Manager will be responsible for assuring that the frequency and content of the report(s) are met. Applicable sections of the report will be sent to the PQAC and the Health and Safety Manager for approval/disapproval. Any deficiencies found in the QA reports will be brought to the attention of the Corporate Quality Assurance Officer and will require correction within 14 days for periodic reports, or within one month for final reports.

The submission of QA reports will be included in the overall project management schedule as critical path points to assist in meeting the QA objectives for this project.

15.0 REFERENCE

United States Environmental Protection Agency. 1994. Guidance for the Data Quality Objectives Process, EPA QA/G-4, September 1994.

Table A-1. Sample Types/Analyses by Task, Ron Hill Dry Cleaner Site, Glen Cove, New York

Task	Media	Field Analyses	Laboratory Analyses
Task 4 - Soil Vapor Survey	Soil Vapor	PID[1] screening	TCL[2] VOCs [3],
Task 5 - Shallow Soil Investigation	Soil	PID[1] screening	TCL VOCs
Task 6 - Deep Soil Borings	Soil Ground Water	PID screening	TCL VOCs
Task 7 - Vertical Ground Water Profiling	Ground Water	PID screening, pH, specific conductance, temperature, turbidity	TCL VOCs
Task 10 – Sample New and Existing Monitoring Wells	Ground Water	PID Screening	TCL VOCs

(1) Photoionization Detector - screens for volatile organic compounds
(2) Target compound list
(3) Volatile organic compounds

Table A-2 Projected Number of Field Samples, Ron Hill Dry Cleaner Site, Glen Cove , New York								
Task	**Media Sampled**	**Parameter**	**Field Samples**	**Field Duplicates[a]**	**Field Blanks[b]**	**Trip Blanks[c]**	**MS/MSD/ MSB[d]**	**Total Laboratory Samples**
4 – Soil Vapor Survey	Soil	TCL VOCs	15	1	1	-	1/1/1	20
5 – Shallow Soil Investigation	Soil	TCL VOCs	30	2	2	-	2/2/2	40
6 - Deep Soil Borings	Soil Ground Water	TCL VOCs TCL VOCs	12 12	1 1	1 1	- 1	1/1/1 1/1/1	17 18
7 - Vertical Ground Water Profiling	Ground Water	TCL VOCs	12	1	1	1	1/1/1	18
10 - Sample New and Existing Monitoring Wells	Ground Water	TCL VOCs	10	1	1	1	1/1/1	16

(a) Field duplicate frequency based on one per twenty field samples, or one per day, which ever is more frequent.
(b) Field blank frequency based on one per twenty field samples, or one per day, which ever is more frequent.
(c) The number of trip blanks is estimated due to requirement of one trip blank per cooler
(d) Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Table A-3. Project Quality Control Summary, Ron Hill Dry Cleaner Site, Glen Cove, New York

Parameter	Matrix	Quantitation Limit[a]	Estimated Accuracy	Estimated Precision[b]	Completeness	Analysis Method
TCL Volatile Organics	Water	10 µg/L	58-137%[c]	24 RPD	95%	ASP 95-1
TCL Volatile Organics	Soil	5 to 10 µg/Kg[d]	52-172%	24 RPD	95%	ASP 95-1

ug/L - microgram per liter
ug/kg - microgram per kilogram
Quantitation limits are based on Analytical Services Protocol procedures and Contract Laboratory Program (CLP) Statement of Work requirements (where applicable), or on method references. Limits for soil are based on nominal wet weight of the sample. Dry weight limits will be higher.
(a) Actual limits for matrix spikes, system monitoring compounds, and laboratory control samples are provided in the ASP/ CLP SOW or cited method.
(b) CLP Statement of Work
(c) Actual limits for matrix spikes, surrogates and laboratory control samples are provided in the CLP SOW.
(d) Limits are based on nominal weight of sample. dry Weight limits will be higher.

Table A-4 Field Quality Control Sample Frequency, Ron Hill Dry Cleaner Site, Glen Cove, New York					
Parameters	**Media**	**Trip Blank[a]**	**Field Blank[b]**	**Field Duplicates[c]**	**MS/MSD**
TCL Volatile Organic Compounds	Water	1/20	1/20	1/20	1/20
TCL Volatile Organic Compounds	Soil	NA	1/20	1/20	1/20
pH/temperature/specific conductance[d]	Water	NA	NA	1/20	N/A

(a) One per shipment container.
(b) Where applicable, one per twenty or fewer samples.
(c) Where applicable, one per twenty or fewer samples.
(d) Field parameters.

Table A-5. Laboratory Quality Control Sample Frequency, Ron Hill Dry Cleaner Site, Glen Cove, New York

Parameter	Media	Method Blank[a]	MS/MSD[a]	Laboratory Replicate[a]	Analysis Method
TCL Volatile Organic Compounds	Soil	1/20	1/20	NA	ASP 95-1[b]
TCL Volatile Organics	Water	1/20	1/20	1/20	ASP 95-1[b]

(a) Where applicable, one per twenty or fewer field samples, or one per analytical batch, whichever is more frequent
(b) Analytical Services Protocol
(c) Contract Laboratory Program Statement of Work
(d) Test Methods for Evaluating Solid Wastes
(e) Standard Methods for the Examination of Water and Wastewater

Table A-6. Preservation, Holding Times and Sample Containers, Ron Hill Dry Cleaner Site, Glen Cove, New York

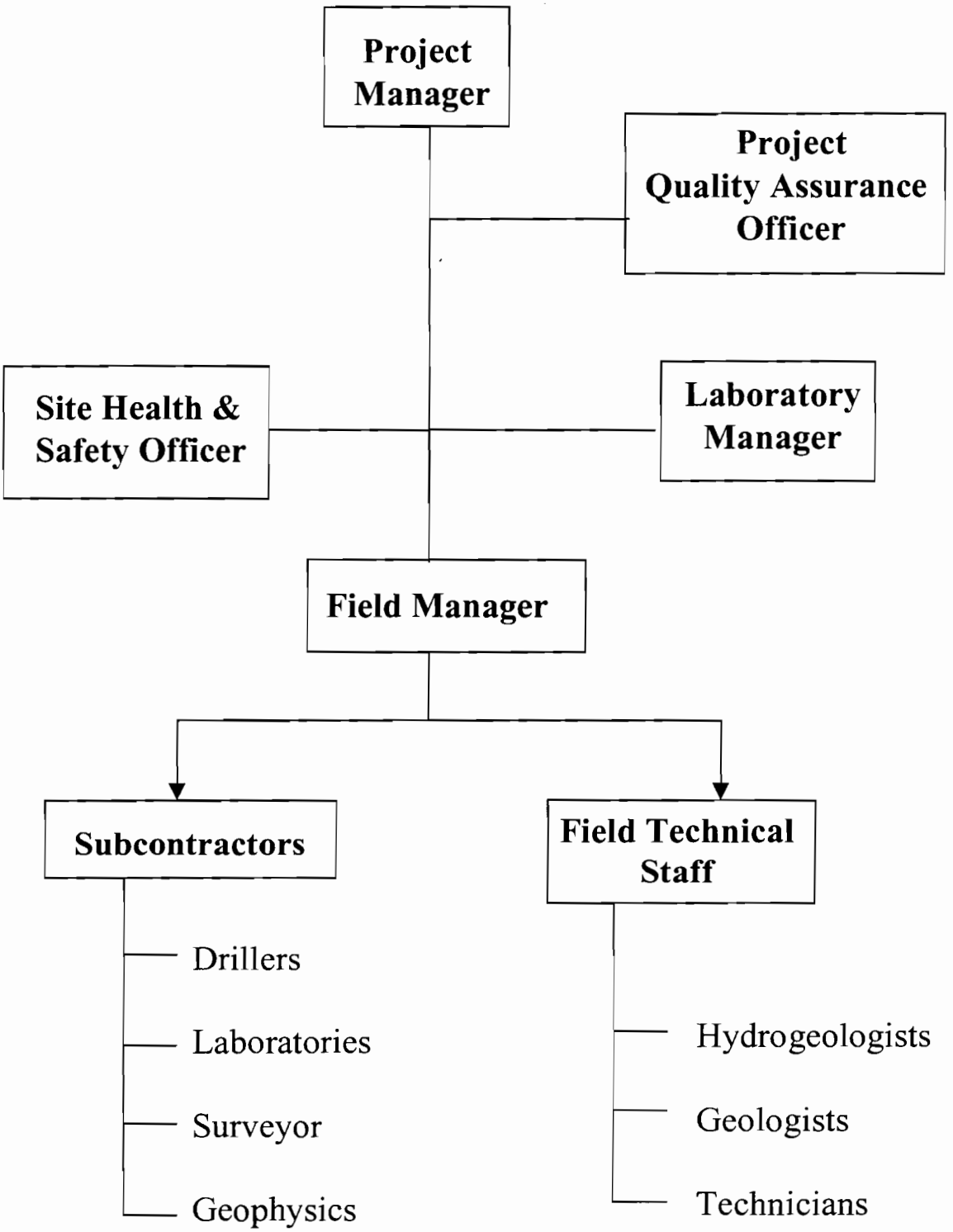
Parameter	Preservation	Holding Time[a]	Containers
Aqueous VOCs	4°C store in dark	7days	2 x 40 ml vials w/teflon septum
Soil VOCs	4°C until extraction and analysis	7 days[b]	4 oz jar w/teflon lined lid

(a) From collection until analysis unless otherwise specified.
(b) 14 days from field to TCLP extraction/14 days from extraction to analysis.

Table A-7. Field Equipment Calibration Requirements and Maintenance Schedule, Ron Hill Dry Cleaner Site, Glen Cove, New York

Equipment Type	Calibration Requirements	Maintenance Schedule
PID	Per Manufacturer's Instructions	Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories.
pH Meter	Per Manufacturer's Instructions	Per manufacturer's specifications and as needed based on calibration checks.
Specific Conductance Meter	Per Manufacturer's Instructions	Per manufacturer's specifications and as needed based on calibration checks.
Thermometer	Per Manufacturer's Instructions	Regularly check for breakage.
Personal Protective Equipment	Per Manufacturer's Instructions	Integrity/function test prior to donning equipment. Visual inspection for defects/leakage for all reusable gear.

Figure A-1: Project Organization Chart



ATTACHMENT A-1

Analytical Laboratory Quality Assurance Plan

ACCUTEST

Quality Assurance Plan

February 1999

Document Control Number:_____

Accutest Laboratories
Dayton, New Jersey

Introduction

The Accutest Laboratories Quality Assurance Program, detailed in this plan, has been designed to meet the requirements of ISO Guide 25. The plan establishes the framework for documenting the requirements of the quality processes regularly practiced by the Laboratory. Changes to the Quality Assurance Program are appended to the plan as they occur. The plan is reviewed annually for compliance purposes and edited if necessary.

The Accutest plan is supported by standard operating procedures (SOPs), which provide specific operational instructions on the execution of each quality element and assure that compliance with the requirements of the plan are achieved. Accutest employees are responsible for knowing the requirements of the SOPs and applying them in the daily execution of their duties. These documents are updated as changes occur and the staff is trained to apply the changes.

At Accutest, we believe that satisfying client requirements and providing a product that meets or exceeds the standards of the industry is the key to a good business relationship. However, client satisfaction cannot be guaranteed unless there is a system that assures the product consistently meets its design requirements and is adequately documented to assure that all procedural steps are executed and are traceable.

This plan has been designed to assure that this goal is consistently achieved and the Accutest product withstands the rigors of scrutiny that are routinely applied to analytical data and the processes that support its generation.

Table of Contents

Section	Title	Page
1.0	Quality Policy	1
2.0	Organization	2
3.0	Quality Assurance Relationships and Responsibilities	4
4.0	Job Descriptions Of Key Staff	6
5.0	Signatory Approvals	9
6.0	Documentation	11
7.0	Reference Standard Traceability	14
8.0	Test Procedures, References, and Regulatory Programs	16
9.0	Sample Management, Login, Custody, and Storage	22
10.0	Laboratory Instrumentation and Measurement Standards	28
11.0	Calibration, Calibration Checking, And Maintenance	32
12.0	Quality Control Parameters, Procedures, and Corrective Action	33
13.0	Corrective Action System	38
14.0	Procedures For Executing Client Specifications	40
15.0	Client Complaint Resolution Procedure	42
16.0	Confidentiality Protection Procedures	43
17.0	Quality Audits And Quality System Reviews	45

ACCUTEST

1.0 QUALITY POLICY

1.1 ***Accutest Mission***:

Accutest Laboratories provides analytical services to commercial and government clients in support of environmental monitoring and remedial activities as requested. The Laboratory's mission is dedicated to providing reliable data that satisfies clients requirements as explained in the following:

"Provide easy access, high quality, analytical support to commercial and government clients which meet or exceeds data quality objectives and provides them with the data needed to satisfy regulatory requirements and/or make confident decisions on the effectiveness of remedial activities."

1.2 ***Policy Statement***:

The management and staff of Accutest Laboratories share the responsibility for product quality. Accordingly, Accutest's quality assurance program is designed to assure that all processes and procedures, which are components of environmental data production, meet established industry requirements, are adequately documented from a procedural and data traceability perspective, and are consistently executed by the staff. It also assures that analytical data of known quality, meeting the quality objectives of the analytical method in use and the data user's requirements, is consistently produced in the laboratory. This assurance enables the data user to make rational, confident, cost-effective decisions on the assessment and resolution of environmental issues.

The laboratory QA program also provides the management staff with data quality and operational feedback information. This enables them to determine if the laboratory is achieving the established quality and operational standards, which are dictated by the client or established by regulation. The information provided to management, through the QA program, is used to assess operational performance from a quality perspective and to perform corrective action as necessary.

Vincent J. Pugliese	William Sherding	David N. Speis
President	Laboratory Director	Director, Quality Assurance

2.0 ORGANIZATION

2.1 ***Organizational Entity***. Accutest Laboratories is a privately held, independent testing laboratory founded in 1956 and registered as a New Jersey Corporation. The laboratory is located in Dayton, New Jersey where it has conducted business since 1987. Satellite laboratories are maintained in Marlborough, Massachusetts and Orlando, Florida.

2.2 ***Management Responsibilities***

Requirement: Each laboratory facility will have an established chain of command. The duties and responsibilities of the management staff are linked to the President/CEO of Accutest Laboratories who establishes the agenda for all company activities.

President/CEO. Primary responsibility for all operations and business activities. Delegates authority to laboratory directors, general managers, and quality assurance director to conduct day to day operations and execute quality assurance duties. Each of the three operational entities (New Jersey, Florida, and Massachusetts) reports to the President/CEO.

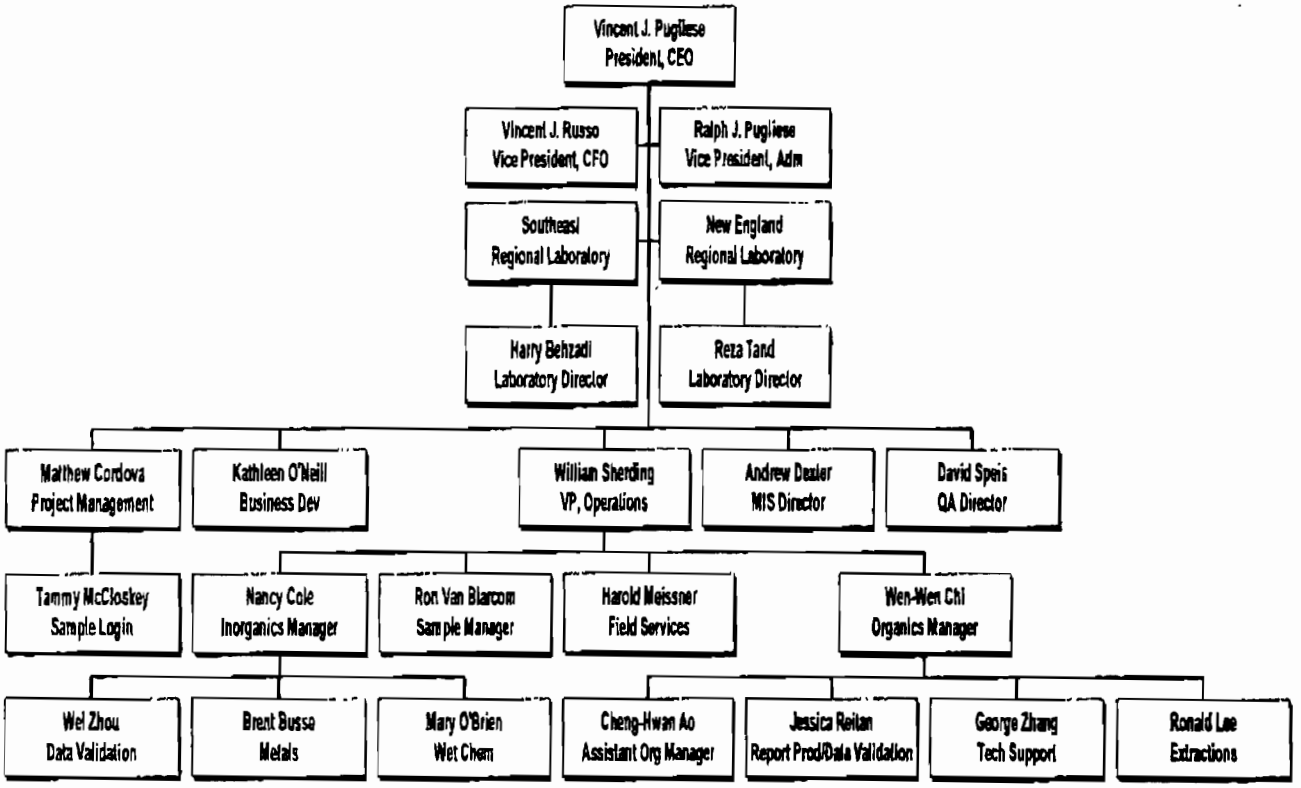
Vice President Operations/Laboratory Director. Executes day to day responsibility for laboratory operations including technical aspects of production activities and associated logistical procedures. Direct report to the President/CEO.

Quality Assurance Director. Design, oversight, and facilitation responsibility for all quality assurance activities established by the Quality Program. Direct report to the President/CEO.

Department Managers. Executes day to day responsibility for specific laboratory areas including technical aspects of production activities and associated logistical procedures. Direct report to the laboratory director.

Section Supervisors. Executes day to day responsibility for specific laboratory units including technical aspects of production activities and associated logistical procedures. Direct report to the unit manager.

Organization Chart



3.0 QUALITY RESPONSIBILITIES OF THE MANAGEMENT TEAM

3.1 ***Requirement***: Each member of the management team has a defined responsibility for the Quality Program. Program implementation and operation is designated as an operational management responsibility. Program design and implementation is designated as a Quality Assurance Responsibility.

President/CEO. Primary responsibility for all quality activities. Delegates program responsibility to the Quality Assurance Director. Serves as the primary alternate in the absence of the Quality Assurance Director. Has the ultimate responsibility for implementation of the Quality Program.

Vice President Operations/Laboratory Director. Responsible for implementing and operating the Quality Program in all laboratory areas. Responsible for the design and implementation of corrective action for defective processes. Has the authority to delegate Quality Program implementation responsibilities.

Quality Assurance Director. Responsible for design, implementation support, training, and monitoring of the quality system. Identifies product, process, or operational defects using statistical monitoring tools and processes audits for elimination via corrective action. Monitors implemented corrective actions for compliance.

Department Managers. Responsible for applying the requirements of the Quality Program in their section and assuring subordinate supervisors and staff apply all program requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Section Supervisors. Responsible for applying the requirements of the Quality Program to their operation and assuring the staff apply all program requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Bench Analysts. Responsible for applying the requirements of the Quality Program to the analyses they perform, evaluating QC data and initiating corrective action for quality control deficiencies within their control. Implements global corrective action as directed by superiors.

3.2 ***Program Authority***:

Authority for program implementation originates with the President/CEO who bears ultimate responsible for program design, implementation, and enforcement of requirements. This authority and responsibility is delegated to the Director of Quality Assurance who performs quality functions independently without the

encumbrances or biases created by operational or production responsibilities to ensure an honest, independent assessment of quality issues.

3.3 ***Technical Ethics Policy***:

Accutest Laboratories provides analytical chemistry services on environmental matters to the regulated community. The data the company produces provides the foundation for determining the risk presented by a chemical pollutant to human health and the environment. The environmental laboratory business is dependent upon the accurate portrayal of environmental chemistry data. The process is reliant upon a high level of scientific and personal ethics.

It is essential to the Company that each employee understands the ethical and quality standards required to work in this industry. Accordingly, Accutest has adapted the following ethical code to which each employee is expected to adhere.

- To perform chemical and microbiological analysis using accepted scientific practices and principles.
- To be above personal compromise, inspiring confidence and honesty.
- To maintain professional integrity as an individual.
- To provide services in a confidential, honest, and forthright manner.
- To produce results that are accurate and defensible.
- To report information without any considerations of self-interest.
- To comply with all pertinent federal, state and local laws and regulations associated with assigned tasks and responsibilities.

Accutest employees receive technical ethics training during new employee orientation. Each employee is required to sign an ethical conduct agreement, which verifies their understanding of Accutest's ethics policy and their ethical responsibilities.

4.0 JOB DESCRIPTIONS OF KEY STAFF

4.1 ***Requirement***: Descriptions of key positions within the organization must defined to ensure that clients and staff understand duties and the responsibilities of the management staff and the reporting relationships between positions.

President/Chief Executive Officer. Responsible for all laboratory operations and business activities. Establishes the company mission and objectives in response to business needs. Direct supervision of the Vice President of Operations, each laboratory director, client services, management information systems, and quality assurance.

Vice President, Operations/Laboratory Director. Reports to the company president. Establishes laboratory operations strategy. Direct supervision of organic chemistry, inorganic chemistry, field services, and sample management. Operational responsibility for Orlando, Florida and Marlborough, Massachusetts laboratories.

Director, Quality Assurance. Reports to the company president. Establishes the company quality agenda, develops quality procedures, provides assistance to operations on quality procedure implementation, monitors the quality system and provides quality system feedback to management to be used for process improvement.

Director, Management Information Systems (MIS). Reports to the company president. Develops the MIS software and hardware agenda. Provides system strategies to compliment company objectives. Maintains all software and hardware used for data handling.

Manager Client Services. Reports to the company president. Establishes and maintains communications between clients and the laboratory pertaining to client requirements which are related to sample analysis and data deliverables. Initiates client orders and supervises sample login operations.

Manager, Organics. Reports to the laboratory director. Directs the operations of the organics group, consisting of organics preparation and instrumental analysis. Establishes daily work schedule. Supervises method implementation, application, and data production. Responsible for following Quality Program requirements. Maintains laboratory instrumentation in an operable condition.

Manager, Inorganics. Reports to the laboratory director. Directs the operations of the inorganics group, consisting of wet chemistry and the metals laboratories. Establishes daily work schedule. Supervises method implementation, application,

and data production. Responsible for following Quality Program requirements. Maintains laboratory instrumentation in an operable condition.

Manager, Field Services. Reports to the laboratory director. Conducts field sampling and analysis of "analyze immediately" parameters in support of ongoing company projects. Responsible for proper collection, preservation, documentation and shipment of field samples. Maintains field sampling and field instrumentation required to perform primary responsibilities.

Manager, Sample Management. Reports to the laboratory director. Develops, maintains and executes all procedures required for receipt of samples, verification of preservation, and chain of custody documentation. Responsible for maintaining and documenting secure storage, delivery of samples to laboratory units on request, and disposal following completion of all analytical procedures.

Supervisor, Wet Chemistry. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for wet chemistry parameters using valid, documented methodology. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements.

Supervisor, Metals. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for metallic elements using valid, documented methodology. Documents all procedures and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements.

Supervisor, Organic Preparation. Reports to the organics manager. Executes the daily sample preparation schedule. Performs the extract of multi-media samples for organic constituents using valid, documented methodology. Prepares documentation for extracted samples. Assumes custody until transfer for analysis.

Technical Support Supervisor, Organics. Reports to the organic manager. Oversees all instrument maintenance and new equipment installation. Conducts method development and implementation tasks.

Assistant Manager, Organics. Reports to the organics manager. Expedites the analysis of samples and sample extracts. Executes daily analysis schedule. Supervises the analysis of samples for organic parameters using valid, documented methodology. Documents all data and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements.

4.2 ***Orientation and Training***.

New employees receive orientation training beginning the first day of employment by the Company. Orientation training consists of initial health and safety training and a detailed review of the chemical hygiene plan. During the first month, new employees also receive quality assurance program training, technical ethics training, and an overview of the Company's goals, objectives, mission, and vision.

All technical staff receive training to develop and demonstrate proficiency for the methods they perform. New analysts work under supervision until the supervisory staff is satisfied that a thorough understanding of the method is apparent. Organic analysts are required to demonstrate method proficiency through a precision and accuracy study. Data from the study is compared to method acceptance limits. If the data is unacceptable, additional training is required. The analyst must also demonstrate the ability to produce acceptable data through the analysis of an independently prepared proficiency sample.

Proficiency is demonstrated annually. Data from initial and continuing proficiency demonstration is archived in the individual's training folder.

5.0 SIGNATORY APPROVALS

Requirement: Procedures are required for establishing the traceability of data and documents. The procedure consists of a signature hierarchy, indicating levels of authorization for signature approvals of data and information within the organization. Signature authority is granted for approval of specific actions based on positional hierarchy within the organization and knowledge of the operation that requires signature approval. A log of signatures and initials of all employees is maintained for cross-referencing purposes.

5.1 *Signature Hierarchy*.

President/Chief Executive Officer. Authorization for contracts and binding agreements with outside parties. Approval of final reports, quality assurance policy, SOPs, project specific QAPs, data review and approval in lieu of technical managers.

Vice President, Operations/Laboratory Director. Approval of final reports and quality assurance policy in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers. Technical policy.

Director, Quality Assurance. Approval of final reports and quality assurance policy in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers.

Director, Management Information Systems (MIS). Department specific supplies purchase. MIS policy.

Manager, Sample Management. . Initiation of laboratory sample custody and acceptance of all samples. Approval of department policies and procedures. Department specific supplies purchase. Waste manifesting and disposal.

Manager Client Services. QAP and sampling and analysis plan approval. Project specific contracts, pricing, and price modification agreements. Approval and acceptance of incoming work, Client services policy.

Managers, Technical Departments. Methodology and department specific QAPs. Data review and approval, department specific supplies purchase. Technical approval of SOPs.

Assistant Managers: Technical Departments. Data review approval, purchasing of expendable supplies.

Supervisor, Field Services. Sampling plan design approval. Data review for field parameters. State form certification. Department policies and procedures. Department specific supplies purchase.

Supervisors, Technical Departments. Data review approval, purchasing of expendable supplies.

5.2 ***Signature Requirements***. All laboratory activities related to sample custody and generation or release of data must be approved using either initials or signatures. The individual, who applies his signature or initial to an activity or document, is authorized to do so within the limits assigned to them by their supervisor. All signatures and initials must be applied in a readable format that can be cross-referenced to the signatures and initials log if necessary.

5.3 ***Signature and Initials Log***. The HR group maintains a signature and initials log. New Employee signatures and initials are appended to the log on the first day of employment. Signature of individuals no longer employed by the company are retained, but annotated with their date of termination.

6.0 DOCUMENTATION

Requirement: Policies and procedures for the control, protection, and storage of any information related to the production of analytical data to assure its integrity and traceability must be established and practiced.

6.1. ***Form Generation & Control***. The quality assurance group approves all forms used as either stand-alone documents or in logbooks to ensure their traceability. The administrative secretary maintains approved forms in a master directory. Approved forms will be assigned a 5-charachter alpha-numeric code. The first two alpha characters designate the department that uses the form; the next three digits are a sequentially assigned number.

New forms must include the name Accutest Laboratories and appropriate spaces for signatures of approvals and dates. Further design specifications are the responsibility of the originating department.

Technical staff is required to complete all forms to the maximum extent possible. If information for a specific item is unavailable, the analyst is required to "Z" the information block. The staff is also required to "Z" the uncompleted portions of a logbook or logbook form if the day's analysis does not fill the entire page of the form.

6.2 ***Logbook Control***. All laboratory logbooks are controlled documents that are comprised of approved forms used to document specific processes. Logbook control is maintained by quality assurance.

New logs are numbered and issued to a specific individual who is assigned responsibility for the log. Old logs are returned to QA for entry into the document archive system where they are retained for seven (7) years. Laboratory staff may hold a maximum of two consecutively dated logbooks of the same type in the laboratory including the most recently issued book to simplify review of recently completed analysis.

6.3 ***Report and Data Archiving***. Accutest Laboratories maintains copies of original reports in archive for a period of seven (7) years. After seven years, the reports are automatically discarded unless contractual arrangements exist which dictate different requirements.

Acculest archives the original report (organized by job number) and the organic and inorganic support data. Organic support data is archived according to instrument batch numbers. Wet chemistry support data is archived by test organized monthly. Metals support data is archived by batch number. Metals digestion data is archived by month.

The reports generation group places copies of completed reports into archive boxes sequentially numbered by job. Filled boxes are transferred to the archive custodian who places these boxes into on site storage for a maximum of six months. After one year, the custodian transfers the archive boxes to secure off-site storage for the remainder of the archive period.

Support data for inorganics accompanies completed reports that are sent to the report generation group. The report generation group segregates the data by analysis into individual files. The files are stored in a local filing cabinet for approximately two months. The files are then transferred to an archive box that is numbered according to the time frame the data was compiled. Filled boxes are transferred to the archive custodian who places these boxes into on site storage for a maximum of one year. After one year, the custodian transfers the archive boxes to secure off-site storage for the remainder of the archive period.

Organics support data is compiled by the analysts on a batch basis. Batch data is sent to the report generation group as it is completed. The report generation group stores the files in a local filing cabinet for approximately one month. The files are then transferred to archive boxes that are numbered according to batch number range. Filled boxes are transferred to the archive custodian who places these boxes into on site storage for one year. After one year, the custodian transfers the archive boxes to secure off-site storage for the remainder of the archive period.

Report generation maintains an active archive record, which includes a box identification number, the date it entered the controlled archive. A separate record is maintained for tracking retrieved and returned reports.

6.4 ***Training***. The company maintains a training record for all employees that documents that they have received instruction on administrative and technical tasks that are required for the job they perform. Training records for individuals employed by the company are retained for a period of six months following their termination of employment.

6.5 ***Training File Origination***. Training files are originated and maintained by the Human Resources Group (HR). The file is begun on the first day of employment. Information required for the file includes a copy of the individual's most current resume, detailing work experience and a copy of any college diplomas or transcript(s).

Information added on the first day includes documentation of health and safety training and a signed ethics agreement.

6.6 ***Technical Training***. The supervisor of each new employee must submit a training plan outline to HR detailing the areas of training the new employee will receive. The supervisor updates the outline, adding signatures and dates as training elements are completed. Supporting documentation, such as precision and accuracy studies, which demonstrate analyst capability for a specific test, are added as completed. Certificates or diplomas for any off-site training are added to the file.

7.0 REFERENCE STANDARD TRACEABILITY

Requirement: Documented procedures, which establish traceability between any measured value and a national reference standard must be in place in the laboratory. All metric measurements must be traceable to NIST reference weights or thermometers that are calibrated on a regular schedule. All chemicals used for calibration of a quantitative process must be traceable to an NIST reference that is documented by the vendor using a certificate of traceability. The laboratory maintains a documentation system that establishes the traceability links. The procedures for verifying and documenting traceability must be documented in standard operating procedures.

7.1 ***Traceability of Metric Measurements - Thermometers***. Accutest uses NIST thermometers to calibrate commercially purchased thermometers prior to their use in the laboratory. If necessary, thermometers are assigned correction factors that are determined during their calibration using an NIST thermometer as the standard. The correction factor is documented in a thermometer log and on a tag attached to the thermometer. The correction factor is applied to temperature measurements before recording the measurement in the temperature log. The NIST thermometer is recalibrated on a biannual basis.

7.2 ***Traceability of Metric Measurements – Calibration Weights***. Accutest uses calibrated weights, which are traceable to NIST standard weights to calibrate all balances used in the laboratory. Balances must be calibrated to specific tolerances within the intended use range of the balance. Calibration checks are required on each day of use. If the tolerance criteria are not achieved, corrective action specified in the balance calibration SOP must be applied before the balance can be used for laboratory measurements. All weights are recalibrated on a biannual basis.

7.3 ***Traceability of Chemical Standards***. All chemicals, with the exception of bulk dry chemicals and acids, purchased as reference standards for use in method calibration must establish traceability to NIST referenced material through a traceability certificate. Process links are established that enable a calibration standard solution to be traced to its NIST reference certificate.

7.4 ***Documentation of Traceability***. Traceability information is documented in individual logbooks designated for the measurement process in use. The quality assurance group maintains calibration documentation for metric references in separate logbooks.

Balance calibration verification is documented in logbooks that are assigned to each balance. The individual conducting the calibration is required to initial and

date all calibration activities. Any defects that occur during calibration are also documented along with the corrective action applied and a demonstration of return to control.

Temperature control is documented in logbooks assigned to the equipment being monitored. A calibrated thermometer is assigned to each individual item. Measurements are recorded along with date and initials of the individual conducting the measurement on a daily or as used basis. Corrective action, if required, is also documented including the demonstration of return to control.

Initial traceability of chemical standards is documented via a vendor-supplied certificate (not available for bulk dry chemicals and acids) that includes lot number and expiration date information. Solutions prepared using the vendor supplied chemical standard are documented in logbooks assigned to specific analytical processes. The documentation includes links to the vendors lot number, an internal lot number, dates of preparation, and the preparer's initials.

8.0 TEST PROCEDURES, METHOD REFERENCES, AND REGULATORY PROGRAMS

Requirements: The laboratory must use client specified or regulatory agency approved methods for the analysis of environmental samples. The laboratory maintains a list of active methods, which specifies the type of analysis performed, and cross-references the methods to applicable environmental regulation. Routine procedures used by the laboratory for the execution of a method must be documented in a standard operating procedure. Method performance must be demonstrated annually where required.

8.1 ***Standard Operating Procedures***. Standard operating procedures (SOP) are prepared for routine methods executed by the laboratory and processes related to sample or data handling. The procedures describe the process steps in sufficient detail to enable an individual, who is unfamiliar with the procedure to execute it successfully. SOPs are reviewed annually and edited if necessary. SOPs can be edited on a more frequent basis if systematic errors dictate a need for process change or the originating regulatory agency promulgates a new version of the method. Procedural modifications are indicted using a revision number. SOPS are available for client review at the Accutest facility upon request.

8.2 ***Method Detection Limit Studies***. Annual method detection limit (MDL) studies are performed as appropriate for routine methods used in the laboratory. The procedure used for determining MDLs is described in 40 CFR, Part 136, Appendix B. The quality assurance group retains MDL data on file.

8.3 ***Precision and Accuracy Studies***. Annual precision and accuracy (P&A) studies, which demonstrate the laboratories ability to generate acceptable date, are performed for all routine methods used in the laboratory. The procedure used for generating organic P&A data is referenced in the majority of the regulatory methodology in use. The procedure requires quadruplicate analysis of a sample spiked with target analytes at a concentration in the working range of the method. This data may be compiled from a series of existing blank spikes or laboratory control samples. Accuracy (percent recovery) of the replicate analysis is averaged and compared to established method performance limits. Values within method limits indicate an acceptable performance demonstration.

8.4 ***Analytical Capabilities***. Table 8.1 provides a detailed listing of the methodology employed for the analysis of test samples.

Table 8.1 – Analytical Capabilities and Method References

Method Type	Method Number	Regulatory Program
Organics – GC/MS:		
Volatile Organics	EPA 524.2	Clean Water Act
Semi-Volatile Organics	EPA 525.2	Clean Water Act
Volatile Organics	EPA 624	Clean Water Act
Semi-Volatile Organics	EPA 625	Clean Water Act
Volatile Organics	SW846 – 8260	RCRA
Semi-Volatile Organics	SW846 – 8270C	RCRA
Semi-Volatile Organics	USEPA CLP SOW OLM03.2	None – USEPA Contract
Volatile Organics	USEPA CLP SOW OLM03.2	None – USEPA Contract
Semi-Volatile Organics	USEPA CLP SOW OLM04.1	None – USEPA Contract
Volatile Organics	USEPA CLP SOW OLM04.1	None – USEPA Contract
Air Toxics	USEPA TO-3	Clean Air Act
Air Toxics	USEPA TO-14	Clean Air Act
Organics – GC:		
VO Aromatic/Halocarbons: DW	EPA 502.2	Safe Drinking Water Act
EDB and DBCP – DW	EPA 504.1	Safe Drinking Water Act
Pesticides and PCBs – DW	EPA 505	Safe Drinking Water Act
Chlorinated Acid Herbs–DW	EPA 515.1	Safe Drinking Water Act
Purgeable Halocarbons	EPA 601	Clean Water Act
Purgeable Aromatics	EPA 602	Clean Water Act
Chlorinated Pesticides & PCBs	EPA 608	Clean Water Act
Poly-Aromatic Hydrocarbons	EPA 610	Clean Water Act
Volatile Aromatic/Halocarbons	SW-846 – 8021B	RCRA
Organochlorine Pesticides	SW-846 – 8081A	RCRA
Polychlorinated Biphenyls	SW-846 – 8082	RCRA
Chlorinated Acid Herbicides	SW-846 – 8151A	RCRA
Metals:		
Digestion of Soils for GF (CLP)	CLP ILMO3.0	None – USEPA Contract
Digestion of Soils for ICP (CLP)	CLP ILMO3.0	None – USEPA Contract
Non-Pot. Water Digest: GF/CLP	CLP ILMO3.0	None – USEPA Contract
Non-Pot. Water Digest: ICP/CLP	CLP ILMO3.0	None – USEPA Contract
Non-Pot. Water Digest: GF/CLP	CLP ILMO4.0	None – USEPA Contract
Non-Pot. Water Digest: ICP/CLP	CLP ILMO4.0	None – USEPA Contract

Method Type	Method Number	Regulatory Program
GF AAS AQ(General)	EPA 200 Series (March 1983)	Clean Water Act
Total Recov. Metals Digestion	EPA 200.7	Clean Water Act
ICP: General – EPA WW	EPA 200.7, 1983	Clean Water Act
Digestion of DWs: GF/ICP	EPA 200.7, 200.9, May 1994	Clean Water Act
ICP: General – EPA DW	EPA 200.7, May 1994	Safe Drinking Water Act
GF AAS DW (General)	EPA 200.9	Safe Drinking Water Act
Cold Vapor Mercury - DW	EPA 245.1	Safe Drinking Water Act
Cold Vapor Mercury - Waters (WW, CLP)	EPA 245.1, EPA 245.5 CLP-M (ILMO4.0)	Clean Water Act
Cold Vapor Mercury - Soils CLP	EPA 245.5 CLP-M (ILMO4.0)	Clean Water Act
Metals Analysis: ICP – CLP	ILMO3.0	None – USEPA Contract
Metals Analysis: ICP – CLP	ILMO4.0	None – USEPA Contract
Non-Pot. Water Digest: ICP	SW846 3010A, EPA 1983	RCRA
Non-Pot. Water Digestion: GF	SW846 3020A, EPA 1983	RCRA
Digestion of Soils for GF	SW846 3050B	RCRA
Digestion of Soils for ICP	SW846 3050B	RCRA
ICP (General – SW846 update)	SW846 6010B	RCRA
GF AAS SO (General)	SW846 7000 Series	RCRA
Cold Vapor Mercury - Soils	SW846-7471A	RCRA
Wet Chemistry:		
General Petroleum Degraders	Accutest in house	None
Total Organic Carbon (Soils)	USACE 81 M-Solids, 9060 M	US Army Corps of Eng.
Specific Gravity	ASTM 1429	ASTM Standard
Percent Sulfur	ASTM D129-61	ASTM Standard
Specific Gravity	ASTM D1298-85	ASTM Standard
Oxidation-Reduction Potential	ASTM D1498-76	ASTM Standard
Oxidation-Reduction Potential	ASTM D1498-76 M-Solids.	ASTM Standard
Moisture, Karl Fischer	ASTM D1744-92	ASTM Standard
Moisture, Karl Fischer	ASTM D1744-92 M-Solids.	ASTM Standard
Percent Ash (dry basis)	ASTM D2974-87	ASTM Standard
Total Organic Content	ASTM D2974-87	ASTM Standard
BTU - Heat Content	ASTM D3286-85	ASTM Standard
Tetraethyl Lead in Soils and Waters	ASTM D3341-87 M-Solids.	ASTM Standard
Viscosity	ASTM D445	ASTM Standard
Base Sediment in Petroleum Samples	ASTM D473-81	ASTM Standard
Percent Ash (dry basis)	ASTM D482-91	ASTM Standard

Method Type	Method Number	Regulatory Program
Total Chlorine	ASTM D808-91	ASTM Standard
Total Organic Chlorine	ASTM D808-91	ASTM Standard
Pour Point	ASTM D97-87 (Petro prods)	ASTM Standard
Neutral Leaching	ASTM E3987	ASTM Standard
Water Content in Petroleum	ASTMD95-83	ASTM Standard
Inorganic Carbon	Corp. Eng. M-Solids	US Army Corps of Eng.
Total Carbon	Corp. Eng. M-Solids.	US Army Corps of Eng.
Specific Conductance	EPA 120.1	Clean Water Act
Color, Apparent	EPA 110.2	Clean Water Act
Hardness	EPA 130.2	Clean Water Act
Odor	EPA 140.1	Clean Water Act
pH by electrode (Waters)	EPA 150.1	Clean Water Act
Total Dissolved Solids	EPA 160.1/SM18 2540C	Clean Water Act
Total Suspended Solids	EPA 160.2	Clean Water Act
Mineral Suspended Solids	EPA 160.2 M-Solids	None – Solids Modification
Volatile Suspended Solids	EPA 160.2/160.4	Clean Water Act
Total Solids	EPA 160.3	Clean Water Act
Total Solids	EPA 160.3 M-Solids.	None – Solids Modification
Percent Solids	EPA 160.3M-Solids	Clean Water Act
Total Mineral Solids	EPA 160.4	Clean Water Act
Total Volatile Solids	EPA 160.4	Clean Water Act
Total Volatile Solids	EPA 160.4 M-Solids.	None – Solids Modification
Settleable Solids	EPA 160.5	Clean Water Act
Turbidity	EPA 180.1	Clean Water Act
Acidity	EPA 305.1	Clean Water Act
Alkalinity	EPA 310.1/SM18 2320B	Clean Water Act
Chloride - Titrametric	EPA 325.3/SW846 9252A	Clean Water Act
Chloride - Titrametric	EPA 325.3/SW9252A M-Solids	None – Solids Modification
Total Residual Chlorine	EPA 330.4/SM18 4500CLF	Clean Water Act
CN^- Amenable to Chlorination	EPA 335.1/2, SW846 9020	CWA or RCRA
Cyanide (Lachat autoanalyzer)	EPA 335.2 (AQ) 335.4 (DW)	Clean Water Act
Cyanide CLP	EPA 335.2 CLP SOW, M-Solids	None – Solids Modification
Fluoride	EPA 340.2	Clean Water Act
Fluoride	EPA 340.2 M-Solids.	None – Solids Modification
Ammonia (Lachat autoanalyzer)	EPA 350.1	Clean Water Act
Ammonia (Lachat autoanalyzer)	EPA 350.1M-Solids	None – Solids Modification
Total Kjeldahl Nitrogen	EPA 351.2	Clean Water Act
Total Kjeldahl Nitrogen	EPA 351.2 M-Solids.	None – Solids Modification
Nitrate/Nitrite (Lachat)	EPA 353.2	Clean Water Act
Nitrate/Nitrite (Lachat)	EPA 353.2 M-Solids.	None – Solids Modification

Method Type	Method Number	Regulatory Program
Nitrogen, Nitrite	EPA 354.1/SM18 4500NO2B	Clean Water Act
Nitrogen, Nitrite	EPA 354.1/SM18 4500NO2B M	None – Solids Modification
Dissolved Oxygen	EPA 360.1	Clean Water Act
Orthophosphate	EPA 365.2/SM18 4500PE	Clean Water Act
Orthophosphate	EPA 365.2/SM18 4500PE M	None – Solids Modification
Total Phosphates	EPA 365.3	
Total Phosphates	EPA 365.3 M-Solids.	None – Solids Modification
Dissolved Silica	EPA 370.1	Clean Water Act
Sulfate (Gravimetric)	EPA 375.3	Clean Water Act
Sulfate (Gravimetric)	EPA 375.3 M-Solids.	None – Solids Modification
Sulfate (Turbidimetric)	EPA 375.4	Clean Water Act
Sulfate (Turbidimetric)	SW846 9038	RCRA
Sulfate (Turbidimetric)	EPA 375.4, SW846 9038 M	None – Solids Modification
Sulfide	EPA 376.1	Clean Water Act
Sulfide	EPA 376.1 M-Solids.	None – Solids Modification
Sulfite	EPA 377.1	Clean Water Act
BOD	EPA 405.1	Clean Water Act
BOD, Carbonaceous	EPA 405.1	Clean Water Act
BOD, Nitrogenous	EPA 405.1	Clean Water Act
Chemical Oxygen Demand	EPA 410.1	Clean Water Act
Chemical Oxygen Demand	EPA 410.1 M-Solids	None – Solids Modification
Oil & Grease, Gravimetric – AQ	EPA 413.1	Clean Water Act
Oil & Grease, Gravimetric – AQ	SW846 9070	RCRA
Inorganic Carbon	EPA 415.1 M-Solids	None – Solids Modification
Total Carbon	EPA 415.1 M-Solids	None – Solids Modification
Total Organic Carbon/DOC - AQ	EPA 415.1	Clean Water Act
Total Organic Carbon/DOC - AQ	SW9060M, SM-18 5310BM	RCRA
Petroleum Hydrocarbons – AQ	EPA 418.1	Clean Water Act
Petroleum Hydrocarbons (Soils)	EPA 418.1M-Solids	None – Solids Modification
Phenols - chloroform extraction	EPA 420.1	Clean Water Act
Phenols - Lachat autoanalyzer	EPA 420.2	Clean Water Act
TOC by Lloyd Kahn Method	Lloyd Kahn 1998	None - USEPA Region II-M
ignitability - Shell Method	Shell Bunsen Burner	None – Client Method
Bromide	SM18 4500 Br	None – Standard Method
Bromide	SM18 4500 Br M-Solids	None – Standard Method
Fecal Streptococci	SM18 9230C	None – Standard Method
Calcium Hardness	SM18 2340B	None – Standard Method
Resistivity	SM18 2510A	None – Standard Method
Salinity	SM18 2520B	None – Standard Method
Ferrous Iron	SM18 3500 FE-D	None – Standard Method
Free CO_2 by Titrametric Method	SM18 4500 CO2 C	None – Standard Method

Method Type	Method Number	Regulatory Program
Bicarbonate, Carbonate, CO_2	SM18 4500 CO2D	None – Standard Method
Hexavalent Chromium (SM18)	SM18 4500 Cr D	None – Standard Method
Chloride in Drinking Waters	SM18 4500Cl-D	None – Standard Method
Total Organic Nitrogen	SM18 4500N	None – Standard Method
Total Nitrogen	SM18 4500N	None – Standard Method
Total Organic Nitrogen	SM18 4500N M-Solids	None – Standard Method
Total Nitrogen	SM18 4500N, M-Solids.	None – Standard Method
Hydrogen Sulfide	SM18 4500S2-F	None – Standard Method
MBAS (Anionic Surfactants as)	SM18 5540C	None – Standard Method
MBAS (Anionic Surfactants as)	SM-18 5540C M-Solids.	None – Standard Method
CTAS	SM18 5540D	None – Standard Method
Total Plate Count	SM18 9215B	None – Standard Method
Total Coliforms (Plate count)	SM18 9222B	None – Standard Method
Fecal Coliforms	SM18 9222D	None – Standard Method
Total Coliform (Colilert) - DW	SM18 9223B	None – Standard Method
Enterococci	SM18 9230C	None – Standard Method
CTAS	SM-Solids18 5540D M-Solids.	None – Standard Method
TCLP Leaching Procedure	SW846 1311	RCRA
SPLP Extraction	SW846 1312	RCRA
Hexa - Chromium/soils NJDEP	SW846 3060/7196A (NJDEP)	None-NJDEP Modification
Hexavalent Chromium (Waters)	SW846 7196A	RCRA
Cyanide (Lachat autoanalyzer)	SW846 9012	RCRA
TOX - Aqueous Matrices	SW846 9020B	RCRA
TOX - Solid and Oil Matrices	SW846 9023	RCRA
Corrosivity & pH – aqueous	SW846 9040B	RCRA
Soil and Waste pH, Corrosivity	SW846 9045B, Chpt. 7	RCRA
Phenols - chloroform extraction	SW846 9065	RCRA
Phenols - Lachat autoanalyzer	SW846 9066	RCRA
Oil & Grease, Gravimetric (Soils)	SW846 9071A M-Solids	RCRA
Cation Exchange Capacity	SW846 9081	RCRA
Paint Filter Test	SW846 9095	RCRA
Sulfide and Cyanide Reactivity	SW846 Chapter 7	RCRA
Sulfide Reactivity - Analysis	SW846 Chapter 7, 9034	RCRA
Ignitability	SW846 Chp 7, SW1010, ASTM D93-90	RCRA

Method Type	Method Number	Regulatory Program
Nitrogen, Nitrite	EPA 354.1/SM18 4500NO2B	Clean Water Act
Nitrogen, Nitrite	EPA 354.1/SM18 4500NO2B M	None – Solids Modification
Dissolved Oxygen	EPA 360.1	Clean Water Act
Orthophosphate	EPA 365.2/SM18 4500PE	Clean Water Act
Orthophosphate	EPA 365.2/SM18 4500PE M	None – Solids Modification
Total Phosphates	EPA 365.3	
Total Phosphates	EPA 365.3 M-Solids.	None – Solids Modification
Dissolved Silica	EPA 370.1	Clean Water Act
Sulfate (Gravimetric)	EPA 375.3	Clean Water Act
Sulfate (Gravimetric)	EPA 375.3 M-Solids.	None – Solids Modification
Sulfate (Turbidimetric)	EPA 375.4	Clean Water Act
Sulfate (Turbidimetric)	SW846 9038	RCRA
Sulfate (Turbidimetric)	EPA 375.4, SW846 9038 M	None – Solids Modification
Sulfide	EPA 376.1	Clean Water Act
Sulfide	EPA 376.1 M-Solids.	None – Solids Modification
Sulfite	EPA 377.1	Clean Water Act
BOD	EPA 405.1	Clean Water Act
BOD, Carbonaceous	EPA 405.1	Clean Water Act
BOD, Nitrogenous	EPA 405.1	Clean Water Act
Chemical Oxygen Demand	EPA 410.1	Clean Water Act
Chemical Oxygen Demand	EPA 410.1 M-Solids	None – Solids Modification
Oil & Grease, Gravimetric – AQ	EPA 413.1	Clean Water Act
Oil & Grease, Gravimetric – AQ	SW846 9070	RCRA
Inorganic Carbon	EPA 415.1 M-Solids	None – Solids Modification
Total Carbon	EPA 415.1 M-Solids	None – Solids Modification
Total Organic Carbon/DOC - AQ	EPA 415.1	Clean Water Act
Total Organic Carbon/DOC - AQ	SW9060M, SM-18 5310BM	RCRA
Petroleum Hydrocarbons – AQ	EPA 418.1	Clean Water Act
Petroleum Hydrocarbons (Soils)	EPA 418.1M-Solids	None – Solids Modification
Phenols - chloroform extraction	EPA 420.1	Clean Water Act
Phenols - Lachat autoanalyzer	EPA 420.2	Clean Water Act
TOC by Lloyd Kahn Method	Lloyd Kahn 1998	None - USEPA Region II-M
ignitability - Shell Method	Shell Bunsen Burner	None – Client Method
Bromide	SM18 4500 Br	None – Standard Method
Bromide	SM18 4500 Br M-Solids	None – Standard Method
Fecal Streptococci	SM18 9230C	None – Standard Method
Calcium Hardness	SM18 2340B	None – Standard Method
Resistivity	SM18 2510A	None – Standard Method
Salinity	SM18 2520B	None – Standard Method
Ferrous Iron	SM18 3500 FE-D	None – Standard Method
Free CO_2 by Titrametric Method	SM18 4500 CO2 C	None – Standard Method

9.0 SAMPLE MANAGEMENT, LOGIN, CUSTODY, STORAGE AND DISPOSAL

Requirement: A system to ensure that client supplied product is adequately evaluated and acknowledged upon delivery to the laboratory must be practiced by the laboratory. The system must assure that chain of custody is maintained and that sample receipt conditions and preservation status are documented and communicated to the client and internal staff. The login procedure must assign, document, and map the specifications for the analysis of each unique sample to assure that the requested analysis is performed on the correct sample. The system must include procedures for reconciling defects in sample condition or client provided data, which occur at sample arrival. The system must specify the procedures for proper sample storage, transfer to the laboratory, and disposal after analysis. The system must be documented in a standard operating procedure.

9.1 ***Order Receipt and Entry***. New orders are initiated and processed by the client services group (See Chapter 14, Procedures for Executing Client Specifications). The new order procedure includes mechanisms for providing bottles to clients, which meet the size, cleanliness, and preservation specifications for the analysis to be performed.

For new orders, the project manager prepares a bottle request form, which is submitted to sample management. This form provides critical project details to the sample management staff, which are used to prepare and assemble the sample bottles for shipment to the client prior to sampling.

The bottle order is assembled using bottles that meet USEPA specifications for contaminant free sample containers. Accutest uses a combination of pre-cleaned bottles, which are purchased from commercial suppliers and bottles that are cleaned to USEPA specifications in the laboratory. Sterile bottles for microbiological samples are purchased from commercial sources.

Separate cleaning processes are used for glass and plastic bottles. Bottles, which are cleaned in-house, are checked to assure that they are free of contamination from the compounds being analyzed before being released for use. Sterile bottles are checked for contamination with each lot. The QA staff retains a copy of the documentation of in-house contamination and sterility checks.

Vials containing preservatives that are specific for the analysis requested are attached to the sample bottle prior to shipment. The preservative is added to the sample by the field technician during sample collection. All preservative solution are prepared in the laboratory and are checked to assure that they are free of contamination from the compounds being analyzed before being released for use.

Reagent water for trip and field blanks is poured into appropriately labeled containers. All bottles are packed into ice chests with blank chain of custody forms and the original bottle order from. Completed bottle orders are delivered to clients using Accutest couriers or commercial carriers for use in field sample collection.

9.2 ***Sample Receipt and Custody***. Samples are delivered to the laboratory using a variety of mechanisms including Accutest couriers, commercial shippers, and client self-delivery. Documented procedures are followed for arriving samples to assure that custody and integrity are maintained and that handling and preservation requirements are documented and continued.

Sample custody documentation is initiated when the individual collecting the sample collects field samples. Custody documentation includes all information necessary to provide an unambiguous record of sample collection, sample identification, and sample collection chronology. Initial custody documentation employs either Accutest or client generated custody forms (Form 9.2).

Accutest generates a chain of custody in situations where the individuals who collected the sample did not generate custody documentation in the field.

Accutest adheres to the USEPA National Enforcement Investigations Center (NEIC) definition of custody as follows:

* The sample is in the actual custody of the responsible person,
* The sample is in the responsible person's view after being in their possession,
* The sample is in the responsible person's possession and they have locked or sealed it to prevent tampering,
* The sample is in a secure area.

The Accutest facility is defined as a secure facility. Perimeter security has been established, which limits access to authorized individuals only. Visitors enter the facility through the building lobby and must register with the receptionist prior to entering controlled areas. While in the facility, visitors must be accompanied by their hosts at all times. After hours, building access is controlled using a computerized pass-key reader system. This system limits building access to individuals with a pre-assigned authorization status. After hours visitors are not authorized to be in the building. Clients delivering samples after hours must make

advanced arrangements through client services and sample management to assure that staff is available to take delivery and maintain custody.

Upon arrival at Accutest, the sample custodian reviews the chain of custody for the samples received to verify that the information on the form corresponds with the samples delivered. This includes verification that all listed samples are present and properly labeled, checks to verify that samples were transported and received at the required temperature, verification that the sample was received in proper containers, verification that sufficient volume is available to conduct the requested analysis, and a check of individual sample containers to verify test specific preservation requirements including the absence of headspace for volatile compound analysis.

Sample conditions and other observations are documented on the chain of custody by the sample custodian prior to completing acceptance of custody. The sample custodian accepts sample custody upon verification that the custody document is correct. Discrepancies or non-compliant situations are documented and communicated to the Accutest project manager, who contacts the client for resolution. The resolution is documented and communicated to sample management for execution.

9.3 ***Subcontracted Analysis***. Subcontract laboratories are employed to perform analysis not performed by Accutest. The quality assurance staff evaluates subcontract laboratories to assure their quality processes meet the standards of the environmental laboratory industry prior to engagement. Throughout the subcontract process, Accutest follows established procedures to assure that sample custody is maintained and the data produced by the subcontractor meets established quality criteria.

Subcontracting Procedure. Subcontracting procedures are initiated through several mechanisms, which originate with sample management. Samples for analysis by a subcontractor are logged into the Accutest system using regular login procedures. If subcontract parameters are part of the project or sample management has received subcontracting instructions for a specific project, a copy of the chain of custody is given to the appropriate project manager with the subcontracted parameters highlighted. This procedure triggers the subcontract process at the project management level. The project manager contacts an approved subcontractor to place the subcontract order. A subcontract order form (SOF) is simultaneously prepared in electronic format, by the project manager and filed with the original chain of custody. The SOF and the subcontract chain of custody are forwarded to sample management, via E-Mail, for processing. A copy is filed with the original CoC.

Sample management signs the subcontract chain of custody and ships the sample(s) to the subcontractor. The subcontract COC is filed with the original COC and the request for subcontract. Copies are distributed to the login department, the project manager, and sample management.

Subcontractor data packages are reviewed by project management to assess completeness and quality compliance. If completeness defects are detected, the subcontractor is asked to immediately upgrade the data package. If data quality defects are detected, the package is forwarded to the QA staff for further review. The QA staff will pursue a corrective action solution before releasing data to the client.

Approved subcontract data is entered into the laboratory information management system (LIMS) if possible and incorporated into the final report. All subcontract data is footnoted to provide the client with a clear indication of its source. Copies of original subcontract data are included in the data report depending on the reporting level specified by the client

Subcontract Laboratory Evaluation. The QA staff evaluates subcontract laboratories prior to engagement. Preference is given to subcontract labs, which are A2LA approved. The subcontract laboratory must provide Accutest with a valid certification to perform the requested analysis, a copy of the laboratory quality assurance plan, copies of SOPs used for the subcontracted analysis, a copy of the most recent performance evaluation study for the subcontracted parameter, and copies of the most recent regulatory agency or A2LA audit report. Certification verification, audit reports and performance evaluation data must be submitted to Accutest annually. If possible, the QA staff conducts a site visit to the laboratory to inspect the quality system. Qualification of a subcontract laboratory may be bypassed if the primary client directs Accutest to employ a specific subcontractor.

9.4 ***Sample Storage***. Following sample custody transfer, samples are assigned to various refrigerated storage areas by the sample custodian depending upon the test to be performed and the matrix of the samples. The location (refrigerator and shelf) of each sample is recorded on the chain of custody adjacent to the line corresponding to each sample number. Samples remain in storage until the laboratory technician requests that they be transferred into the laboratory for analysis.

Second shift staff are authorized to retrieve samples from storage and initiate custody transfer. All sample request forms must be completed regardless of who performs the transfer.

Samples for volatile organics analysis are placed in storage in designated refrigerators by the sample custodian and immediately transferred to the organics group control. These samples are segregated according to matrix to limit opportunities for cross contamination to occur.

Organics staff is authorized to retrieve samples from these storage areas for analysis. When analysis is complete, the samples are placed back into storage.

9.5 ***Sample Login***. Following sample custody transfer to the laboratory, the documentation that describes the clients analytical requirements are delivered to the sample login group for coding and entry to the Laboratory Information management System (LIMS). This process translates all information related to collection time, turnaround time, sample analysis, and deliverables into a code which enables client requirements to be electronically distributed to the various departments within the laboratory for scheduling and execution.

9.6 ***Sample Retrieval for Analysis***. Individual laboratory departments prepare and submit written requests to the sample custodian to retrieve samples for analysis. The sample custodian retrieves the samples and delivers them to the requesting department. Retrieval priorities are established by the requesting department and submitted to the sample custodian when multiple requests are submitted.

After sample analysis has been completed, the department requests pick-up and return of the sample to storage area. The sample custodian retrieves the sample and obtains written acknowledgement from the department of the transfer back to sample management or sample storage.

9.7 ***Sample Disposal***. Accutest retains all samples under proper storage for a minimum of 14 days following completion of the analysis report. Longer storage periods are accommodated on a client specific basis if required. Samples may also be returned to the client for disposal.

Accutest disposes of all laboratory wastes following the requirements of the Resource Conservation and Recovery Act (RCRA). The Company's has obtained and maintains a waste generator identification number, NJD982533622.

Sample management generates a sample disposal dump sheet from the LIMS tracking system each week, which lists all samples whose holding period has expired. Data from each sample is compared to the hazardous waste criteria established by the New Jersey Department of Environmental Protection (NJDEP).

Samples containing constituents at concentrations above the criteria are labeled as hazardous and segregated into six separate waste categories for disposal as follows:

* Organic extracts: Chlorinated and non-chlorinated solvents
* Mixed flammable solvents (hexane, acetone, toluene)
* Waste oil
* Soil (solids)
* Aqueous
* Sludges (semi-solids)

Non-hazardous aqueous samples are diluted and disposed directly into the laboratory sink. All aqueous liquids pass through a neutralization system before entering the municipal system.

Non-hazardous solids are disposed as municipal waste. Sample bottles are crushed prior to disposal to minimize waste volume and destroy sample labels. Laboratory wastes are collected by waste stream in designated areas throughout the laboratory. Waste streams are consolidated daily by the waste custodian and transferred to stream specific drums for disposal through a permitted waste management contractor. Filled, consolidated drums are tested for hazardous characteristics and scheduled for removal from the facility for appropriate disposal based on the laboratory data.

10.0 LABORATORY INSTRUMENTATION AND MEASUREMENT STANDARDS

Requirement: Procedures, which assure that instrumentation is performing to a pre-determined operational standard prior to the analysis of any samples must be established by the laboratory. In general, these procedures will follow the regulatory agency requirements established in promulgated methodology. These procedures must be documented and incorporated into the standard operating procedures for the method being executed.

10.1 ***Mass Tuning – Mass Spectrometers***. The mass spectrometer tune and sensitivity must be monitored to assure that the instrument is assigning masses and mass abundances correctly and that the instrument has sufficient sensitivity to detect compounds at low concentrations. This is accomplished by analyzing a specific mass tuning compound at a fixed concentration. If the sensitivity is insufficient to detect the tuning compound, corrective action must be performed prior to the analysis of standards or samples. If the mass assignments or mass abundances do not meet criteria, corrective action must be performed prior to the analysis of standards or samples.

10.2 ***Wavelength Verification – Spectrophotometers***. Spectrophotometer detectors are checked on a regular schedule to verify proper response to the wavelength of light needed for the test in use. If the detector response does not meet specifications, corrective action (detector adjustment or replacement) is performed prior to the analysis of standards or samples.

10.3 ***Inter-element Interference Checks (Metals)***. Inductively Coupled Plasma Emission Spectrophotometers (ICP) are subject to a variety of spectral interferences, which can be minimized or eliminated by applying interfering element correction factors and background correction points. Interfering element correction factors are checked on a specified frequency through the analysis of check samples containing high levels of interfering elements. Analysis of single element interferent solutions is also conducted at a specified frequency.

If the check indicates that the method criteria has not been achieved for any element in the check standard, the analysis is halted and data from the affected samples are not reported. Sample analysis is resumed after corrective action has been performed and the correction factors have been re-calculated.

New interfering element correction factors are calculated and applied whenever the checks indicate that the correction factors are no longer meeting criteria. At a minimum, correction factors are replaced once a year.

10.4 ***Calibration and Calibration Verification***. Many tests require calibration using a series of reference standards to establish the concentration range for performing quantitative analysis. Calibration is performed using a regression calculation or calibration factors calculated from the curve. The calibration must meet method specific criteria for linearity or precision. If the criteria are not achieved, corrective action (re-calibration or instrument maintenance) is performed. The instrument must be successfully calibrated before analysis of samples can be conducted.

Initial calibrations must be regularly verified using a single concentration calibration standard. The response to the standard must meet pre-established criteria that indicate the initial calibration curve remains valid. If the criteria are not achieved corrective action (re-calibration) is performed before any additional samples may be analyzed.

10.5 ***Linear Range Verification and Calibration (ICP Metals***. A linear range verification is performed for all ICP instrumentation. The verification frequency is specified by the regulatory program or analytical method. A series of calibration standards are analyzed over a broad concentration range. The data from these analyses are used to determine the valid analytical range for the instrument. ICP instrument calibration is routinely performed using a single standard at a concentration within the linear range and a blank.

Some methods or analytical programs require a low concentration calibration check to verify that instrument is sufficient to detect target elements at the reporting limit. The analytical method or regulatory program defines the criteria used to evaluate the low concentration calibration check. If the low calibration check fails criteria, corrective action is performed and verified through reanalysis of the low concentration calibration check before continuing with the field sample analysis.

10.6 ***Retention Time Verification (GC)***. Chromatographic retention time windows are developed for all analysis performed using gas chromatographs with conventional detectors. The windows establish the time range required for the elution of a specified target analyte on the primary and confirmation columns. Retention times must be confirmed regularly through the analysis of an authentic standard. If the target analytes do not elute within the defined range, new windows are defined using the procedures described in the methodology.

10.7 ***Equipment List***.

Table 10.7. Accutest Laboratories Equipment List

Organics Instrumentation

Instrument	Manufacture & Description	Serial Number	Purchase
GC/MS	Hewlett-Packard 5973 MSD/HP 7683 AS	US82601551	1998
GC/MS	Hewlett-Packard 5973 MSD/HP 7683 AS	US81501001	1998
GC/MS	Hewlett-Packard 5972 MSD/HP G1896A AS	3524A03106	1996
GC/MS	Hewlett-Packard 5972 MSD/OI 4552/4560 ARCHON	3501A02354	1995
GC/MS	Hewlett-Packard 5972 MSD/HP 7673 AS	3501A02356	1995
GC/MS	Hewlett-Packard 5971 MSD/Entech Air Samp 7000	3188A02934	1993
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2807A11004	1992
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2716A10218	1990
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2716A10552	1990
GC/MS	Hewlett-Packard 5970 MSD/OI 4552/4560 ARCHON	2716A10379	1990
GC/MS	Hewlett-Packard 5970 MSD/HP 7673 AS	3034A12779	1990
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2905A11905	1989
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2807A10886	1988
GC/MS	Hewlett-Packard 5970 MSD/OI 4551/4560 P&T	2824A11332	1988
GC/MS	Hewlett-Packard 5970 MSD/Tekmar 2000/2032 P&T	2807A11057	1988
GC/MS	Hewlett-Packard 5970 MSD/Tekmar 2000/2032 P&T	2637A01687	1986
GC/MS	Hewlett-Packard 5970 MSD/HP 7673 AS	2623A01291	1986
GC	Hewlett-Packard 6890/Dual ECD/HP 7683 AS	US00022968	1998
GC	Hewlett-Packard 6890/Dual FID/HP 7673 AS	US00011065	1998
GC	Hewlett-Packard 6890/PID/FID/OI 4551/4560 P&T	US00008927	1998
GC	Hewlett-Packard 6890/Dual ECD/HP 7673 AS	US00010037	1997
GC	Hewlett-Packard 5890/FID/NPD/HP 7673 AS/Tek	3140E38871	1996
GC	Hewlett-Packard 5890/Dual FID/HP 7673 AS	2921A23322	1996
GC	Hewlett-Packard 5890/PID/Hall/OI 4551/4560 P&T	3336A58858	1995
GC	Hewlett-Packard 5890/PID/FID/Tekmar 2000/2032	3336A58859	1995
GC	Hewlett-Packard 5890/Dual ECD/HP 7673 AS	3336A58788	1995
GC	Hewlett-Packard 5890/PID/Hall/4552/4560ARCHON	3336A51043	1994
GC	Hewlett Packard 5890/PID/FID/Entech AutoAir7000	3336A51044	1993
GC	Hewlett-Packard 5890/Dual ECD/HP 7673 AS	2541A06786	1992
GC	Hewlett-Packard 5890/FID/HP 7673 AS	2612A07448	1992
GC	Hewlett-Packard 5890/Dual FID/HP 7673 AS	2938A25059	1990
GC	United Technologies 439/Dual FID/Tekmar 7050 HS	79257	1990
GC	Hewlett-Packard 5890/Dual ECD/HP 7673 AS	2750A16635	1987
GPC	Waters 717	717-000152	1992

Metals Instrumentation

Instrument	Manufacture & Description	Serial Number	Purchase
ICP	TJA Enviro Trace 61E Simultaneous	469790	1997
ICP	TJA Enviro Trace 61E Simultaneous	228390	1993
ICP	TJA Enivro 61E Simultaneous	191390	1993
GFAA	Perkin-Elmer 5100 Zeeman Graphite Furnace	134796	1990
GFAA	Perkin-Elmer 5100 Zeeman Graphite Furnace	136297	1989
FAA	Perkin-Elmer 1100B Flame Spectrophotometer	131674	1990
Hg Analyzer	Spectro Products HG-4	9867	1994
Hg Analyzer	Spectro Products HG-4	8862	1990

Wet Chemistry Instrumentation:

Instrument	Manufacture & Description	Serial Number	Purchase
Auto Anal.	Lachat Quikchem AE	2000-0067	1995
TOC Anal.	Shimadzu 5000 Series Aqueous/Solid System	35517409	1998
TOC Anal.	Dohrman DC-80	RMHK4868	1992
TOC Anal.	Dohrman DC-80	HH3312	1990
TOX Anal.	Mitsubishi TOX-10E	75R04185	1996
TOX Anal.	Dohrman DX-20	HD1628	1991
IR Spec.	Buck Scientific HC-404	687	1997
DO Meter	YSI-50b	91L034801	1988
Turbidimeter	HF Scientific DRT 100B	21141	1987
UVVIS Spec	Milton Roy 20-D	3322140032	1989
pH Meter	Orion 407A	L23580	1995
PH Meter	Orion SA520	R0254A	1995
Flashpoint	Fisher Scientific Pensky-Martins	40300010	1996
PH Meter	Orion SA720	1344	1994
Cond. Meter	YSI-35	1702	1993
UVVIS Spec	Spectronix 20 Gensys	3SGA122034	1998
pH Meter	Fisher 710A	3978	1990
Calorimeter	PARR 1261EA	1499	1996

11.0 INSTRUMENT MAINTENANCE

Requirement. Procedures must be established for equipment maintenance. The procedure may include a maintenance schedule if required or documentation of daily maintenance related activities. All instrument maintenance activities must be documented in instrument specific logbooks.

11.1 ***Routine, Daily Maintenance***. Routine, daily maintenance is required on an instrument specific basis. It is performed each time the instrument is used. Daily maintenance traditionally includes activities to insure a continuation of good analytical performance. In some cases, they include performance checks that indicate whether non-routine maintenance is required. If the performance check indicates a need for higher level maintenance, the equipment is taken out of service until maintenance is performed. Analysis cannot be continued until the performance checks meet established criteria.

11.2 ***Non-routine Maintenance***. Non-routine maintenance is reserved for catastrophic occurrences such as instrument failure. The need for non-routine maintenance is indicated by failures in general operating systems, that result in an inability to conduct required performance checks or calibration. Equipment in this category are taken out of service and repaired before attempting further analysis. Analysis cannot continue until the instrument meets all performance check criteria and is capable of being calibrated.

11.3 ***Scheduled Maintenance***. Modern laboratory instrumentation rarely requires regular preventative maintenance. Where required, the equipment is placed on a schedule, which dictates when maintenance is required. Examples include annual balance calibration by an independent provider, biannual replacement of mass spectrometer vacuum pump oil and optical alignment of the ICP. Scheduled maintenance is documented using routine documentation practices.

11.4 ***Maintenance Documentation***. Routine and non-routine maintenance activities are documented in logbooks assigned to instruments and equipment used for analytical measurements. The logbooks contain preprinted forms, which specify the maintenance activities required with each use. The analyst who performs the maintenance is required to check the activity upon its completion and initial the form.

Non-routine maintenance (i.e. repairs, upgrades, etc.) is documented in a separate service log.

12.0 QUALITY CONTROL PARAMETERS, PROCEDURES, AND CORRECTIVE ACTION

Requirement: All procedures used for test methods must incorporate quality control parameters to monitor elements that are critical to method performance. Each quality parameter includes acceptance criteria that have been established by regulatory agencies for the methods in use. Criteria may also be established through client dictates or through the accumulation and statistical evaluation of internal performance data. Data obtained from these parameters must be evaluated by the analyst, and compared to established method criteria. If the criteria are not achieved, the procedures must specify corrective action and conformation of control before proceeding with sample analysis. QC parameters, procedures, and corrective action must be documented within the standard operating procedures for each method.

12.1 ***Procedure***. Bench analysts are responsible for methodological quality control and sample specific quality control. Each method specifies the control parameters to be employed for the method in use and the specific procedures for incorporating them into the analysis.

The data from each parameter provides the analyst with critical decision making information on method performance. The information is used to determine if corrective action is needed to bring the method or the analysis of a specific sample into compliance. These evaluations are conducted throughout the course of the analysis. Each parameter being indicative of a critical control feature.

12.2 ***Methodological Control Parameters and Corrective Action***. Prior to the analysis of field sample the analyst must determine that the method is functioning properly. Specific control parameters indicate whether critical processes meet specified requirements before continuing with the analysis. Method specific control parameters must meet criteria before sample analysis can be conducted. Each of these parameters is related to processes that are under the control of the laboratory and can be adjusted if out of control.

Method Blank. A method blank is analyzed during the analysis of any field sample. The method blank is defined as a sample. It contains the same standards (internal standards, surrogates, matrix modifiers, etc.) and reagents that are added to the field sample during analysis, with the exception of the sample itself. If the method blank contains target analytes(s) at concentrations that exceed method requirements (typically defined as detection limit concentrations), the source of contamination is eliminated before proceeding with sample analysis.

Laboratory Control Samples (LCS or Spiked Blanks). A laboratory control sample (spiked blank or commercially prepared performance evaluation sample) is

analyzed along with field samples to demonstrate that the method accuracy is within acceptable limits. The performance limits are derived from published method specifications or from statistical controls generated from laboratory method performance data.

Accuracy data is compared to the applicable performance limits. If the spike accuracy exceeds the performance limits, corrective action, as specified in the SOP for the method is performed and verified before continuing with a field sample analysis. In some cases, decisions are made to continue with sample analysis if performance limits are exceeded; provided the unacceptable result has no negative impact on the sample data.

Blanks and spikes are routinely evaluated before samples are analyzed. However, in situations where sample analysis is performed using an autosampler, they may be evaluated after sample analysis has occurred. If the blanks and spikes do not meet criteria, sample analysis is repeated.

Performance Evaluation Samples. Performance evaluation samples (PEs) are single or double blind spikes, introduced to the laboratory to assess method performance. PEs may be introduced as double blinds submitted by commercial clients, single or double blinds from regulatory agencies, or internal blinds submitted by the QA group.

Data from PE sample analysis is compared to established performance limits. If the data does not meet performance specifications, the system is evaluated for sources of acute or systematic error. If required, corrective action is performed and verified before initiating or continuing sample analysis.

PE samples performed for clients or regulatory agencies, which do not meet performance specifications, require a written summary that documents the corrective action investigation, findings, and corrective action implementation.

12.3 ***Sample Control Parameters and Corrective Action***. The analysis of samples can be initiated following a successful demonstration that the method is operating within established controls. Additional controls are incorporated into the analysis of each sample to determine if the method is functioning within established specifications for each individual sample. Sample QC data is evaluated and compared to established performance criteria. If the criteria are not achieved the method or the SOP specifies the corrective action required to continue sample analysis. In many cases, failure to meet QC criteria is a function of sample matrix and cannot be remedied. Each parameter is designed to provide quality feedback on a defined aspect of the sampling and analysis episode.

Duplicates. Duplicate sample analysis is used to measure analytical precision. This can also be equated to laboratory precision for homogenous samples. Precision criteria are method dependent. If precision criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before sample data can be reported.

Spikes & Spiked Duplicates. Spikes and spiked duplicates are used to measure analytical precision and accuracy for the sample matrix selected. Precision and accuracy criteria are method dependent. If precision and accuracy criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before sample data can be reported.

Serial Dilution (Metals). Serial dilutions of metals samples are analyzed to determine if analytical matrix effects may have impacted the reported data. If the value of the serially diluted samples does not agree with the undiluted value within a method-specified range, the sample matrix may be causing interference, which may lead to either a high or low bias. If the serial dilution criterion is not achieved, it must be flagged to indicate possible bias from matrix effects.

Surrogate Spikes (Organics). Surrogate spikes are organic compounds that are similar in behavior to the target analytes but unlikely to be found in nature. They are added to all quality control and field samples to measure method performance for each individual sample. Surrogate accuracy limits are derived from published method specifications or by statistical evaluation of laboratory generated surrogate accuracy data. Accuracy data is compared to the applicable performance limits. If the surrogate accuracy exceeds performance limits, corrective action, as specified in the method or SOP is performed before sample data can be reported.

Internal Standards (Organic Methods). Internal standards are retention time and instrument response markers added to every sample to be used as references for quantitation. Their response is compared to reference standards and used to evaluate instrument sensitivity on a sample specific basis. Internal standard retention time is also compared to reference standards to assure that target analytes are capable of being located by their individual relative retention time.

If internal standard response criteria are not achieved, corrective action or additional action may be required. The recommended action must be completed before sample data can be reported.

If the internal standard retention time criteria are not achieved corrective action or additional action may be required. This may include re-calibration and re-analysis. Additional action must be completed before sample data is reported.

Internal Standards (ICP Metals). Internal standards are used on some ICP instruments to compensate for variations in response caused by differences in sample matrices. This adjustment is performed automatically during sample analysis. The internal standard response of replicated sample analysis is monitored to detect potential analytical problems. If analytical problems are suspected, then the field samples are reanalyzed.

12.4 ***Bench Review & Corrective Action***. The bench chemists are responsible for all QC parameters. Before proceeding with sample analysis, they are required to successfully meet all instrumental QC criteria. They have the authority to perform any necessary corrective action before proceeding with sample analysis.

The bench chemists are also responsible for all sample QC parameters. If the sample QC criteria are not achieved, they are authorized and required to perform the method specified corrective action before reporting sample data.

12.5 ***QA Monitoring***. A spot review of completed data packages is conducted by the QA staff prior to client release. This review includes an examination of QC data for compliance and trends indicative of systematic difficulties. If non-conformances are detected, the QA staff places an immediate stop on the release of the data and initiates corrective action to rectify the situation. The data package is released when the package becomes compliant with all quality requirements.

If the review reveals trends indicative of systematic problems, QA initiates an investigation to determine the cause. If process defects are detected, a corrective action is implemented and monitored for effectiveness.

Performance Limits. Quality control data for all test methods are accumulated and stored in the laboratory information management system (LIMS). Parameter specific QC data is extracted annually and statically processed to eliminate outliers and develop laboratory specific warning limits and confidence limits. The new limits are used to evaluate QC data for compliance with method requirements for a period of one year. Laboratory generated limits appear on all data reports.

12.6 ***Data Package Review***. Accutest employs multiple levels of data review to assure that reported data has satisfied all quality control criteria and that client specifications and requirements have been met. Three departments have data review requirements, which must be conducted before data is released to the client.

Analytical Review. The analyst conducts the primary review of all data. This review begins with a check of all instrument and method quality control and progresses through sample quality control concluding with a check to assure that

the client's requirements have been executed. The analyst has the authority and responsibility to perform corrective action for any out-of-control parameter or nonconformance at this stage of review.

Secondary data reviews are performed at the supervisory level. Supervisors review 100% of the data produced by their department. It includes a check of all manual calculations; a check of all QC criteria and a comparison of the data package to client specified requirements. Supervisors have the authority to reject data and initiate re-analysis, corrective action, or reprocessing.

The group manager performs a tertiary review on a spot check basis. This review includes an evaluation of QC data against acceptance criteria and a check of the data package contents to assure that all analytical requirements and specifications were executed.

Report Generation Review. The report generation group reviews all data and supporting information delivered by the laboratory for completeness and compliance with client specifications. Missing deliverables are identified and obtained from the laboratory. The group also reviews the completed package to verify that the delivered product complies with all client specifications. Non-analytical defects are corrected before the package is sent to the client.

Project Management/Quality Assurance Review. Spot-check reviews are performed by the project manager and/or the QA staff. Project management reviews focus on project specifications. If the project manager identifies defects in the product prior to release, he initiates immediate corrective action to rectify the situation.

The QA review focuses on all elements of the deliverable including the client's specifications and requirements, analytical quality control, sample custody documentation and sample identification. QA reviews at this step in the production process are geared towards systematic process defects, which require procedural changes to effect a corrective action. However, if defects are identified that can be corrected prior to data release, the QA staff returns the package to the laboratory for corrective action.

13.0 CORRECTIVE ACTION SYSTEM

Requirement. The laboratory must have polices and procedures for correcting defective processes, systematic errors, and quality defects, which enables the staff to systematically improve product quality. The system must include procedures for communicating items requiring corrective action, corrective action tracking procedures, corrective action documentation, monitoring of effectiveness, and reports to management. The system must be documented in a standard operating procedure.

13.1 ***Procedure***. Corrective action is the step that follows the identification of a process defect. The type of defect determines the level of documentation, communication, and training necessary to prevent re-occurrence of the defect or non-conformance.

Routine Corrective Action. Routine corrective action is defined as the procedures used to return out of control analytical systems back to control. This level of corrective action applies to all analytical quality control parameters or analytical system specifications.

Bench analysts have full responsibility and authority for performing routine corrective action. The resolution of defects at this level does not require a procedural change or staff re-training. The analyst is free to continue work once corrective action is complete and the analytical system has been returned to control.

Procedural Modifications. Corrective actions in this category require process change. They may be the result of systematic defects identified during audits, the investigation of client complaints, product defects identified during data review, or method updates. Resolution of defects of this magnitude require formal identification of the defect, development and documentation of a corrective action plan, and staff training to communicate the procedural change.

13.2 ***Documentation & Communication***. Routine corrective actions are documented as part of the analytical record. Notations are made in the comments section of the analytical chronicle or data sheet detailing the nonconformance. Continuation of the analysis indicates that return to control was successful.

Procedural modifications require more formal documentation. Process defects of this magnitude are documented in a brief memo to the QA staff. The memo is retained in the corrective action directory of the network server. QA works with the supervisor of the affected area to develop the procedural change. Existing documentation is edited to reflect the change. The affected staff is informed of

the procedural change through a formal training session. The training is documented and copies are placed into individual training files. A brief summary describing the corrective action is appended to the original memo. Senior management is informed of the completed corrective action in regular QA reports to management.

Monitoring. Department managers and the QA staff routinely monitor recently implemented corrective actions for effectiveness. Monitoring continues until it is apparent that the corrective action was effective and the systematic deficiency has been eliminated. If monitoring indicates continued difficulties, the corrective action is re-evaluated and modified if necessary to assure the desired outcome. If another procedural change is required, it is treated as a new corrective action, which is documented and monitored using established procedures.

14.0 PROCEDURES FOR EXECUTING CLIENT SPECIFICATIONS

Requirement. Systems must be established for processing client specifications for routine and non-routine analytical services. The systems must enable the client services staff to identify and document the requested specifications. The system must include procedures for communicating the specifications to the laboratory staff for execution and procedures for verifying the specifications have been executed.

14.1 ***Client Specific Requirements***. The project manager is the primary contact for clients requesting laboratory services. Client specifications are communicated using several mechanisms. The primary source of information is the client's quality assurance project plan (QAPjP) which details analytical and quality control specifications for the project. In the absence of a QAPjP, projects specifications can also be communicated using contracts, letters of authorization, or letters of agreement, which may be limited to a brief discussion of the analytical requirements and the terms and conditions for the work. These documents may also include pricing information, liabilities, scope of work, in addition to the analytical requirements. QAPjPs include detailed analytical requirements and data quality objectives, which supersede those found in the referenced methods. This information is essential to successful project completion.

The project manager is responsibility for obtaining project documents, which specify the analytical requirements. Following project management review, copies are distributed to the QA Director and the appropriate departmental managers for review and comment. The original QAPP is numbered with a document control number and filed in a secure location.

14.2 ***Documentation***. New projects are initiated using a project set up form, which is completed prior to the start of the project. This form details all of the information needed to correctly enter the specifications for each client sample into the laboratory information management system (LIMS, see example). The form includes data reporting requirements, billing information, data turnaround times, QA level, state of origin, and comments for detailing project specific requirements. The project manager is responsible for obtaining this information from the client and completing the form prior to sample arrival and login.

Sample receipt triggers project creation and the login process. The information on the set-up form is entered into the LIMS immediately prior to logging in the first sample. The set up form may be accompanied by a quotation, which details the analytical product codes and sample matrices. These details are also entered into the LIMS during login.

Special information is distributed to the laboratory supervisors and login department in electronic or hardcopy format upon project setup. All, project specific information is retained by the project manager in a secure file. The project manager maintains a personal telephone log, which details conversations with the client regarding the project.

14.3 ***Communication***. A pre-project meeting is held between client services and the operations managers to discuss the specifications described in the QAPP and/or related documents. Project logistics are discussed and finalized and procedures are developed to assure proper execution of the client's analytical specifications and requirements. Questions, raised in the review meeting, are discussed with the client for resolution. Exceptions to any requirements, if accepted by the client, are documented and incorporated into the QAPjP or project documentation records.

14.3 ***Operational Execution***. A work schedule is prepared for each analytical department on a daily basis. Analytical specifications from recently arrived samples have now been entered into the LIMS database. The database is sorted by analytical due date and holding time, into product specific groups. Samples are scheduled for analysis by due date and holding time. The completed schedule, which is now defined as a work list, is printed. The list contains the client requested product codes and specifications required for the selected sample(s). Special requirements are communicated to the analyst using the comments section or relayed through verbal instructions provided by the supervisor. The bench analyst assumes full responsibility for performing the analysis according to the specifications printed on the work sheet.

14.4 ***Verification***. Prior to the release of data to the client, laboratory section managers and the report generation staff review the report and compare the completed product to the client specifications documentation to assure that all requirements have been met. Project managers perform a spot check of projects with unique requirements to assure that the work was executed according to specifications.

15.0 CLIENT COMPLAINT RESOLUTION PROCEDURE

Requirement. A system for managing and reconciling client complaints must be implemented in the laboratory. The system must include procedures for documenting client complaints and communicating the complaint to the appropriate department for resolution. The system must also include a quality assurance evaluation to determine if the complaint is related to systematic defects requiring process changes.

15.1 ***Procedure***. Client complaints are communicated to client services representatives, quality assurance staff, or senior management staff for resolution. The individual receiving the complaint retains the responsibility for documentation and communicating the nature of the complaint to the responsible department(s) for resolution. The responsible party addresses the complaint. The resolution is communicated to quality assurance (QA) and the originator for communication to the client. QA reviews the complaint and resolution to determine if systematic defects exist. If systematic defects are present, QA works with the responsible party to develop a corrective action that eliminates the defect.

15.2 ***Documentation***. Client's complaints are documented by the individual receiving the complaint using the Data Query and Corrective Action Inquiry Form. This form is an Excel spreadsheet that contains detailed information essential to the complaint resolution. A record of the telephone conversation is maintained by client services. The form is distributed by E-Mail to QA and the party responsible for resolution. The complaint resolution is documented on the form by the responsible party and returned to the originator. A copy is sent to QA for review and database archiving.

15.3 ***Corrective Action***. Responses to data queries are required from the responsible party. At a minimum, the response addresses the query and provides an explanation to the complaint. Corrective action may focus on the single issue expressed in the complaint. Corrective action may include reprocessing of data, editing of the initial report, and re-issue to the client. If the QA review indicates a systematic error, process modification is required. The defective process at the root of the complaint is changed. SOPs are either created or modified to reflect the change. The party responsible for the process implements process changes.

15.4 ***QA Monitoring***. Process changes, implemented to resolve systematic defects, are monitored for effectiveness by QA. If monitoring indicates that the process change has not resolved the defect, QA works with the department management to develop and implement an effective process. If monitoring indicates that the defect has been resolved, monitoring is slowly discontinued. Continued monitoring is incorporated as an element of the annual system audit.

16.0 CONFIDENTIALITY PROTECTION PROCEDURES

Requirements: Policies and procedures are required to protect client data from release to unauthorized parties or accidental release of database information through accidental electronic transmission or illegal intrusion. These policies must be communicated to clients and staff. Electronic systems must be regularly evaluated for effectiveness.

16.1 ***Client Anonymity***. Information related to the Company's clients is granted to employees on a "need to know" basis. An individual's position within the organization defines his "need to know". Individuals with "need to know" status are given password access to systems that contain client identity information and access to documents and document storage areas containing client reports and information. Access to client information by individuals outside of the Company is limited to the client and individuals authorized by the client.

Individuals outside of the Company may obtain client information through subpoena issued by a court of valid jurisdiction. Clients are informed when subpoenas are received ordering the release of their information.

16.2 ***Documents***. Access to client documents is restricted to employees in need to know positions. Copies of all client reports are stored in secure archive with restricted access. Reports and report copies are distributed to individuals who have been authorized by the client to receive them. Documents are not released to third parties without verbally expressed or written permission from the client.

16.3 ***Electronic Data***.

Database Intrusion. Direct database entry is authorized for employees of Accutest only on a need to know basis. Entry to the database is restricted through a user specific multiple password entry system. Direct access to the database outside of the facility is possible through a dial-up connection. A unique password is required for access to the local area network. A second unique password is required to gain access to the database. The staff receives read or write level authorization on a hierarchical privilege basis.

Internet Access. Access to client information is through an HTTP Web application only. It does not contain a mechanism that allows direct access to the database. Clients can gain access to their data only using a series of Accutest assigned, client and user specific passwords. The viewable data, which is encrypted during transmission, consists of an extraction of database information only.

16.4 ***Information Requests***. Client specific data or information is not released to third parties without verbally expressed or written permission from the client. Written permission is required from third parties, who contact the Company directly for the release of information. Verbal requests will be honored only if they are received directly from the client. These requests must be documented in a record of communication maintained by authorization recipient.

17.0 QUALITY AUDITS AND SYSTEM REVIEWS

Requirement: The quality assurance group will conduct regularly scheduled audits of the laboratory to assess compliance with quality system requirements, technical requirements of applied methodology, and adherence to documentation procedures. The information gathered during these audits will be used to provide feedback to senior management and perform corrective action where needed for quality improvement purposes.

17.1 ***Quality Systems Audits***. Quality system audits are performed annually. In this audit, the laboratory is evaluated for compliance with the laboratory quality assurance plan (QAP). Findings, which indicate non-compliance or deviation from the QAP, are flagged for corrective action. Corrective actions require either a return to compliance with plan requirements or a plan change to reflect an improved quality process.

17.2 ***Technical Compliance Audits***. Technical compliance audits are performed semi-annually. Selected analytical procedures are evaluated for compliance with standard operating procedures (SOPs) and method requirements. If non-conformances exist, the published method serves as the standard for compliance. SOPs are edited for compliance if the document does not reflect method requirements. Analysts are trained to the new requirements and the process is monitored by quality assurance. Analysts are retrained in method procedures if an evaluation of bench practices indicates non-compliance with SOP requirements.

17.3 ***Documentation Audits***. Documentation audits are conducted monthly. This audit includes a check of measurement processes that require manual documentation. It also includes checks of data archiving systems. Non-conformances are corrected on the spot. Procedural modifications are implemented if the evaluation indicates a systematic defect.

17.4 ***Corrective Action Monitoring***. Defects or non-conformances that are identified during client or internal audits are corrected through process modifications and/or retraining. Once a corrective action has been designed and implemented, it is monitored for compliance on a regular basis by the QA staff. Spot corrections are performed if the staff is not following the new procedure. Monitoring of the corrective action continues until satisfactory implementation has been verified.

17.5 ***Management Reports***. Formal reports of all audit activities are prepared for the management staff. The report briefly summarizes observations, identifies practices in need of corrective actions, and reports on the outcome of corrective action monitoring. Recommendations for further action on listed items are included in the report.

ATTACHMENT A-2

Data Validator's Qualifications Statement

JUDY V. HARRY
P. O. Box 208
120 Cobble Creek Rd.
North Creek, NY 12853

Occupation: Data Validator/Environmental Technical Consultant

Years Experience: 23

Education: B.S., Chemistry, Magna cum laude, 1976, Phi Beta Kappa

Certifications: New York State Woman-Owned Business Enterprise (WBE)

Relevant Work History:

Data Validation Services: September 1989 - present

Sole proprietor of Data Validation Services, providing consultation/validation services to various regulatory and commercial clients.

These services include the review of analytical laboratory data for compliance with respect to various protocols, accuracy and defensibility of data, verification of reported values, and evaluation of quality parameters for analytical usability of results. Approved by NYSDEC NJDEP, and NYCDEP as a data validator for projects contracted through the Division of Hazardous Waste Remediation, Division of Solid Waste, and Division of Water Quality. Has also performed validation and usability determinations for data pertaining to USEPA Superfund and lead sites.

Performed validation for compliance with protocols including 1989/1991/1995 NYSDEC ASPs, 1987 NYSDEC CLP, USEPA OLM, USEPA OLC, USEPA ILM, USEPA DFLM, USEPA SOW3/90, USEPA SOW 7/87 CLP, USEPA SOW 2/88 CLP, USEPA SW846, RCRA, AFCEE, Part 360, 40 CFR, and Air analysis methods. Performed validation according to the NYSDEC Validation Scope of Work, USEPA National and Region I Functional Guidelines, USEPA Region II HW SOPs, AFCEE, and NJDEP Division of Hazardous Site Mitigation/Publicly Funded Site Remediation SOPs.

Performed validation for USEPA Superfund Sites including Salem Acres, York Oil, Port Washington L-4 Landfill, and OTIS AFB; and for USEPA lead sites including SJ&J Piconne, Maska, Bowe System, and Syossett Landfill, involving CLP, RAS, and SAS protocols.

Contracted for NYSDEC Superfund Standby Contracts with LMS Engineers, Camp Dresser & McKee, Malcolm-Pirnie, and EC Jordan, involving samples collected at NYS Superfund Sites and analysed under the NYSDEC ASP.

Validated data for NYSDEC Phase II remedial investigations, RI/FS projects, and PRP over-sight projects for hazardous waste sites. Was the primary contractor for Lawler, Matusky & Skelly Engineers during fifth and sixth round Phase II investigation, reviewing results for TCL/TAL analyses performed according to EPA CLP and 1989 NYSDEC ASP. Provided data validation for Phase II investigations for Gibbs & Hill, Inc, reviewing results from TCL/TAL analyses performed according to 1989 NYSDEC ASP.

Performed validation services for clients conducting RI/FS activities involving samples of many matrices, including waste, air, sludges, leachates, solids/sediments, aqueous, and biota; clients have included Barton & Loguidice, Blasland Bouck & Lee, Camp Dresser & McKee, C&S Consulting Engineers, Clough Harbour & Associates, Columbia Analytical Services, C.T. Male, Dames & Moore, Ecology & Environment, EC Jordan, Fanning Phillips & Molnar, FluorDaniel GTI, Foster Wheeler, Frontier Technical, Galson Consultants, H2M Group, Lockwood, Kessler & Bartlett, LMS Engineers, Malcolm-Pirnie, Metcalf & Eddy, O'Brien & Gere, Parsons Engineering-Science, P. W. Grosser, Rizzo Associates, Roux Associates, Sear Brown Group, ThermoRemediation Inc., URS Consultants, Wehran Emcon, Weston, and YEC.

Validated sample data pertaining to numerous landfill site investigations for TCL/TAL and NYS Part 360 analytes.

Validated data for NYSDEC and NJDEP sites for samples analysed according to EPA CLP SOPs, with validation performed according to NJDEP validation procedures.

Provided consultation services to laboratories regarding analytical procedures and protocol interpretation, and to law firms for litigation support.

Provided services to firms involving audits of environmental analytical laboratories to determine analytical capability, particulary for compliance with NYSDEC ASP adn AFCEE requirements.

Guest speaker on a panel discussing Data Review/Compliance and Usability, for an analysts workshop for the New York Association of Approved Environmental Laboratories, 1993.

Adirondack Environmental Services: June 1987 - August 1989

Senior mass spectroscopist for AES. Responsible for GC/MS analyses of environmental samples; development of the GC/MS laboratory, initiating the instrumental and computer operations from the point of installation; and for implementing the procedures and methodologies for Contract Laboratory Protocol.

CompuChem Laboratories: May 1982 - January 1987

Managed a GC/MS laboratory; developed, implemented, and supervised QA/QC criteria at three different levels of review; and was responsible for the development and production of environ-ental and clinical samples. Directed a staff of 23 technical and clerical personnel, and managed the extraction, GC/MS, and data review labs.

Research Triangle Institute: December 1979 - May 1982

Worked as an analytial research chemist responsible for development of analytical methods for the EPA Federal Register at RTI. This involved analysis of biological and environmental samples for priority pollutants, primarily relating to wastewaters and to human sampling studies. Method development included modification and interfacing of volatile purge apparatus to GC/MS, analysis and resolution/identification of individual PCB congeners by capillary column by mass spectra.

Guardsman Chemical Company: February 1977 - November 1979

Performed all quality control functions for the manufacturing plant. Performed research and development on coatings and dyes.

Almay Cosmetics: May 1976 - December 1976

Product evaluation chemist. Responsible for analytical QC of manufactured products.

ATTACHMENT A-3

Field Change Request Form

Project # _____
Project Name: _____
Location: _____
Date: _____

FIELD CHANGE REQUEST

SITE SAFETY REVIEW -- CHANGES AND OVERALL EVALUATION
(To Be Completed For Each Field Change In Plan)

Was the Safety Plan Followed as presented _____ **Yes** _____ **No**

Describe, in detail, all changes to the Safety Plan

_____

_____

_____

_____

_____

Reason for changes

_____

_____

_____

_____

Follow-up, Review and Evaluation Prepared by: _____ **Date** _____

Discipline _____

Approved by: **Site Manager** _____ **Date** _____

Site Safety Officer _____ **Date** _____

Office Health & Safety Supervisor _____ **Date** _____

Evaluation of Site Safety Plan:

Was the Safety Plan adequate? _____ **Yes** _____ **No**

What changes would you recommend?

_____

_____

_____

_____

APPENDIX B

Site-Specific Health and Safety Plan

SITE-SPECIFIC
HEALTH AND SAFETY PLAN

Ron Hill Dry Cleaners Site
(Registry No. 1-30-071)
71 Forest Avenue
Glen Cove, Nassau County, New York

December 6, 1999

Prepared for:

Mr. Richard Sills

Prepared by:

ROUX ASSOCIATES, INC.
1377 Motor Parkway
Islandia, New York 11788

ROUX

CONTENTS

1.0 GENERAL 1

2.0 EMERGENCY INFORMATION 2

3.0 HEALTH AND SAFETY PERSONNEL DESIGNATIONS 3

4.0 SITE HISTORY AND PHYSICAL DESCRIPTION 4
- 4.1 Location 4
- 4.2 Site History 4

5.0 HAZARD ASSESSMENT 5
- 5.1 Chemical Hazards 5
- 5.2 Physical Hazards 5
  - 5.2.1 Noise 5
  - 5.2.2 Heat Stress 5
  - 5.2.3 Cold Stress 7

6.0 TRAINING REQUIREMENTS 9
- 6.1 Basic Training 9
- 6.2 Site-Specific Training 9
- 6.3 Safety Briefings 9
- 6.4 Record Keeping Requirements 9

7.0 MONITORING PROCEDURES FOR SITE OPERATIONS 11
- 7.1 Intrusive Operations 11

8.0 MEDICAL SURVEILLANCE REQUIREMENTS 13

9.0 ZONES, PROTECTION AND COMMUNICATIONS 14
- 9.1 Site Zones 14
  - 9.1.1 Work Zone 14
  - 9.1.2 Contamination Reduction Zone 14
  - 9.1.3 Support Zone 15
- 9.2 Personal Protection 15
  - 9.2.1 General 15
  - 9.2.2 Respiratory Protection and Clothing 16
- 9.3 Decontamination Procedures 18
  - 9.3.1 Contamination Prevention 19
  - 9.3.2 Decontamination 20
  - 9.3.3 Disposal Procedures 20

CONTENTS (Continued)

9.4 Standard Operating Procedures/Safe Work Practices 20
9.4.1 Communications 20
9.4.2 General Safe Work Practices 21
9.4.3 Waste Disposal 22
9.4.4 Heavy Equipment and Drill Rig Safety 22
9.4.5 Confined Space Entry 22

10.0 EMERGENCY PLAN 24
10.1 Site Emergency Coordinator(s) 24
10.2 Evacuation 24
10.3 Potential or Actual Fire or Explosion 25
10.4 Environmental Incident (Release or Spread of Contamination) 25
10.5 Personal Injury 26
10.6 Overt Personnel Exposure 26
10.7 Adverse Weather Conditions 26

11.0 AUTHORIZATIONS 27

12.0 FIELD TEAM REVIEW 28

TABLES

B-1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the RonHill Dry Cleaner Site, Glen Cove, New York

FIGURES

B-1. Route to Hospital from RonHill Dry Cleaner Site
B-2. Typical Decontamination Layout - Level D Protection
B-3. Typical Decontamination Layout - Level C Protection
B-4. Typical Decontamination Layout - Level B Protection

APPENDIX

B-1. Incident Report
B-2. Site Safety Follow-Up Report
B-3. Health and Safety Field Change Request Form

1.0 GENERAL

This site-specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations, and Roux Associates, Inc. (Roux Associates) Standard Operating Procedures (SOPs). It addresses all activities to be performed during the investigation at the RonHill Dry Cleaner site in the City of Glen Cove, New York (Site). The HASP will be implemented by the designated Site Health and Safety Officer (SHSO) during work at the Site.

Compliance with this HASP is required for all Roux Associates employees and third parties who enter this Site. Assistance in implementing this HASP can be obtained from Roux Associates' Office Health and Safety Manager (OHSM). The content of this HASP may undergo revision based upon additional information made available. Any changes proposed must be reviewed and approved by Roux Associates' OHSM or her designee.

Scope of Work

The Scope of Work for this investigation will include implementation of the following tasks:

- test borings;
- ground-water monitoring well installation; and
- soil, ground-water, and soil gas sampling.

These tasks are described in detail in Section 5.0 of the Work Plan.

2.0 EMERGENCY INFORMATION

Multiple emergency services may be obtained from 911. More specific numbers for local services are listed below.

Type	Name	Telephone Numbers
Police	City of Glen Cove	(516) 676-1000
Fire	City of Glen Cove	(516) 676-0366
Hospital	North Shore University Hospital at Glen Cove	(516) 674-7306
National Response Center		(800) 424-8802
Poison Control Center	Nassau County Medical Center	(516) 542-2323
Roux Associates' Health and Safety Manager	Linda Wilson	(516) 232-2600

The route to Glen Cove Community Hospital is shown in Figure B-1.

3.0 HEALTH AND SAFETY PERSONNEL DESIGNATIONS

Roux Associates has designated health and safety personnel to be responsible for the implementation of this HASP for Roux Associates employees, and to provide assistance to the contractor for health and safety-related issues.

Personnel Designation	Responsibilities
Office Health and Safety Manager (OHSM)	Implementation and modification of the HASP. Will assign health and safety duties. Provides adequate resources for field health and safety personnel. Ensures that field personnel are trained and aware of Site conditions. Schedules adequate personnel and equipment to perform job safely.
Site Health and Safety Officer (SHSO)/ Site Emergency Coordinator	Conducts safety briefings and worker awareness meetings. Ensures compliance with HASP. Notifies OHSM of accidents/ incidents. Coordinates health and safety activities. Makes contact with local emergency groups prior to beginning work on-site. Responsible for evacuation, emergency treatment, and emergency transport of personnel.
Field Crew Personnel	Report unsafe or hazardous conditions to SHSO. Understand the information contained in this HASP.

4.0 SITE HISTORY AND PHYSICAL DESCRIPTION

This section provides a brief summary of the location and history of the RonHill Dry Cleaner Site.

4.1 Location

The Site is a former dry cleaner facility located at 71 Forest Avenue in the City of Glen Cove, Nassau County, New York. The Site is currently owned by Bedford Affiliates and is currently operated as a retail shoe store (Payless Shoes).

4.2 Site History

Dry cleaning activities began at the site in 1963 and continued under various tenant-operators until 1993. Bedford Affiliates has owned the property since August 27, 1952. Tetrachloroethene (PCE), which was used as a dry cleaning solvent, was first detected in nearby municipal water supply wells in 1977. PCE has also been detected in nearby monitoring wells maintained by the Nassau County Department of Public Works. During the past decade, numerous investigations have examined soil and groundwater contamination at the Site. Currently, an air sparging/vapor extraction system is operating at the Site.

5.0 HAZARD ASSESSMENT

The potential hazards associated with the anticipated investigation activities include chemical and physical hazards. There is little potential for encountering biological hazards due to the nature of the work location and the activities to be conducted.

5.1 Chemical Hazards

Previous investigations have shown the presence of organic compounds at the Site. The toxicological, physical, and chemical properties of these potential contaminants are presented in Table B-1. This table includes action levels (permissible exposure levels) which will establish the level of protection. The potential for encountering these contaminants exists during intrusive activities such as drilling.

5.2 Physical Hazards

A variety of physical hazards may be present during Site activities. These hazards are similar to those associated with any construction-type project. These physical hazards are due to motor vehicle and heavy equipment operation, the use of power and hand tools, hazardous working surfaces, and handling and storage of fuels. These hazards are not unique and are generally familiar to most field personnel. Additional task-specific requirements will be covered during safety briefings.

5.2.1 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. High noise operations will be evaluated at the discretion of the SHSO. Personnel with 8-hour time-weighted-average exposures exceeding 85 dBA must be included in a hearing conservation program in accordance with 29 CFR 1910.95.

5.2.2 Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment (PPE) in hot weather environments.

Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat cramps are as follows:

- severe muscle cramps, usually in the legs and abdomen;
- exhaustion, often to the point of collapse; and
- dizziness or periods of faintness.

First aid treatment includes shade, rest and electrolyte fluid replacement therapy. Normally, the individual should recover within one-half hour. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to a hospital for medical attention.

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat while working. The circulatory system of the individual fails as blood collects near the skin in an effort to rid the body of excess heat. The signs and symptoms of heat exhaustion are as follows:

- rapid and shallow breathing;
- weak pulse;
- cold and clammy skin with heavy perspiration;
- skin appears pale;
- fatigue and weakness;
- dizziness; and
- elevated body temperature.

First aid treatment includes cooling the victim, elevating the feet, and replacing fluids and electrolytes. If the individual has not recovered within 30 minutes and the temperature has not decreased, the individual should be transported to the hospital for medical attention.

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a **MEDICAL EMERGENCY**, requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- dry, hot, red skin;
- body temperature approaching or above 105°F;
- large (dilated) pupils; and
- loss of consciousness - the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility.

Heat stress (heat cramps, heat exhaustion, and heat stroke) is a significant hazard if any type of PPE (semipermeable or impermeable) which prevents evaporative cooling is worn in hot weather environments. Local weather conditions may require restricted work schedules in order to adequately protect personnel. The use of work/rest cycles (including working in the cooler periods of the day or evening) and training on the signs and symptoms of heat stress should help prevent heat-related illnesses from occurring. Work/rest cycles will depend on the work load required to perform each task, type of protective equipment, temperature, and humidity. In general, when the temperature exceeds 88°F, a 15 minute rest cycle will be initiated once every two hours. In addition, potable water and fluids containing electrolytes (e.g., Gatorade) will be available to replace lost body fluids.

5.2.3 Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 40°F. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. Training on the signs and symptoms of cold stress should prevent cold-related illnesses from occurring. The signs and symptoms of cold stress include the following:

- severe shivering;
- abnormal behavior;

- slowing;
- weakness;
- stumbling or repeated falling;
- inability to walk;
- collapse; and/or
- unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks, and encourage activity, such as walking wrapped in a blanket.

6.0 TRAINING REQUIREMENTS

The Hazardous Waste Operations and Emergency Response Rule (29 CFR 1910.120) requires that all personnel be trained to recognize on-site hazards, understand the provisions of this HASP, and be made aware of the responsible health and safety personnel. This section discusses the means to meet these requirements.

6.1 Basic Training

All Site personnel who will perform work in areas where the potential for toxic exposure exists will be health and safety-trained prior to performing work on-site, per OSHA 29 CFR 1910.120(e). Training records will be submitted to and maintained by the SHSO on-site, as described in Section 6.4.

6.2 Site-Specific Training

Health and safety-related training that will specifically address the activities, procedures, monitoring and equipment for the Site operations will be provided to all Site personnel and visitors by the SHSO. It will include Site and facility layout, hazards, emergency services at the Site and will detail all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand, and to reinforce their responsibilities regarding safety and operations for their particular activity. Site-specific training will be documented and kept as part of the project records.

6.3 Safety Briefings

Project personnel will be given briefings by the SHSO on an as-needed basis to further assist them in conducting their activities safely. Safety briefings will be held when new operations are to be conducted, whenever changes in work practices must be implemented, before work is begun at each location, and each Monday morning. Records of safety briefings will be kept as part of the project records.

6.4 Record Keeping Requirements

All record keeping requirements mandated by OSHA 29 CFR 1910.120 will be strictly followed. Specifically, all personnel training records, injury/incident reports, medical examination records and exposure monitoring records will be maintained by Roux Associates and each contractor for

a period of at least thirty years after the employment termination date of each employee. Pertinent health and safety training and medical certifications will be kept onsite during the field operations. The SHSO shall maintain a daily written log of all health and safety monitoring activities, and monitoring results shall become part of the project records.

7.0 MONITORING PROCEDURES FOR SITE OPERATIONS

The SHSO will record wind direction and temperature during monitoring in the logbook. All monitoring equipment will be calibrated per the owner's manual which will be kept onsite, or at least monthly according to Site inspection rules.

7.1 Intrusive Operations

Data from previous investigations have identified the presence of organic compounds in soil. Air monitoring will be performed to establish the concentrations of these constituents during intrusive activities (e.g., drilling) using a photoionization detector (PID). Although it is not anticipated that the intrusive operations will produce significant airborne particulates, air monitoring for particulates will also be performed, as described below.

Volatile Organic Compounds

The SHSO will monitor the breathing zone with the PID in continuous operating mode and with the alarm activated. The alarm will be set at 5 parts per million (ppm), which is below the permissible exposure level (PEL) for all constituents of concern (except vinyl chloride). If the PID indicates that total vapor exceeds the 5 ppm level, the SHSO will order cessation of the activity until all personnel within the work zone have donned a full face air purifying respirator, or until the nature of the hazard has been more thoroughly evaluated.

Dräeger tubes will be used to provide direct readings to establish the levels of vinyl chloride if the PID indicates that total vapor exceeds the 5 ppm level, to determine that personal protection is adequate. The Dräeger tubes will be chemical-specific to vinyl chloride, but will be conservatively biased high, and the readings will enable the SHSO to make an immediate decision on the level of protection. If any detections of benzene are noted based upon the Dräeger tube readings, the SHSO will order cessation of the activity until:

- all potentially exposed personnel have donned Level B respiratory protection (supplied air);
- the vinyl chloride levels are not detectable by the Dräeger tubes; or
- the nature of the hazard has been more thoroughly evaluated and it has been determined that the measured compound(s) was not vinyl chloride.

Airborne Particulates

By design, the intrusive activities that will be performed as part of the RI (i.e., drilling) will not produce significant amounts of airborne particulates. Additionally, the majority of the locations at which drilling will be performed are covered with asphalt and concrete, further reducing the potential for airborne particulates. Despite the very low potential to produce a significant increase in airborne particulates, the SHSO will monitor airborne particulates using a MiniRam™ particulate monitor upwind and downwind from the work zone as a level of protection to the general public. If significant increases of particulates are measured downwind from the work site, as compared to airborne particulate concentration measured upwind, dust control measures (e.g., misting, etc.) will be implemented.

8.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance specifies any special medical monitoring and examination requirements as well as stipulates that all Roux Associates personnel and contractors are required to pass the medical surveillance examination or equivalent for hazardous waste work required by 29 CFR 1910.120. As a minimum, the examination will include:

- complete medical and work histories;
- EKG;
- urinalysis;
- physical exam;
- eye exam;
- blood chemistry;
- pulmonary function test; and
- audiometry.

The examination will be taken annually, at a minimum, and upon termination of employment with the company. Additional medical testing may be required by the OHSM in consultation with the company physician and the SHSO if an overt exposure or accident occurs, or if other Site conditions warrant further medical surveillance.

9.0 ZONES, PROTECTION AND COMMUNICATIONS

Work zones, levels of personal protection, and means of communication are described in the following sections.

9.1 Site Zones

Roux Associates may employ the following three zone approach to Site operations if warranted.

- the Work Zone;
- the Contamination Reduction Zone; and
- the Support Zone.

9.1.1 Work Zone

The Work Zone is the area where work will be conducted. The Work Zone will be designated by a temporary barrier consisting of barricade tape. No personnel shall work in the Work Zone without a buddy. All workers within the Work Zone shall wear the proper PPE (see Section 9.2). No unauthorized persons will be allowed in the Work Zone during Site activities.

No personnel are allowed in the Work Zone without:

- a buddy;
- the proper PPE;
- medical authorization; and
- training certification.

9.1.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the Work Zone and the Support Zone. The CRZ will provide for full personnel and portable equipment decontamination (Section 9.3). The CRZ will also contain safety and emergency equipment such as first aid equipment (bandages, blankets, eye wash) and containment equipment (adsorbent, fire extinguisher).

9.1.3 Support Zone

The Support Zone is considered the uncontaminated area and will provide for team communications and emergency response. Appropriate safety and support equipment will be located in this zone. The Support Zone will be located upwind of Site operations, if possible and may be used as a potential evacuation point. No potentially contaminated personnel or materials are allowed in this zone except appropriately packaged/ decontaminated and labeled samples, and drummed wastes.

9.2 Personal Protection

This section describes the levels of protection which will be required by on-site personnel during the remediation activities.

9.2.1 General

The level of protection to be worn by field personnel and visitors will be defined and controlled by the SHSO with approval of the OHSM. Where more than one hazard area is indicated, further definition shall be provided by review of Site hazards, conditions, and operational requirements and by monitoring at the particular operation being conducted.

During intrusive activities, continuous monitoring will be performed using the PID. Dräeger tubes will also be used for initial and periodic real-time measurements of vinyl chloride. The use of Dräeger tubes for vinyl chloride will allow the SHSO to make an immediate decision on the adequacy of protection against this compound. Should the PID or Dräeger tubes indicate that the PEL for vinyl chloride has been exceeded, work will cease in this area until:

- workers have donned a full face air purifying respirator; or
- the concentration levels for vinyl chloride are below the Dräeger tube detection levels.

Protection may be upgraded or downgraded by the SHSO in conjunction with the OHSM based upon the PID instrument and Dräeger tube results.

9.2.2 Respiratory Protection and Clothing

Three levels of protective equipment are discussed below including Level D, Level C, and Level B.

Level D Protection

1. PPE:
   - Cotton coveralls
   - Cotton gloves
   - Boots/shoes, leather or chemical-resistant, steel toe and shank
   - Boots (outer), chemical-resistant (disposable)
   - Safety glasses or chemical splash goggles
   - Hard hat
   - Escape mask

2. Criteria for selection

   PID readings in the breathing zone are less than 5 ppm, and vinyl chloride is not detected using Dräeger tubes. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

NOTE: Modifications of Level D will be used to increase the level of skin protection during activities which increase the degree of contact with chemical hazards. These modifications include the use of chemical/corrosion resistant coveralls (e.g., tyveks), and chemical resistant gloves.

Level C Protection

1. PPE:
   - Full face, air purifying, cartridge-equipped respirator (Mine Safety and Health Administration [MSHA]/National Institute for Occupational Safety and Health [NIOSH] approved)
   - Chemical-resistant clothing (coverall; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls)

- Cotton or synthetic coveralls*
- Gloves (inner), chemical-resistant - latex
- Gloves (outer), chemical-resistant - nitriles
- Boots (inner), chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant (disposable)
- Hard hat (face shield)
- Escape mask
- 2-Way radio communications (intrinsically safe)*

*Optional

2. Criteria for selection
   - Continuous total vapor readings register between 5 ppm and 25 ppm on PID, and vinyl chloride is not detected with Dräeger tubes.
   - Measured air concentrations of identified substances (organic vapors) will be reduced by the respirator to at or below the substance's exposure limit, and the concentration is within the service limit of the canister.
   - Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) levels.
   - Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
   - Job functions have been determined not to require self-contained breathing apparatus.

Level B Protection

1. PPE:
   - Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved)
   - Chemical-resistant clothing (overall and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls)
   - Coveralls
   - Gloves (inner), chemical-resistant - latex

- Gloves (outer), chemical-resistant - nitriles
- Boots (inner), chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant (disposable)
- Hard hat (face shield)
- 2-way radio communications (intrinsically safe)

2. Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

- PID readings in the breathing zone are greater than 25 ppm and less than 500 ppm, or vinyl chloride is detected, but less than 100 ppm utilizing Dräeger tubes.
- The type(s) and atmospheric concentration(s) of toxic substance(s) have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:
  -- with IDLH concentrations
  or
  -- exceeding limits of protection afforded by a full face, air purifying mask
  or
  -- containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.
- The atmosphere contains less than 19.5 percent oxygen.
- Operations at the Site make it highly unlikely that the small, unprotected arc of the head or neck will be contacted by splashes of extremely hazardous substances.
- If work is performed in an enclosed space.

9.3 Decontamination Procedures

A steam cleaner will be utilized to decontaminate heavy equipment used in drilling. Personnel should exercise caution when using a steam cleaner. The high pressure steam can cause burns. Protective gloves, face shields, hard hats, steel-toed boots, and Tyvek suits or rain gear will be worn when using steam cleaners.

9.3.1 Contamination Prevention

Adequate contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include the following.

Personnel

- Do not walk through areas of obvious or known contamination;
- Do not handle contaminated materials directly;
- Make sure all PPE has no cuts or tears prior to donning;
- Fasten all closures on suits, covering with tape, if necessary;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contaminants;
- Do not carry cigarettes, gum, etc., into contaminated areas; and
- Use disposables to cover nondisposable equipment when contact is probable.

Sampling/Monitoring

- When required by the SHSO, cover instruments with clear plastic, leaving opening for sampling and exhaust ports; and
- Bag sample containers prior to the placement of sample material.

Heavy Equipment

- Care should be taken to limit the amount of contamination that comes in contact with heavy equipment;
- If contaminated tools are to be placed on non-contaminated equipment for transport to the decontamination pad, plastic should be used to keep the equipment clean; and
- Excavated soils should be contained and kept out of the way of workers.

9.3.2 Decontamination

All personnel and equipment exiting the Work Zone shall be thoroughly decontaminated. Figures B-2, B-3 and B-4 illustrate decontamination procedures for Levels D, C and B, respectively. Safety briefings shall explain the decontamination procedures for personnel and portable equipment for the various levels of protection. Heavy equipment will be decontaminated with a steam cleaner.

9.3.3 Disposal Procedures

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left at the Site. All potentially contaminated materials (e.g., soil, clothing, gloves, etc.) will be bagged or drummed, as necessary, and segregated for disposal. All contaminated materials shall be disposed of in accordance with appropriate regulations. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste. All waste disposal operations conducted by Roux Associates will be monitored by the SHSO and carried out under the appropriate level of personal protection.

9.4 Standard Operating Procedures/Safe Work Practices

This section discusses safe work practices to be used during all activities. In addition, non-monitoring safety-related procedures are described.

9.4.1 Communications

- Telephones -- A telephone will be available for communication with emergency support services/facilities.
- Hand Signals -- To be employed by personnel required to have Level C protection. They shall be known by the entire field team before operations commence and covered during Site-specific training.

The following hand signals will be used, if needed:

Signal	Meaning
Hand gripping throat	Out of air, can't breath
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm all right, okay
Thumbs down	No, negative

9.4.2 General Safe Work Practices

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth contact and ingestion of material is prohibited onsite except in lunch room or designated office areas.
- Hands must be washed thoroughly upon leaving the Work Zone or before eating, drinking, or any other activities.
- Contaminated protective equipment shall not be removed from the Site until it has been decontaminated and properly packaged and labeled.
- Portable eyewash stations shall be located in the decontamination staging area in the Support Zone.
- Facial hair, which interferes with a satisfactory fit of respiratory equipment, will not be allowed on personnel if it is established that respiratory protective equipment is warranted.
- An emergency first aid kit and fire extinguisher shall be onsite in the Support Zone at all times.
- All respiratory protection selected to be used onsite shall meet MSHA/NIOSH requirements for the existing contaminants.
- Any skin contact with surface and ground water shall be avoided.
- No contact lenses may be worn.

9.4.3 Waste Disposal

All waste disposal operations shall be monitored by the SHSO and performed using the appropriate level of personal protection. Personnel shall wear the prescribed clothing, especially eye protection and chemical resistant gloves, when handling or drumming waste materials. Contamination avoidance shall be practiced at all times.

9.4.4 Heavy Equipment and Drill Rig Safety

Typical machinery to be found at this site may include pumps, compressors, generators, portable lighting systems, fork lifts, trucks, dozers, backhoes, and drill rigs. From a safety standpoint, it is important for all site workers to be continually aware of the equipment around them. It poses a serious hazard if not operated properly, or if personnel near machinery cannot be seen by operators.

Drilling crews are confronted with all of these heavy equipment hazards. They must be responsible for housekeeping around the rig because of the rods, auger sections, rope, and hand tools cluttering the operation. Maintenance is a constant requirement. Overhead and buried utilities require special precautions because of electrical and natural gas hazards. Electrical storms may seek out a standing derrick. The hoist or cathead rope poses specific hazards that must be respected. A clean, dry, sound rope should always be used. Hands should be kept away from the test hammer. Hearing loss, while not an immediate danger, is considerable over time. Hearing protection must be worn.

9.4.5 Confined Space Entry

The scope of work does not require personnel to enter any confined space during the conduct of this project. Confined space is defined as having limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work, and is not designed for continuous occupancy by the employee. These spaces include, but are not limited to, underground vaults, tanks, storage bins, pits and diked areas, vessels, and silos.

A permit-required confined space is one that meets the definition of confined space, and has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere;
- contains a material that has the potential for engulfing an entrant;
- has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or
- contains any other recognized serious safety or health hazards.

10.0 EMERGENCY PLAN

As a result of the hazards onsite and the conditions under which operations are conducted, the possibility of an emergency exists. An emergency plan is required by OSHA 29 CFR 1910.120 to be available for use and is included below. A copy of this plan shall be posted in the Support Zone at each work site.

10.1 Site Emergency Coordinator(s)

The SHSO shall act as the Site Emergency Coordinator to make contact with the local fire, police and other emergency units prior to beginning work onsite. In these contacts, the SHSO will inform the emergency units about the nature and duration of work expected at the Site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants.

The SHSO or his designee shall implement this emergency plan whenever conditions at the Site warrant such action. The coordinator(s) will be responsible for assuring the evacuation, emergency treatment, emergency transport of Site personnel as necessary, and notification of emergency response units and the appropriate management staff.

10.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of particulates, etc., an air horn or other appropriate device will be sounded by the SHSO for approximately ten seconds indicating the initiation of evacuation procedures. All persons in both the restricted and non-restricted areas will evacuate and assemble near the Support Zone or other safe area as identified in advance by the SHSO. Under no circumstances will incoming personnel or visitors be allowed to proceed into the evacuated area once the emergency signal has been given. The SHSO must see that access for emergency equipment is provided and that all combustible apparatus has been shutdown once the alarm has been sounded. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency. The hospital route will be posted onsite (Figure B-1). Any other excavation routes will be specified by the appropriate emergency personnel.

10.3 Potential or Actual Fire or Explosion

If the potential for a fire exists or if an actual fire or explosion occurs, the following procedure will be implemented:

- immediately evacuate the Work Zone as described above (Section 10.2); and
- notify fire department and security.

10.4 Environmental Incident (Release or Spread of Contamination)

The SHSO shall instruct a person onsite to immediately contact police and fire authorities to inform them of the possible or immediate need for nearby evacuation. If a significant release (above the reportable quantity as described in 40 CFR 302) has occurred, the National Response Center and other appropriate groups should be contacted. Those groups will alert National or Regional Response Teams as necessary. The personnel listed below shall be notified as necessary.

Type	Name	Telephone #
Fire Department		(516) 676-0366
Hazardous Material Emergency Response		911
Police Department		(516) 676-1000
Ambulance		(516) 676-1000
Poison Control Center		(516) 542-2323
Hospital	North Shore University Hospital at Glen Cove	(516) 674-7306
National Response Center (Release or Spill)		(800) 424-8802
Site Health and Safety Officer	Tom Dwyer	On-Site
Health and Safety Manager	Tom Dwyer	(516) 232-2600
Project Manager	Neil O'Halloran	(516) 232-2600

10.5 Personal Injury

Emergency first aid shall be applied onsite as deemed necessary to stabilize the patient. Notify the emergency units as deemed necessary.

10.6 Overt Personnel Exposure

If an overt exposure to toxic materials should occur, the exposed person shall be treated onsite as follows:

Skin Contact:	Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention. An eyewash and/or emergency shower or drench system will be provided onsite at the CRZ and/or support zone, as appropriate. Eyes should be rinsed for at least fifteen (15) minutes upon chemical contamination.
Inhalation:	Move to fresh air and/or if necessary, decontaminate and transport to the hospital.
Ingestion:	Decontaminate and transport to emergency medical facility.
Puncture Wound or Laceration	Decontaminate and transport to emergency medical facility. SHSO will provide medical data sheets to medical personnel as requested.

10.7 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO will determine if work can continue without sacrificing the health and safety of field workers. Some of the items to be considered prior to determining if work should continue are:

- heavy rainfall;
- potential for heat stress;
- potential for cold stress and cold-related injuries;
- limited visibility;
- potential for electrical storms;
- potential for malfunction of health and safety monitoring equipment or gear; and
- potential for accidents.

11.0 AUTHORIZATIONS

Personnel authorized to enter the Site while operations are being conducted must be approved by the SHSO and the Project Manager. This document will be completed when the subcontractors have assigned trained personnel for the Site. Authorization will require completion of appropriate training courses, medical examination requirements as specified by OSHA 29 CFR 1910.120, and review and sign-off of this HASP.

The following Roux Associates personnel are authorized to perform work onsite:

1. Tom Dwyer
2. Tom Lindberg
3. Neil O'Halloran
4. Craig Werle

Personnel authorized to enter the Site are:

1. Soil Gas Survey Subcontractor
2. Surveying Subcontractor
3. Drilling Subcontractor

12.0 FIELD TEAM REVIEW

Each person entering the Site and each field member shall sign this section after site-specific training is completed and before being permitted to work onsite.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provision contained therein.

Site/Task: _____

Name Printed	Signature	Date

APPENDIX B-1

Incident Report

INCIDENT REPORT

Project # _____

Project Name _____ **Date** _____

Site Location _____

Report Prepared By _____

Name Printed **Title**

Incident Category (Check all that apply)

_____ Injury	_____ Illness	_____ Property Damage
_____ Near Miss	_____ On-Site Equipment	_____ Chemical Exposure
_____ Motor Vehicle	_____ Fire	_____ Electrical
_____ Mechanical	_____ Other	

Date and Time of Incident: _____

Names of Persons Injured (see end of report for details) _____

_____

_____

_____

_____

NARRATIVE REPORT OF INCIDENT

(Provide sufficient detail so that the reader may fully understand the actions leading to or contributing to the incident, the incident occurrence, and actions following the incident. Append additional sheets of paper if necessary.)

_____

_____

_____

_____

WITNESSES TO INCIDENT

1. Name Company

Address _____

_____

Telephone No.

2. Name _____ Company _____

Address _____

Telephone No. _____

PROPERTY DAMAGE

Brief Description of Property Damage _____

_____

_____

_____

_____

Estimate of Damage _____

INCIDENT LOCATION

_____

_____

_____

_____

INCIDENT ANALYSIS

Causative agent most directly related to accident (object, substance, material, machinery, equipment, conditions): _____

_____

Project # _____
Project Name: _____
Location: _____
Date: _____

INCIDENT REPORT

Was weather a factor? _____

Unsafe mechanical/physical/environmental condition at time of incident (be specific) _____

_____

Unsafe act by injured and/or others contributing to the incident (be specific, must be answered) _____

_____

Personal factors (improper attitude, lack of knowledge or skill, slow reaction, fatigue) _____

_____

_____

ON-SITE INCIDENTS

Level of personal protection equipment required in Site Safety Plan _____

_____

_____

_____

_____

Modifications _____

_____

Was injured using required equipment? _____

_____

_____

_____

APPENDIX B-2

Site Safety Follow-Up Report

INCIDENT FOLLOW-UP

Date of Incident

Site

Brief Description of Incident _____

_____

_____

Outcome of Incident _____

_____

_____

Physician's Recommendations _____

_____

_____

Date Injured Returned to Work _____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

APPENDIX B-3

Health and Safety Field Change Request Form

Project # _____
Project Name: _____
Location: _____
Date: _____

FIELD CHANGE REQUEST

SITE SAFETY REVIEW -- CHANGES AND OVERALL EVALUATION
(To Be Completed For Each Field Change In Plan)

Was the Safety Plan Followed as presented _____ **Yes** _____ **No**

Describe, in detail, all changes to the Safety Plan

_____

_____

_____

_____

_____

Reason for changes

_____

_____

_____

_____

Follow-up, Review and Evaluation Prepared by: _____ **Date** _____

Discipline _____

Approved by: **Site Manager** _____ **Date** _____

Site Safety Officer _____ **Date** _____

Office Health & Safety Supervisor _____ **Date** _____

Evaluation of Site Safety Plan:

Was the Safety Plan adequate? _____ **Yes** _____ **No**

What changes would you recommend?

_____

_____

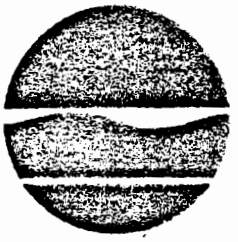
_____

_____

APPENDIX C

Dvirka and Bartilucci
RI/FS Work Plan

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY



WORK PLAN

RONHILL CLEANERS SITE

Glen Cove
Nassau County, New York
(Site Registry No. 1-30-071)

WORK ASSIGNMENT NO. D003600-11

Prepared For

New York State Department of Environmental Conservation

JULY 1999

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN

FOR

RONHILL CLEANERS SITE

WORK ASSIGNMENT NO. D003600-11

(SITE REGISTRY NO. 1-30-071)

PREPARED FOR

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

BY

DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
WOODBURY, NEW YORK

APRIL 1999

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
RONHILL CLEANERS SITE

TABLE OF CONTENTS

Section	Title	Page
1.0	**INTRODUCTION**	1-1
2.0	**SUMMARY OF EXISTING INFORMATION**	2-1
2.1	Site Location, Ownership and Access	2-1
2.2	Site Description	2-1
2.3	Site History	2-4
2.3.1	PCE Detected in Seaman Road Wells - 1977	2-4
2.3.2	Environmental Assessment - 1990	2-7
2.3.3	Environmental Investigation - 1990	2-7
2.3.4	Remedial Action - 1993: Excavation	2-7
2.3.5	Preliminary Site Assessment (PSA) - 1993 to 1995	2-8
2.3.6	Remedial Action - 1996-1995: Soil Vapor Extraction System	2-9
2.3.7	Supplemental Investigation - 1998	2-10
2.3.8	Current RI/FS Investigation - 1999	2-10
3.0	**SCOPE OF REMEDIAL INVESTIGATION/FEASIBILITY STUDY**	3-1
3.1	Objectives and Approach	3-1
3.2	Field Investigation	3-2
3.3	Qualitative Human Exposure and Environmental Risk Assessment	3-23
3.4	Interim Remedial Measure/Presumptive Remedy Selection	3-24
4.0	**PROJECT MANAGEMENT PLAN**	4-1
4.1	Project Schedule and Key Milestones/Reports	4-1
4.2	Project Management, Organization and Key Technical Personnel	4-1
5.0	**SITE SPECIFIC QUALITY ASSURANCE AND QUALITY CONTROL PLAN**	5-1
5.1	Sampling Program Design and Rationale	5-1
6.0	**SITE SPECIFIC HEALTH AND SAFETY PLAN**	6-1

TABLE OF CONTENTS (continued)

Section	Title	Page
7.0	**SITE SPECIFIC CITIZEN PARTICIPATION PLAN**	7-1
8.0	**PROJECT COST ESTIMATE (SCHEDULE 2.11s)**	8-1

List of Appendices

Resolution Resources, Inc. - Scope of Work for Fracture Trace Analysis ..... A

List of Figures

2-1 Site Location Map 2-2
2-2 Site Plan with Existing On-site Monitoring Well Locations and PCE Results, and Existing Soil Vapor Extraction Wells 2-3
2-3 Existing Off-site Well Locations 2-5
2-4 Historic Soil Sample Locations and PCE Results 2-6

3-1 Soil Vapor, Surface Soil and Geoprobe Soil Screening and Sampling Locations 3-13
3-2 Geoprobe Groundwater Sampling Locations and Monitoring Well Locations 3-14

6-1 Medical Center Emergency Route 6-3

List of Tables

3-1 Remedial Investigation Summary 3-4
3-2 Sampling Matrix 3-15
3-3 Investigative Research/Mapping Matrix 3-20

4-1 Project Schedule 4-2

Section 1

1.0 INTRODUCTION

As part of New York State's program to investigate and remediate hazardous waste sites, the New York State Department of Environmental Conservation (NYSDEC) has entered into a contract with Dvirka and Bartilucci, Consulting Engineers (D&B) of Woodbury, New York to conduct a remedial investigation and feasibility study (RI/FS) for the RonHill Cleaners Site in the City of Glen Cove, Nassau County, New York. The RI/FS for this site is being performed with funds allocated under the New York State Superfund Program.

This document, entitled "Remedial Investigation/Feasibility Study Work Plan for the RonHill Cleaners Site," has been prepared in accordance with NYSDEC Technical and Administrative Guidance Memoranda and contains site-specific information for conducting an RI/FS for this site. Detailed field investigation, quality assurance and quality control (QA/QC), and health and safety procedures are provided in the Generic Work Plan for the Investigation and Remediation of Dry Cleaner Sites, prepared by D&B in February 1996.

This site-specific work plan provides information pertaining to the following:

- Summary of existing information;
- Scope of remedial investigation and feasibility study;
- Project management;
- Site-specific quality assurance and quality control plan;
- Site-specific health and safety plan;
- Project cost estimate (Schedule 2.11s).

Section 2

2.0 SUMMARY OF EXISTING INFORMATION

2.1 Site Location, Ownership and Access

The RonHill Cleaners Site is a former dry cleaner facility located at 71 Forest Avenue in the City of Glen Cove, Nassau County, New York (see Figure 2-1). The Site is currently owned by Bedford Affiliates and is currently operated as a retail shoe store. Dry cleaning activities began at the site in 1963 and continued under various tenant-operators until 1993. Bedford Affiliates has owned the property since August 27, 1952.

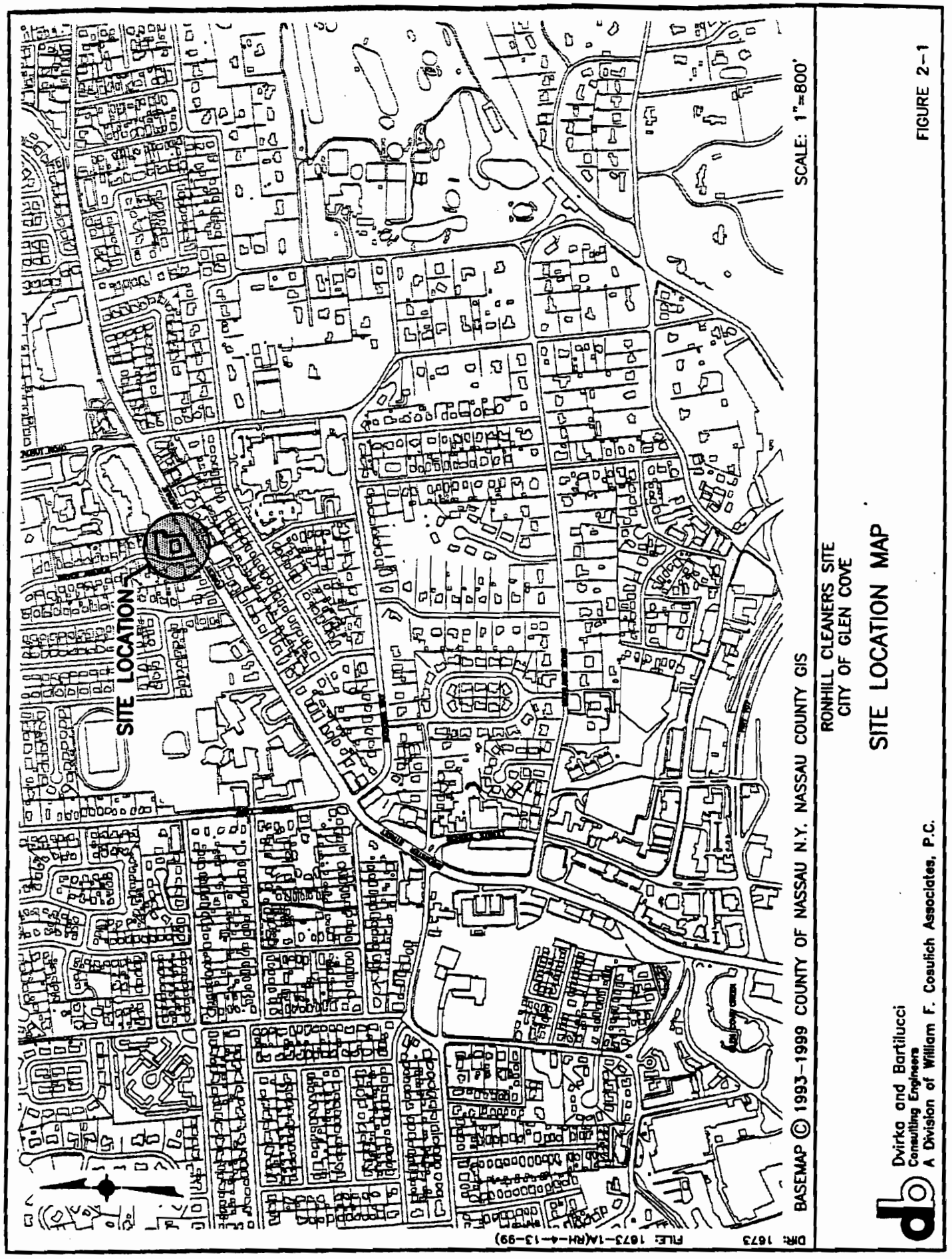
The site occupies the northeast corner of the intersection of Forest and Bryce Avenues. Primary access to the site is off of Forest Avenue. Secondary access is off of Bryce Avenue.

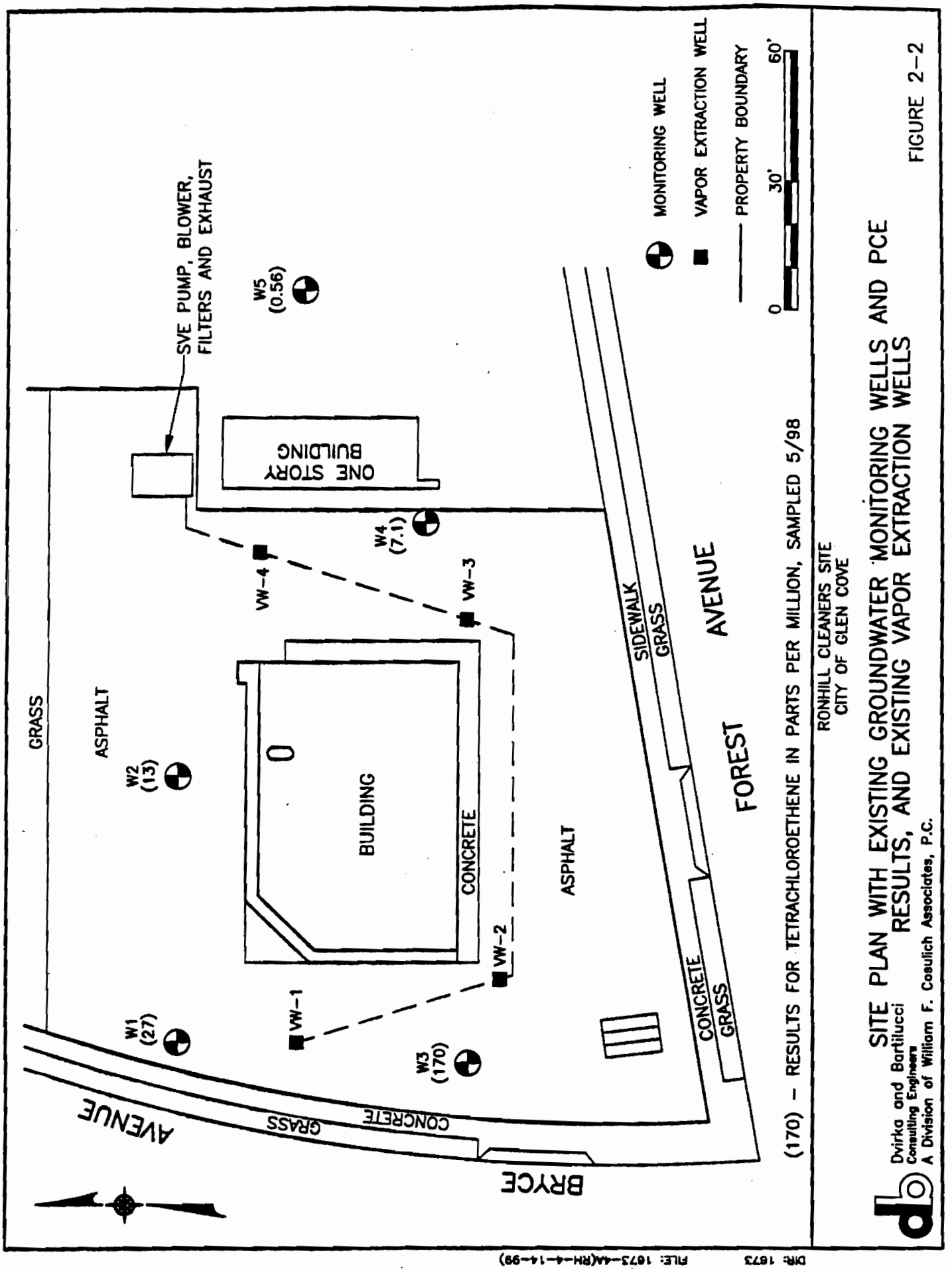
2.2 Site Description

The RonHill Cleaners Site is depicted on Figure 2-2 (which also illustrates locations of existing on-site monitoring wells and the on-site soil vapor extraction system). Land use in the vicinity of the site consists of residential, commercial and institutional land use. A photographic shop sits on the east-adjacent property. A grassy area extends northward from the site. A residential neighborhood begins just beyond (north of) the grassy area. The east-adjacent property is commercially developed. To the west are commercial and residential properties. Forest Avenue, a major surface route, borders the site to the south.

A single-story, concrete-block building occupies the central portion of the approximately 0.75-acre, roughly rectangular parcel that comprises the site. The approximately 70 feet long by 50 feet wide building sits on a concrete slab on grade. The building was constructed in 1963 as a drive-in cleaners. Prior to 1963, the site consisted of undeveloped land.

The site is relatively flat. It sits at an elevation of approximately 125 feet above mean sea level (msl) in a shallow topographic swale. The swale trends southwestward, toward Glen Cove Creek and is the local expression of a pronounced northeast/southwest trending lineament. In the


SITE LOCATION
SCALE: 1"=800'
BASEMAP © 1993-1999 COUNTY OF NASSAU N.Y. NASSAU COUNTY GIS
RONHILL CLEANERS SITE
CITY OF GLEN COVE
SITE LOCATION MAP
Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.
DR: 1673
FILE: 1673-1A(RM-4-13-99)
FIGURE 2-1



(170) – RESULTS FOR TETRACHLOROETHENE IN PARTS PER MILLION, SAMPLED 5/98

RONHILL CLEANERS SITE
CITY OF GLEN COVE

SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELLS AND PCE RESULTS, AND EXISTING VAPOR EXTRACTION WELLS

FIGURE 2-2

Dvirka and Bartilucci Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

DIR: 1673 FILE: 1673-4A(RH-4-14-99)

vicinity of the site, Forest Avenue follows this swale. Slopes above the swale mark a drainage divide in the upper reaches of the Glen Cove Creek watershed. The RonHill Cleaners Site is approximately 5,000 feet northeast of Glen Cove Creek's headwaters. Before emptying into Hempstead Harbor, Glen Cove Creek flows for roughly 4,500 feet through a modified, southwest-trending channel. The swale at and near the site appears to be a natural feature associated with drainage into Glen Cove Creek.

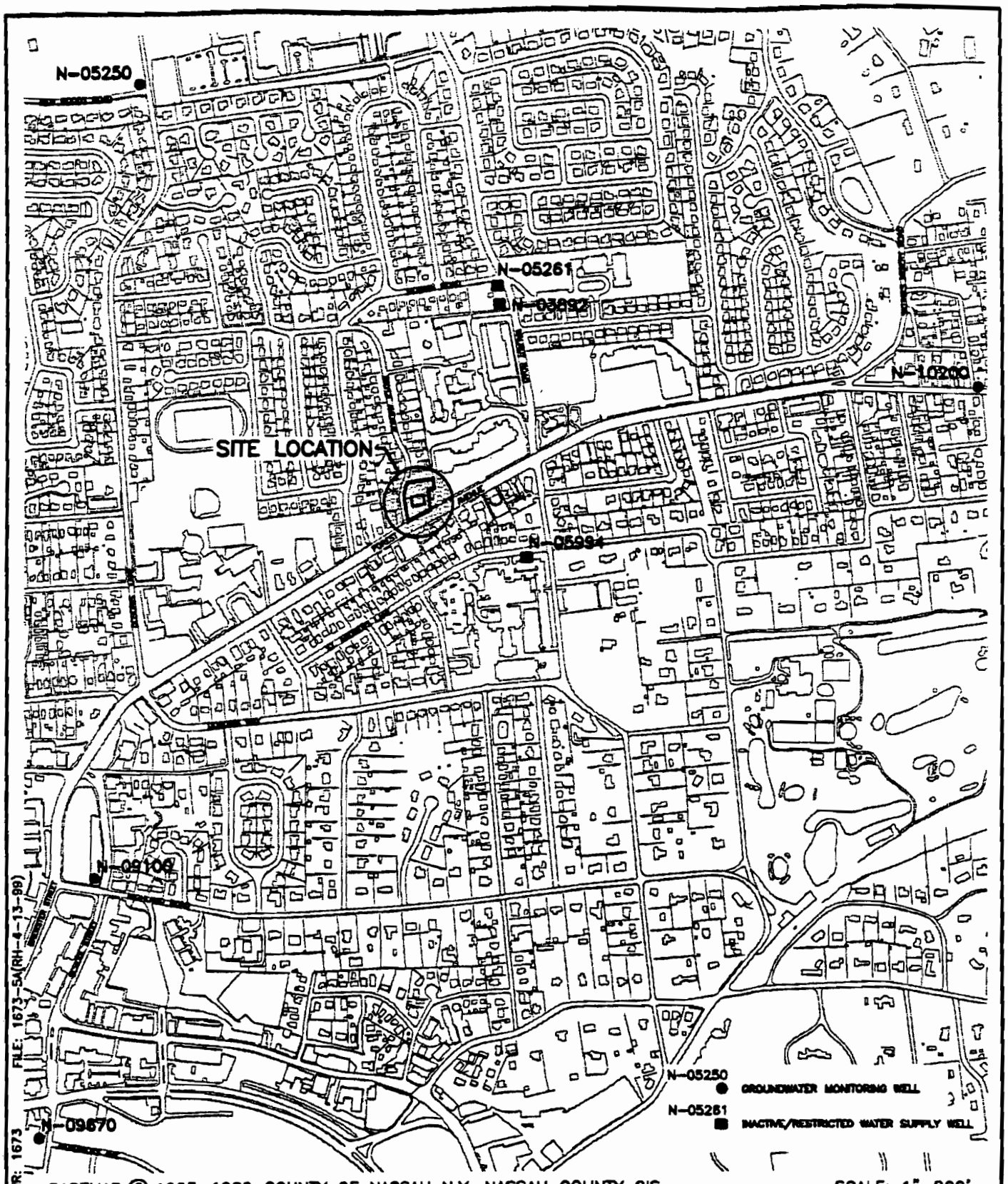
The site receives public water supply from the City of Glen Cove. Wastewater is discharged into the City of Glen Cove's sanitary sewer system.

2.3 Site History

The RonHill Cleaners Site was developed as a drive in cleaners in 1963. Various tenants operated dry cleaners at the site for 30 years. Tetrachloroethene (PCE), which is used as a dry cleaning solvent, was first detected in nearby municipal water supply wells in 1977. PCE has also been detected in nearby monitoring wells maintained by Nassau County Department of Public Works. Figure 2-3 illustrates off-site well locations. During the past decade, numerous investigations have examined soil and groundwater contamination at the RonHill Cleaners Site. Figure 2-2 shows recent PCE levels in on-site monitoring wells. Figure 2-4 shows historic, on-site soil sample locations and PCE results.

2.3.1 PCE Detected in Seaman Road Wells - 1977

During the 1970s, PCE was detected in two public water supply wells at the nearby Seaman Road well field (N-05261 and N-03892). Elevated levels of PCE caused these wells to be shut down in 1978. Both of these wells drew water from the Upper Glacial aquifer. Well N-05261 is 230 feet deep and N-03892 is 246 feet deep. The ensuing Nassau County Health Department investigation determined that RonHill Cleaners was the only significant user of PCE in the area and named the cleaners as the probable source of PCE contamination in the wells.

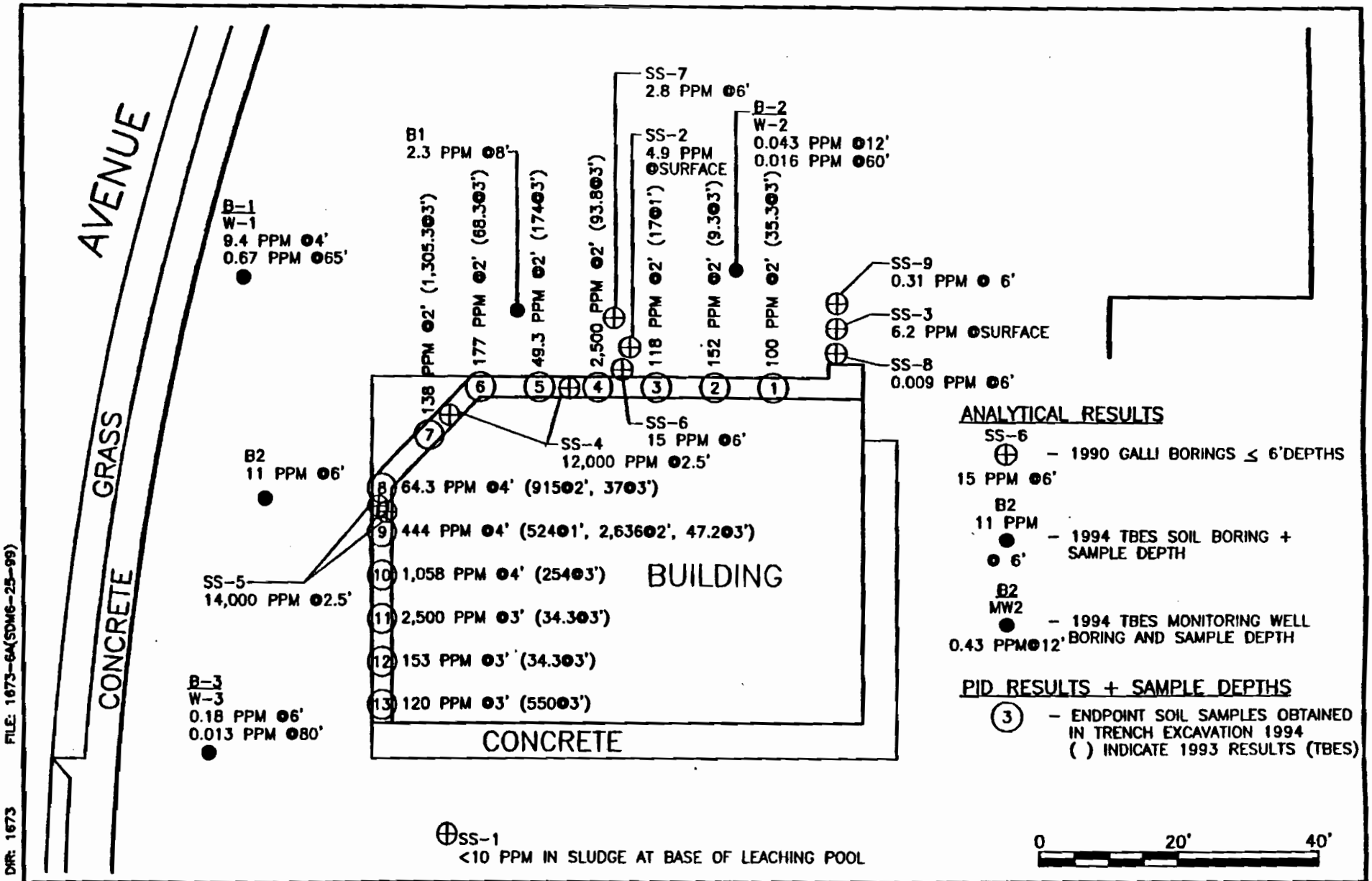


RONHILL CLEANERS SITE
CITY OF GLEN COVE

EXISTING OFF-SITE WELL LOCATIONS

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 2-3



RONHILL CLEANERS SITE
CITY OF GLEN COVE

HISTORIC SOIL SAMPLE LOCATIONS AND PCE RESULTS

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 2-4

DIR: 1673 FILE: 1673-64(SDM6-25-99)

2.3.2 Environmental Assessment - 1990

In 1990, Bedford Affiliates, the site owner, contracted with Richard D. Galli to perform an environmental site assessment in order to "determine if soil quality within the subject site has been affected by ... contaminant discharge" (Galli 1990). Galli collected shallow soil samples at five locations, including outside the building's north and west walls, and inside an indoor trench along the north and west sides of the building. Laboratory analyses indicated high levels of PCE (up to 14,000 ppm), particularly from soil sampled within the trench near the building's northwest corner. Toluene, used in spot-removal, was also detected.

2.3.3 Environmental Investigation - 1990

An environmental investigation performed by Galli (also in 1990) detected moderate to high levels of PCE at a depth of 6 feet in borings hand-augured outside and just north of the building. Laboratory analysis reported 15 ppm PCE in soil sampled at a depth of 6 feet below grade, just below a window in the north wall of the dry cleaning building. During this investigation, Galli sampled soil at four locations north of the building.

2.3.4 Remedial Action - 1993: Excavation

In 1993, Bedford Affiliates retained Tyree Brothers Environmental Services, Inc. (TBES) to perform a remedial action focused on excavating soil from within the trench/suspected source area. This action was conducted independently of NYSDEC requirements. During the excavation, the concrete floor of the building was cut roughly 5 feet from the edge of the building and contaminated soil was excavated to a depth of approximately 4 feet below floor grade (TBES, PSA of RonHill Cleaners, 1995, page 12). A photoionization detector (PID) was used to screen soil samples for volatile organic chemical (VOC) vapors during and after the excavation. PID readings for soil on the floor and sidewalls of the excavation ranged from 49.3 ppm to 2,500 ppm (Ibid.). Due to safety reasons, additional excavation could not be performed without shoring, and clean, endpoint samples were not obtained. The excavation was lined with 4-mil polyethylene sheeting and backfilled. A new concrete floor was poured over the

clean fill. Approximately 36 tons of excavated soil were stockpiled on site and later transported off-site as a hazardous waste.

2.3.5 Preliminary Site Assessment (PSA) - 1993 to 1995

Also in 1993, Bedford Affiliates entered into an Order on Consent with the NYSDEC to perform a preliminary site assessment (PSA). Bedford Affiliates then initiated legal action against previous tenants in order to determine their liability for contamination at the site. Bedford Affiliates retained TBES to perform the PSA.

As part of the PSA, TBES drilled five soil borings and collected continuous split spoon soil samples to a depth of 20 feet. Soil samples were field screened for VOCs with a PID. Two soil samples were selected for laboratory analysis from each boring; these included the deepest sample and the sample with the highest PID reading.

Laboratory analysis of selected samples in the 20-foot deep borings indicated highest PCE contamination in the shallow subsurface soil at depths of between 4 and 8 feet. Boring 2, located somewhat south and west of the building's northwest corner, exhibited the highest PCE concentration: 11 ppm from a sample obtained between 4 and 6 feet below grade.

Three of the borings were extended to depths of approximately 90 feet and were later utilized for monitoring wells. Split spoon soil samples were collected at 5-foot intervals between depths of 20 and 80 feet (the water table was encountered at a depth of approximately 79 feet). Soil samples were field screened for VOCs with a PID. The sample with the highest PID reading in each boring was selected for laboratory analysis.

Analytical results for PCE in the three deep borings were 0.67 ppm for soil collected at a depth of 64 to 66 feet in B-1/W-1, 0.016 ppm for soil collected from B-2/W-2 from a depth of 59 to 61 feet and 0.013 ppm for soil sampled in B-3/W-3 from a depth of 79 to 81 feet.

Field measurements of VOC concentrations in the upper 20 feet indicated the highest VOC concentrations within the upper 2 to 8 feet of the surface, except in B-2/W-2 where field screening results were greatest at a depth of 10 to 12 feet. Concentrations detected in the field ranged between 0 ppm and 59.1 ppm for soil sampled within 20 feet of the ground surface. Field measurements of VOC concentrations in the deep borings were also significantly higher than analytical samples and measured 212 ppm in W-1 (65 feet), 30.3 ppm in W-2 (60 feet) and 70.8 ppm in W-3 (80 feet) (TBES, 1995: *Preliminary Site Assessment for Ron Hill Cleaners*, pp. 15, 16, and boring logs). Field screening results for all the borings revealed 2 zones of high VOC contamination. Highest VOC contamination occurred within 12 feet of the surface and within 20 feet of the water table.

In addition to the three monitoring wells installed in the soil borings, a fourth monitoring well, W-4, was installed east of the dry cleaning building at a location believed to be upgradient of local groundwater flow. Soil samples were not collected from the boring for well W-4. Groundwater samples from the four monitoring wells were laboratory analyzed for VOCs and found to have PCE concentrations ranging from 81 ppm (well W-3) to 6.8 ppm (well W-1). The upgradient well (W-4) exhibited a PCE concentration of 8.8 ppm. In addition to PCE, the TBES investigation reported that site soil and groundwater contaminants included trichloroethene (TCE), 1,2-dichloroethene (DCE), chlorobenzene, acetone and xylenes (*Ibid.* page 20)

2.3.6 Remedial Action - 1996-1995: Soil Vapor Extraction System

Bedford Affiliates entered into a second Order on Consent to perform an interim remedial action (IRM) consisting of installing an on-site soil vapor extraction (SVE) system. The SVE system consists of four vapor extraction wells, an electrical generator, a vacuum blower, moisture separator, in-line filter, two vapor phase granulated activated carbon adsorbers operating in series, a blower shed and a fence around a 10' X 14' X 6" concrete pad on which the equipment sits. Each of the adsorbers contains 2,000 pounds of carbon. The 4-inch diameter vapor extraction wells were installed at depths of 80 feet, 67 feet, 20 feet and 15 feet. The system has been operating intermittently at the site since August 1996. It was not operating during a site

visit by D&B, NYSDEC, New York State Department of Health (NYSDOH), and New York State Attorney General Office personnel in March 1999.

2.3.7 Supplemental Investigation - 1998

At the request of one of the site tenant's counsel, Roux Associates performed a Supplemental Investigation, which was completed July, 1998. As part of this investigation, an additional water-table well (W-5) was installed, upgradient of the site, east of the neighboring photo shop. All on-site monitoring wells were sampled for PCE. Groundwater sampled from monitoring well W-3 was found to contain 170 ppm (greater than the solubility limit) of PCE. The upgradient well W-5 exhibited 0.56 ppm PCE.

2.3.8 Current RI/FS Investigation - 1999

At the request of NYSDEC, D&B will be conducting a remedial investigation/feasibility study at the site. The RI/FS is being performed in order to determine the nature and extent of PCE contamination, assess the exposure potential for human and environmental receptors and develop a remedial action plan for the site. The remainder of this work plan describes the investigative methods, sampling methods, quality assurance and safety controls, project management, risk assessment methods and costs associated with conducting the RI/FS.

Section 3

3.0 SCOPE OF REMEDIAL INVESTIGATION/FEASIBILITY STUDY

The approach to conducting a RI/FS at dry cleaner sites is to perform a focused field investigation and feasibility study, with emphasis on source investigation and remediation. The remedial investigation will also focus on the determination of the extent of contamination, in particular as it relates to groundwater, and the selection of a remediation plan/interim remediation measure (IRM), if necessary. Presumptive Remedies appropriate for dry cleaner sites will be addressed as part of the Remedial Investigation Report IRM selection. The objective of this investigation is to collect sufficient data with which to evaluate potential IRMs or other remedial actions. While the emphasis is on an accelerated investigation and selection of a remedial action, the work plan is structured to be in conformance with the Comprehensive Emergency Response, Compensation and Liability Act (CERCLA), Federal Superfund Amendments and Reauthorization Act (SARA), the National Contingency Plan (NCP) and the New York State Superfund Program.

3.1 Objectives and Approach

The objective of the RonHill Cleaners remedial investigation is to identify the source(s) and extent of air, soil and groundwater contamination, define the pathways of contaminant migration, determine potential receptors and evaluate the need for corrective measures.

The field investigation described below has been developed to allow for a comprehensive investigation of the RonHill Cleaners Site. However, the field investigation will be conducted in a sequenced approach, and therefore, may be modified based on information obtained during the initial investigation activities.

Initially, the investigation will focus on location and definition of the source and migration pathways for PCE, which is the primary solvent used in dry cleaning, and its derivative compounds. Field activities associated with the initial phase of the remedial investigation will include: background information search and existing facilities inspection; inventory of existing water supply and monitoring wells; review of pre- and post site

development aerial photographs to identify historic site structures, land use practices and possible waste disposal locations, as well as geomorphic features, drainage, moisture, soil and vegetation patterns before and since site development; fracture trace analysis focused on identifying linear structural features possibly associated with potential contaminant migration pathways; a geophysical survey to identify buried tanks, drywells, pipes and utilities; and a soil vapor survey combined with surface and shallow sub-surface soil sampling to identify PCE contaminant source areas.

Once the source area and potential routes of contaminant migration, including geology, geomorphology and hydrogeology have been delineated, the second phase of the investigation will be implemented. This will include screening of groundwater using direct push and Hydropunch sampling techniques, and profiling the deeper sub-surface stratigraphy through soil sampling and geological logging of soil borings. Soil borings will be drilled on- and off-site. Borings will be converted to groundwater monitoring wells. Gamma logging will be performed in boreholes and/or monitoring wells in order to identify possible clay layers or lenses at and near the site. Activities performed during the second phase of the remedial investigation will provide information regarding the direction and extent of contaminant migration, and will provide the basis for characterizing the site with respect to future remedial activities.

The following section provides a detailed description of the field investigation for the RonHill Cleaners Site. Modifications to this work plan based on the initial phase of the investigation will be provided to NYSDEC for approval prior to implementation.

3.2 Field Investigation

The field investigation for the RonHill Cleaners Site will include the following tasks:

- Background information search and facilities inspection;
- Inventory of existing public and private water supply wells and monitoring wells at and in the vicinity of the site;
- Aerial photograph review;

- Fracture trace analysis;
- On-site geophysical survey (magnetometer and ground penetrating radar);
- Soil vapor survey;
- Air sampling;
- Surface soil sampling;
- Geoprobe shallow soil sampling;
- Geoprobe on-site deep soil sampling;
- Geoprobe groundwater sampling;
- Sub-surface soils screening and logging;
- Hydropunch groundwater screening;
- Monitoring well installation;
- Monitoring well sampling;
- Gamma logging; and
- Surveying and mapping.

A summary of the remedial investigation program is provided in Table 3-1. The sampling locations are provided on Figures 3-1 and 3-2. A summary of the sampling program is provided in Table 3-2. Table 3-3 summarizes investigative research and mapping activities. As discussed in the Generic Work Plan, because PCE, a volatile organic compound, is the primary contaminant of concern, all samples provided to the laboratory will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs). This analysis will also identify any breakdown products of PCE, including trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride. Select groundwater samples will also be analyzed for iron and manganese to evaluate potential groundwater treatment processes. Further descriptions of sampling procedures, decontamination procedures and monitoring well installation procedures are provided in the draft Generic Work Plan dated February 1996.

Table 3-1

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

	Program Element	Description
1.	Background Information Search	Building plans and "as built" plans for existing and historic on-site facilities will be obtained, where available, from the City of Glen Cove. Locations of on-site utility trenches and excavations will be determined through querying appropriate agencies and utilities (City of Glen Cove, KeySpan, LIPA). Other spills/ investigations in the area will be researched at the Nassau County Department of Health (NCDH) and at the NYSDEC Regional Office. Relevant geological maps and literature will be researched.
2.	Facility Inspection	The building and surrounding area will be inspected to identify, if any, floor drains, waste pipes, storm water drains, etc., which may have received wastewater discharges from the dry cleaning operations. The results of this inspection will be used to select the locations of soil vapor and soil-sampling surveys as discussed below.
3.	Existing Well Survey	Based on information provided by the City of Glen Cove, NCHD and NYSDEC, public and private water supply wells within a one-mile radius of the site will be identified and inventoried to evaluate their possible influences on groundwater flow patterns near the site. Available and pertinent boring/geologic logs, groundwater quality data and pumpage records will be compiled and evaluated for use in the RI. Existing monitoring wells installed as part of NYSDEC's spill program at neighboring sites will also be inventoried and evaluated. Well locations, geologic logs, well construction details, water-level elevations and groundwater quality data will be used in the evaluation.
4.	Existing Well Sampling	Existing wells will be sampled during two rounds of sampling. This will coincide with sampling from new monitoring wells, as described below. Analytical results obtained during this investigation will be compared with previous sampling results for existing wells.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

	Program Element	Description
5.	Review of Aerial Photographs	Historical aerial photographs for the site will be obtained and/or reviewed with the objective of identifying relevant geomorphic features, drainage, vegetation and soil patterns, as well as previous land use practices. This will aid in identifying locations where waste may have been disposed and will provide a geomorphological overview for identifying on- and off-site drainage conditions and potential contaminant migration pathways.
6.	Fracture Trace Analysis	Fracture trace analysis will be performed to identify linear structural features possibly associated with buried channels and potential contaminant migration pathways.
7.	Geophysical Survey: Ground Penetrating Radar/Magnetometer Site Reconnaissance	A preliminary magnetic locator traverse has suggested the presence of buried metallic objects at the RonHill Cleaners Site. Magnetometer and ground penetrating radar (GPR) surveys will be combined in order to locate and map shallow buried objects, such as dry wells, tanks and pipes. Using both technologies will provide complimentary data that will help offset signal interference associated with urban sites. The geophysical survey area will include the asphalt-covered parking/ driveway areas surrounding the on-site building. The site will be cleared of vehicles and roped off during the day of the survey.
8.	Gamma Logging Existing Vapor Extraction Wells and/or Existing Monitoring Wells	A portable, MGX digital logging unit with a gamma probe capable of fitting inside a 2-inch casing will be lowered into each existing well on-site. The data recorder interfaces with a notebook computer and portable printer to provide a continuous display of log traces and a simultaneous, real-time plot print. Two logs will be run for each well/boring; one run will occur as the gamma probe is lowered and the other as it is raised. Gamma logging data will be utilized to help establish subsurface stratigraphy, particularly with respect to clay layers.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

	Program Element	Description
9.	Create Site Base Map	Data obtained through the investigative elements outlined above, along with identified site features, will be incorporated onto a site base map developed from the Nassau County GIS map.
10.	Air Sampling	A total of five Summa canisters with 2-hour flow valves will be deployed in four locations in order to sample air for VOCs, as per New York State Department of Health (NYSDOH). Two canisters will sample air quality in the indoor breathing zones in the front and rear portions of the on-site building. Two canisters will be positioned out of doors near the existing SVE system exhaust. One canister will be deployed out of doors in a neutral location in order to measure background air quality.
11.	Air Monitoring	Air monitoring will be conducted during all field activities using a Miniram Aerosol Monitor and a photoionization detector (PID). Air monitoring will be performed in accordance with appropriate NYSDEC and NYSDOH guidance documents.
12.	Soil Vapor Survey	A soil vapor survey will be conducted along the western perimeter of the site in order to determine whether VOC vapors are migrating off site in the direction of downgradient residences. Two soil vapor samples will be collected from the grassy median between the sidewalk and Bryce Avenue and will sample soil gas to a depth of 4 feet. The sampling points are depicted on Figure 3-1. Soil vapor samples will be collected utilizing a stainless steel Geoprobe-driven tube with removable inner rod using vacuum to purge and extract soil vapor. Soil vapors will be field screened with a PID.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

Program Element	Description
13. Surface Soil Sampling	Two grab soil samples will be collected from within the upper 2 inches of the ground surface and analyzed for VOCs. One sample will be obtained from the grassy area north of the site building and the other will be collected from the grassy median west of the building, unless other areas are determined to be more appropriate based on a greater likelihood of human exposure.
14. Geoprobe Shallow Soil Screening	Twenty-four shallow Geoprobe screening points will collect soil to a depth of 8 feet. Screening points will be arranged on 20-foot centers to form a grid extending northward from the site building's north wall and eastward from the building's east wall. One row of Geoprobe soil screening points will be placed adjacent to the site building's western wall. Two 4-foot soil cores will be collected in each shallow boring and field screened in the sleeve with a PID. Soil will be collected in two or three jars (depending on contamination detected through sleeve screening) and will be field screened for VOCs by headspace analysis using a PID.
15. Geoprobe Shallow Soil Sampling	Ten Geoprobe sampling points will sample soil to a depth of 8 feet beneath and/or immediately adjacent to the building at the site. Samples will be field screened for VOCs with a PID and laboratory analyzed (Method 95-1) for VOCs. The sample locations will be determined from the results of the shallow Geoprobe soil screening (element 14). If high levels of VOCs are detected immediately adjacent to the site building, some borings may be angled in order to sample soil beneath the building.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

	Program Element	Description
16.	Geoprobe Deep Soil Sampling	Four deep, on-site Geoprobe borings will sample the soil continuously to the water table. One of these borings will be located south of monitoring well W-3. The others will be positioned adjacent to shallow Geoprobe soil borings that exhibit high VOC levels. Four samples will be collected for VOC analysis (Method 95-1) in the vadose zone in each boring, based on the results of continuous PID screening. A saturated soil sample will be collected at each Geoprobe deep soil sampling location from just below the water table. The sample will be field screened for VOCs with a PID and sent for laboratory analysis (Method 95-1).
17.	Geoprobe Groundwater Sampling	Up to 24 groundwater samples will be collected at 12 locations using a Geoprobe grab sampler. Up to two samples will be obtained at each location, one from the water table (approximately 80 feet below grade) and, if technically possible, one from a depth of approximately 110 feet below grade. Samples will be laboratory analyzed for VOCs with a 24-hour turnaround time for preliminary results. The Geoprobe groundwater sampling grid will consist of three rows of four sampling points, spaced to transect the somewhat meandering course of the Forest Avenue swale. Additionally, a Geoprobe grab sampler will collect groundwater at the water table in each Geoprobe deep soil sampling location. Water-table water samples will be laboratory analyzed for VOCs by Method 95-1. Hydropunch sampling (in conjunction with hollow stem auger drilling) may be used, access permitting, if subsurface conditions do not allow the use of Geoprobe technology at depth.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

Program Element	Description
18. Soil Borings (7, six of which will become monitoring wells, as discussed below)	A total of 7 soil borings will be drilled on- and off-site. Six soil borings will reach depths of approximately 150 feet where they ideally will terminate in a low permeability unit. One soil boring will extend to approximately 225 to 250 feet. Split spoon samples will be collected from each boring at 10-foot intervals. In one downgradient off-site boring (for monitoring well MW-9D) continuous split spoon samples will be collected from the water table to the base of the boring, in order to provide off-site correlation between formation sampling and gamma logging. Samples will be field screened for VOCs with a PID. Ten soil samples will be laboratory analyzed for VOCs (Method 95-1). These will be selected based on high VOC field screening results. At least two samples selected for laboratory analyses will be collected from samples exhibiting "clean" and/or low to moderate VOC contaminant levels (as determined through PID screening) in order to better correlate field screening results with laboratory analytical results. The 150-foot deep soil borings will become monitoring wells, as discussed below, in program element 20. One approximately 150-foot deep soil boring will be drilled on-site adjacent to existing monitoring well W-3. Three approximately 150-foot deep soil borings will be drilled along the axis of the contaminant plume (as identified through Geoprobe groundwater screening) downgradient from the site. One approximately 150-foot deep soil boring will be located up-gradient (east) of the site.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

Program Element	Description
18. Soil Borings (7, six of which will become monitoring wells, as discussed below) (continued)	One approximately 150-foot deep soil boring will be located north of the site, roughly mid-way between the site and the Seaman Road public supply wells. One 225 to 250-foot deep soil boring will be drilled south of the site in order to characterize deposits within the Magothy aquifer. This boring will be sealed with grout after sampling. Subsurface materials will be geologically logged and field screened for VOCs (using a PID). Ten soil samples will be collected for laboratory VOC analysis, based on field screening results. Borings will be drilled with hollow stem augers. However, if difficult drilling conditions warrant, mud rotary drilling will be used in the deeper lengths of the borings. If mud is used, the consistency of the mud should be as thin as practical in the anticipated screen zones of monitoring well borings.
19. Hydropunch Groundwater Screening in Soil Borings	Groundwater samples will be collected for laboratory analysis with 24-hour turnaround for VOCs in the seven soil borings, beginning just below the water table and at 20-foot increments to a depth of approximately 150 feet.
20. Monitoring Well Installation and Development	Thirteen groundwater monitoring wells will be installed at seven locations at and near the site. Wells will be constructed of 2-inch diameter, schedule 40 PVC riser. Deep monitoring wells will terminate in a 10-foot length of 10-slot, 2-inch diameter, schedule 40 PVC screen. Water table monitoring wells will terminate in a 15-foot length of 10-slot, 2-inch diameter schedule 40 PVC screen to allow for sampling despite fluctuations in the water table elevation.

Table 3-1 (continued)

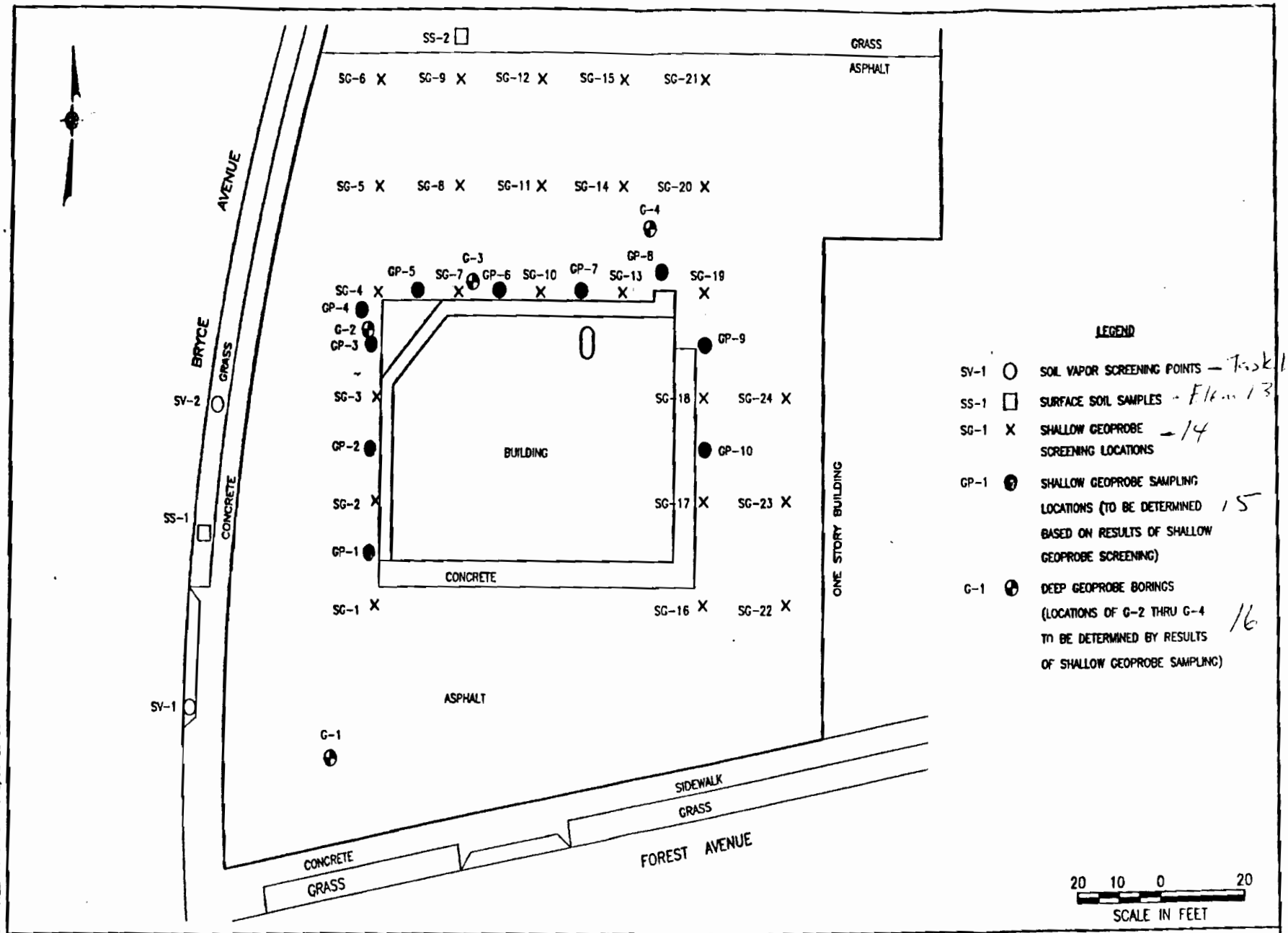
RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

Program Element	Description
20. Monitoring Well Installation and Development (continued)	Six, approximately 150 foot deep monitoring wells will be situated in each of the six 150-foot deep soil borings described above (in element 18). A 150-foot deep monitoring well will be constructed adjacent to the 250 foot deep soil boring. Six off-site water-table monitoring wells will be installed at an approximate depth of 90 feet. Water table and deeper wells will be constructed as pairs. The on-site deep well will be paired with the existing water table well, W-3. Wells will be developed for up to 4 hours or until turbidity measurements are less than 50 NTUs and parameters (pH, electrical conductivity, turbidity, dissolved oxygen, temperature) measured on a hand-held Horiba water quality meter have stabilized. If mud rotary drilling methods are used in/near the screened interval of the well borings, wells will be developed for up to 8 hours each or until development water field parameters have stabilized. For monitoring wells drilled with mud rotary drilling, development will take place as soon as practical after drilling and will include surging and/or jetting. Following development and before sampling, monitoring wells will be allowed to equilibrate for a minimum of 5 days.

Table 3-1 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
REMEDIAL INVESTIGATION SUMMARY

Program Element	Description
21. Monitoring Well Sampling	Groundwater samples will be obtained from each of the 13 newly installed monitoring wells, from the 5 existing on-site monitoring wells, and from up to 4 existing monitoring wells in the vicinity of the site. Prior to sampling, three to five well volumes will be purged from each well through dedicated tubing using a decontaminated, submersible Grundfos Redi-Flo pump. Wells will be purged until field parameters (as measured on a Horiba water quality meter) have stabilized. Groundwater samples will be collected from the submersible pump at low flow rate (1 to 3 gallons per minute). Samples will be analyzed for VOCs (TCL +10). Four samples will be selected for analysis for iron and manganese. Two rounds of sampling, conducted 3 months apart, will be performed. Synoptic groundwater elevations will be measured during each sampling round.
22. Gamma Logging in New Soil Borings/Monitoring Wells	Gamma logging will be used as an investigative tool in each new boring/deep monitoring well in order to identify thin clay layers and/or lenses not sampled during split spoon and Hydropunch sampling. Gamma logging equipment and procedures are described above, in element 8.

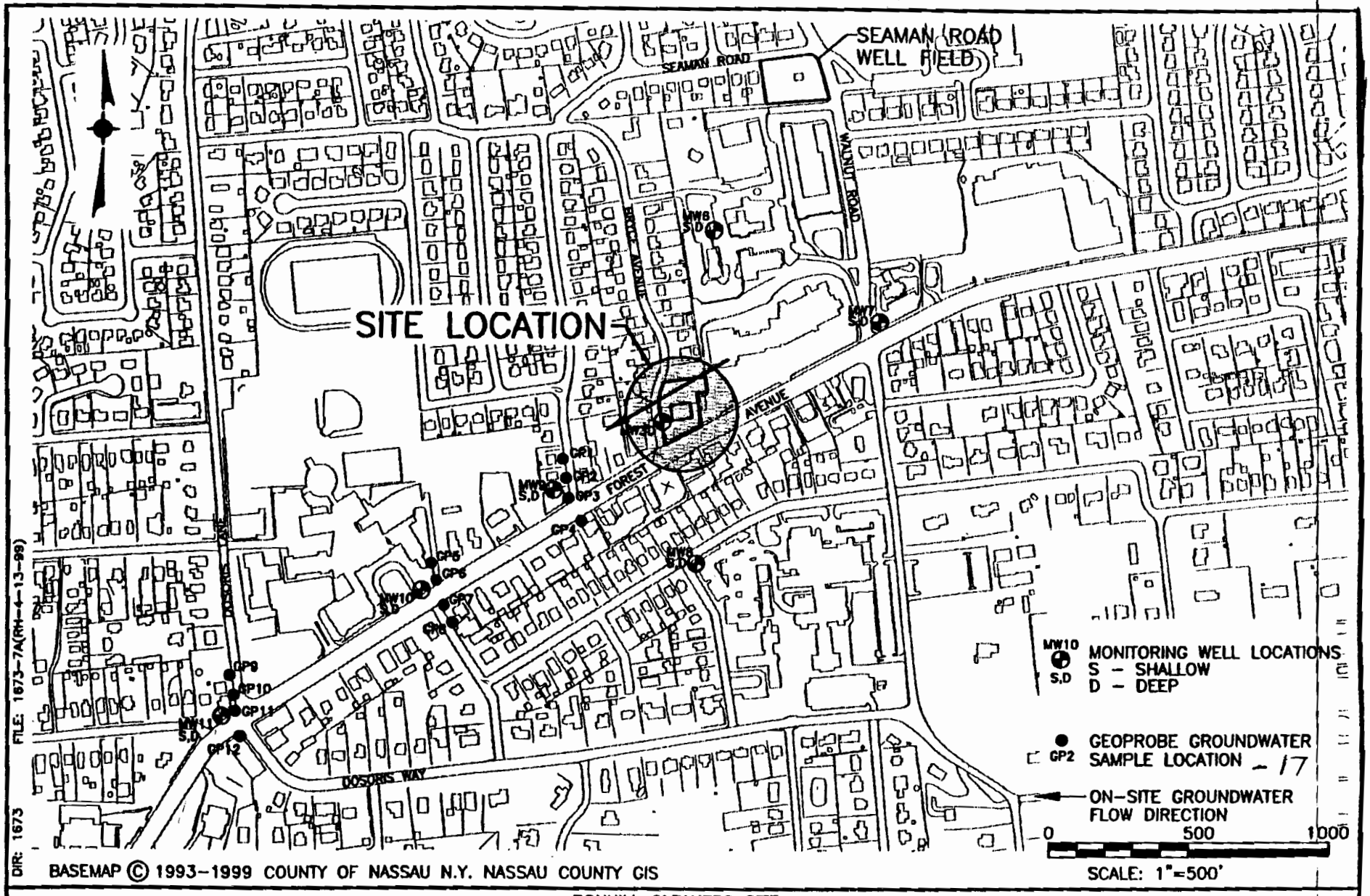


RONHILL CLEANERS SITE
CITY OF GLEN COVE
SOIL VAPOR, SURFACE SOIL AND GEOPROBE
SOIL SCREENING AND SAMPLING LOCATIONS

FIGURE 3-1

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

DIR: 1973 FILE: 1973-18 DGE/08-25-99



RONHILL CLEANERS SITE
CITY OF GLEN COVE

GEOPROBE GROUNDWATER SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 3-2

Table 3-2

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SAMPLING MATRIX

Program Element	Environmental Media	Sample Type/Depth	No. of Samples	Equipment	Analysis
1. Air Sampling	Air	Two Summa canisters in interior of building formerly housing dry cleaners, placed in breathing zone in front and rear parts of building. One outdoor canister near SVE system exhaust, and one outdoor canister positioned to reflect ambient background air, as directed by NYSDOH.	4	4 Summa canisters with 2-hour flow valves.	VOCs Method TO14
2. Surface Soil	Soil	Sample within upper 2 to 6 inches	2	Decontaminated or disposable scoop and/or wooden tongue depressor	VOCs Method 95-1 (24-hour turnaround)
3. Geoprobe Shallow Soil Sampling	Soil	Sample soil to depth of 8 feet beneath and/or immediately adjacent to building and field screen for VOCs at 10 locations as determined by soil vapor screening results. Sample continuously using 4-foot macro core.	20	Decontaminated Geoprobe Sampler	VOCs Method 95-1 (24-hour turnaround)

Table 3-2 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SAMPLING MATRIX

Program Element	Environmental Media	Sample Type/Depth	No. of Samples	Equipment	Analysis
4. Geoprobe Deep Soil Sampling	Soil	Sample soil on site from surface to water table in four locations, as per program element 16, described in Table 3-1.	20	Decontaminated Geoprobe Sampler Field screen PID	VOCs Method 95-1 (24-hour turnaround)
5. Geoprobe Groundwater Sampling	Groundwater	Grab with Geoprobe sampler at water table (approximately 80 feet below grade) and at a depth of 110 feet in each of 12 sampling locations to identify areal extent of shallow plume.	28	Decontaminated Geoprobe Sampler	VOCs Method 95-1 (24-hour turnaround)
		Grab water sample at water table in 4 on-site Geoprobe deep soil borings.	4	Decontaminated Geoprobe Sample	VOCs Method 95-1
6. Soil Borings	Subsurface Soil	Split spoon sample at 10-foot depth intervals, continuous sampling between water table and 150' in 1 boring.		Decontaminated split spoon sampler	Geological logging using Unified Soil Classification
		a) 150 foot borings (6)	110	Field screen PID	Total VOCs
		b) 225-250 foot boring (1) (upgradient, to top of clay)	25	Field screen PID	Total VOCs
		c) selected contaminated samples	10		VOCs Method 95-1

Table 3-2 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SAMPLING MATRIX

Program Element	Environmental Media	Sample Type/Depth	No. of Samples	Equipment	Analysis
7. Hydropunch Sampling in Soil Borings	Groundwater	In six soil borings, at 20-foot intervals between 80 and 150 feet	28	Decontaminated Hydropunch Sampler	VOCs Method 95-1 (24-hour turn-around)
	NAPL	If identified in borings or Geoprobe	3		
8. New Monitoring Wells	Groundwater	90 feet	6	2-inch Schedule 40 PVC with 10-foot length of 10-slot PVC screen in 150-foot wells and 15-foot length of 10-slot PVC screen in 90-foot wells	Sample as described below
		150 feet (6 of these will be installed in 150 foot deep soil borings)	7		
		Six well pairs off-site (three downgradient, one upgradient, two sidegradient) one deep well on-site (to pair with existing monitoring well W-3)			
9. Monitoring Well Sampling	Groundwater	<u>First Round</u>:			
		New monitoring wells	13	Decontaminated submersible Grundfos Redi-Flo pump with dedicated tubing	VOCs Method 95-1
		Existing on-site monitoring wells	5		VOCs Method 95-1
		Existing off-site monitoring wells	4		VOCs Method 95-1

Table 3-2 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SAMPLING MATRIX

Program Element	Environmental Media	Sample Type/Depth	No. of Samples	Equipment	Analysis
9. Monitoring Well Sampling (continued)	Groundwater	<u>Second Round (3-month interval)</u>:			
		New monitoring wells	13	Sample off pump at low flow rate (1-3 gpm)	VOCs Method 95-1
		Existing monitoring wells	5		VOCs Method 95-1
		Existing off-site monitoring wells	4		VOCs Method 95-1
		<u>Metals Sampling</u>: Fe and Mn			
		(Sample locations to be determined based on results of Hydropunch screening)	4		Metals Method 6010
10. Matrix Spike and Matrix Spike Duplicate	Soil	Collect three sets of MS/MSD from select Geoprobe soil sample and soil boring sample locations.	3	Decontaminated Geoprobe sampler and/or split spoon	VOCs Method 95-1
11. Matrix Spike and Matrix Spike Duplicate	Groundwater	Collect six sets of MS/MSD from the following select groundwater sampling locations: two from Geoprobe points, two from Hydropunch locations and one from monitoring wells during each round of sampling.	6	Decontaminated Geoprobe sampler, Hydropunch sampler and/or decontaminated submersible Grundfos Redi-Flo pump with dedicated tubing.	VOCs Method 95-1 one MS/MSD to be run for Fe and Mn Method 6010

Table 3-2 (continued)

RONHILL CLEANERS SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SAMPLING MATRIX

Program Element	Environmental Media	Sample Type/Depth	No. of Samples	Equipment	Analysis
12. Trip Blank	Water	One per shipment of groundwater samples.	*	Supplied by laboratory.	VOCs Method 95-1
13. Duplicate	Air	Collected duplicate air sample of SVE exhaust.	1	Summa Canister with 2-hour flow valve.	VOCs Method TO14

Table 3-3

RONHILL CLEANERS SITE REMEDIAL INVESTIGATION/FEASIBILITY STUDY
INVESTIGATION RESEARCH/MAPPING MATRIX

Investigative Element	Technique/Objective	Performed By
1. General Records Searches	1a) Obtain building plans and "as built" plans for on-site facilities (existing and historic) from City of Glen Cove. 1b) Locate utility trenches, excavations (City of Glen Cove, KeySpan, LIPA). 1c) Identify other spills/investigations in area (Nassau County Department of Public Works, Nassau County health Department, NYSDEC). 1d) Investigate relevant geological maps/literature (USGS).	D&B
2. Water Well Identification	Identify all nearby private and public water supply wells and monitoring wells. Obtain well data where available through Nassau County Departments of Health and Public Works, City of Glen Cove, NYSDEC.	D&B
3. Geophysical Survey	Employ ground penetrating radar and magnetometer to locate buried tanks, pipes, drywells and utilities.	Subcontract to Hager-Richter Geoscience, Inc.
4. Historical Aerial Photograph Analysis	Delineate geomorphology, drainage, and soil and vegetation patterns before and since site development. Identify historic structures, land use practices and possible waste disposal locations.	D&B

Table 3-3 (continued)

RONHILL CLEANERS SITE REMEDIAL INVESTIGATION/FEASIBILITY STUDY INVESTIGATION RESEARCH/MAPPING MATRIX

Investigative Element	Technique/Objective	Performed By
5. Fracture Trace Analysis	Locate linear structural features possibly associated with clay layers, buried channels and potential contaminant migration pathways.	Subcontract to Resolution Resources, Inc.
6. Monitoring Well Survey	Obtain elevations and planar coordinates for 13 new and 5 existing groundwater monitoring wells.	Sub-contract to YEC, Inc.
7. Gamma Logging	Identify clay layers in borings and in existing, on-and near site monitoring wells.	Subcontract to Hager Richer Geoscience, Inc.
8. Create Base Map	Incorporate data obtained through investigative Elements 1-7 with mapping ground features onto a site/area base map.	D&B
9. Fish and Wildlife Impact Assessment	Assess impact of contamination originating on-site on fish and wildlife.	D&B
10. Human Exposure and Environmental Risk Assessment	Qualitative assessment of human health and environmental exposure based on results of the remedial investigation.	D&B
11. Citizen Participation Plan	Obtain mailing list of businesses/residences in area identified by NYSDEC as potentially impacted by project. Create mailing database and provide NYSDEC with electronic labels. Prepare and mail meeting notices. Meeting Organization/Presentations.	D&B NYSDEC NYSDEC and D&B

During the field program, drill cuttings and fluids, decontamination water, development water and purge water will be generated. Drill cuttings collected on site will be containerized and staged in a fenced area at the City of Glen Cove Department of Public Works garage (as specified by NYSDEC Project Manager). On-site drill cuttings will be sampled for VOCs and presumed contaminated pending receipt of analytical results. Drillers will containerize on-site drill cuttings in drums and transport drums to the garage each day that they are generated. At appropriate intervals, contaminated drums will be removed from the staging area by a licensed waste hauler. Drill cuttings from off-site soil borings will be presumed clean unless field screening with a PID indicates the presence of VOCs. If contaminated, they will be disposed in the same manner as the on-site drill cuttings. Drillers will containerize clean drill cuttings in drums and transport them on a regular basis to an appropriate staging location (as arranged by NYSDEC) or to a nearby location designated to receive the clean cuttings for immediate use as clean fill (as arranged by NYSDEC).

A portable decontamination pad will be set up on site by the drilling contractor to decontaminate all drilling and sampling equipment. All drill cuttings will be handled in a manner consistent with NYSDEC TAGM 4032, Disposal of Drill Cuttings. Development and purge water will be discharged to the City of Glen Cove or Nassau County sanitary sewer system (subject to City or County approval and as arranged by NYSDEC) if "clean" or treated on site using NYSDEC's portable liquid-phase granular activated carbon (GAC) system. Temporary storage of these liquids may have to be arranged.

NYSDEC will be informed of any information collected during the course of this investigation which may indicate potential impacts to drinking water supplies.

Historical, existing groundwater and soil data from the site will be evaluated before the scope of work for the RonHill Cleaners Site investigation is finalized.

3.3 Qualitative Human Exposure and Environmental Risk Assessment

A qualitative human health and environmental exposure assessment based on the results of the remedial investigation will be prepared for the site. The exposure assessment will address the potential exposure routes for contaminants and identify potentially affected on-site and off-site receptors. The goals of the exposure assessment are to:

- Provide qualitative analysis of human health risks under current site conditions, including identification of contaminant migration pathways and potential receptors;
- Qualitatively identify the potential impacts to flora and fauna posed by existing contamination at the site; and
- Provide a basis for determining whether contaminant levels that can remain on-site threaten adequate protection of human health and the environment.

The general approach for preparation of the exposure assessment will be consistent with that described in the draft Generic Dry Cleaner Work Plan, dated February 1996. However, the specific methodology to be used for the RonHill Site will be qualitative instead of quantitative and will focus primarily on potential exposure. Contaminants and concentrations of concern will be identified through the comparison of analytical results to air and soil screening criteria selected for the site (e.g., Tetrachloroethene Ambient Air Criteria Document [NYSDOH] and New York State Class GA groundwater standards and guidelines). Exceedances of these standards, criteria and guidelines (SCGs), migration pathways, routes of exposure and potential receptors of concern will be determined. Potential exposure pathways will be examined for functionality and completeness.

Using appropriate data from the remedial investigation, site reconnaissance and previous site investigations, the contaminant source, migration pathways and human exposure points will be identified and evaluated. Potential human exposures include ingestion, inhalation and dermal contact with waste, contaminated groundwater, soil, vapors and fugitive dust from the RonHill Cleaners Site by individuals having access to, or that could be affected by the site. The results of the exposure assessment will be incorporated into the Remedial Investigation Report.

The environmental risk assessment will consist of a qualitative assessment of potential impacts to flora and fauna at the site caused by the level and extent of contamination identified as a result of the remedial investigation. Based upon this evaluation, a determination will be made regarding the need to perform an expanded quantitative health risk assessment.

A complete Step I Fish and Wildlife Impact Assessment (FWIA) as described in the NYSDEC document entitled, "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites," (October 1994) will not be performed as part of this investigation. The RonHill Cleaners Site is located in an urban setting. Groundwater is approximately 80 feet below grade and does not discharge to the surface in the vicinity of the site. The nearest surface water bodies are located more than 1/2 mile from the site and include Island Swamp Brook which is situated approximately 3,000 feet to the northeast, a pond adjacent to the Long Island Rail Road at the Nassau Country Club approximately 4,000 feet to the southeast, and the headwaters to Glen Cove Creek in Pratt Park nearly 5,000 feet to the southwest.

3.4 Interim Remedial Measure/Presumptive Remedy Selection

The need for preparation of a feasibility study, implementation of an Interim Remedial Measure (IRM) or selection of a Presumptive Remedy will be made based on the results of the remedial investigation. IRMs and Presumptive Remedies for dry cleaner sites are described in detail in the Generic Work Plan.

Based on available information with regard to the RonHill Cleaners Site, an IRM or Presumptive Remedy may be appropriate for this site. If appropriate, an IRM/Presumptive Remedy Report will be prepared (either as a separate document or as part of the Remedial Investigation Report), which will include a discussion of the technical and financial rationale for selection of the IRM and/or Presumptive Remedy, and conceptual design. As part of the selection of any final remedies recommended for the site, data from the remedial investigation will be used to examine the effectiveness of the existing soil vapor extraction system (SVE) and recommend any modifications if necessary.

Section 4

4.0 PROJECT MANAGEMENT

4.1 Project Schedule and Key Milestones/Reports

The Remedial Investigation/Feasibility Study (RI/FS) schedule for the RonHill Cleaners Site is provided in Table 4-1. Key milestones are identified to monitor work progress. The following is the list of milestones proposed for this project:

Milestone 1: Submittal of the Draft Scoping Summary and Budget for Task 1.

Milestone 2: Submittal of the draft Remedial Investigation/Feasibility Study Work Plan

Milestone 3: Submittal of the Draft Remedial Investigation Report.

Milestone 4: Submittal of the Draft Feasibility Study Report.

4.2 Project Management, Organization and Key Technical Personnel

Dvirka and Bartilucci Consulting Engineers will be the prime consultant responsible for performance of the remedial investigation/feasibility study. Subcontractors planned to be used for this RI/FS include:

- YEC, Inc. (MBE) (surveying)
- Hager-Richter Geoscience, Inc. (WBE) (ground penetrating radar/magnetometer survey, gamma logging)
- Resolution Resources, Inc. (fracture trace analysis)
- Zebra Environmental Corp. (Geoprobe soil and groundwater sampling, soil vapor survey)
- Uni-Tech Drilling Co., Inc. (drilling and monitoring well installation)
- Field Safety Corporation, (MBE) (health and safety plan)
- Chemical Waste Disposal

Table 4-1

PROJECT SCHEDULE

Scope of RI/FS	
• Scoping Meeting	Early March 1999
• Scoping Plan and Budget for Work Plan	Late March 1999
• RI/FS Work Plan – Draft	April 1999
• RI/FS Work Plan – Final	June 1999
• Public Meeting	July/August 1999
Remedial Investigation	
• Field Investigation	July - November 1999
• Laboratory Analysis	December 1999
• Data Validation	January 2000
• Remedial Investigation Report - Draft	March 2000
• Remedial Investigation Report – Final	May 2000
Feasibility Study	
• Feasibility Study Report – Draft	May 2000
• Feasibility Study Report – Final	July 2000
• Second Round of Groundwater Sampling*	February 2000
• Laboratory Analysis	March 2000
• Data Validation	April 2000
• Public Meeting	August 2000

*Results will be incorporated in the Final RI report.

Section 5

5.0 SITE SPECIFIC QUALITY ASSURANCE AND QUALITY CONTROL PLAN

All sample analysis and data validation for the RonHill Cleaners Site will be conducted in accordance with the NYSDEC 1995 Analytical Services Protocol (ASP). Sample analysis will be performed by Mitkem Corporation. Mitkem is certified by the New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) and NYSDOH Contract Laboratory Program (CLP). All other information which is not provided below regarding detailed sampling procedures and protocols, as well as other quality assurance and quality control (QA/QC) requirements, is provided in the draft Generic Dry Cleaner Work Plan.

5.1 Sampling Program Design and Rationale

- Two surface soil samples will be collected on-site to determine the extent of surface contamination.
- Up to ten soil samples will be collected from one or more soil borings advanced on and/or off site to determine the extent/presence of subsurface contamination.
- Twenty shallow subsurface soil samples will be collected on site utilizing a Geoprobe and analyzed in order to determine the extent of on-site soil contamination.
- Twenty deep soil samples will be collected on site utilizing a Geoprobe and analyzed in order to determine the extent of on-site soil contamination.
- Twenty-eight groundwater samples will be collected utilizing a Geoprobe and analyzed in order to determine the horizontal and vertical extent of groundwater contamination.
- Twenty-eight groundwater samples will be collected by the Hydropunch method and analyzed in order to determine the horizontal and vertical extent of groundwater contamination.
- Up to 22 groundwater samples will be collected, during each of two rounds, from existing and newly installed groundwater monitoring wells on and off-site to determine the extent to which site operations may have impacted groundwater.
- Up to three NAPL samples will be collected by the Hydropunch method.
- Four air samples will be collected in Summa canisters equipped with 2-hour flow valves. Two of these will be collected within the building in order to determine

potential exposure of workers to contaminants. One air sample will be collected near the soil vapor extraction system exhaust in order to assess potential release of contaminants into the atmosphere. One air sample will be collected from a background location in order to determine background VOC concentrations in air.

- Seven soil samples will be collected (one from each boring location) in order to characterize drill cuttings for disposal purposes.

In addition to the above, the following QA/QC samples will be collected.

- One trip blank will be sent with each shipment of the groundwater samples.
- Three soil and six groundwater matrix spike/matrix spike duplicate sample sets will be collected based upon one set per 20 samples collected of each matrix (i.e., soil and water).
- One duplicate air sample will be collected from near the soil vapor system exhaust.

Section 6

6.0 SITE-SPECIFIC HEALTH AND SAFETY PLAN

The following site-specific information comprises information not included in the draft Generic Dry Cleaner Work Plan. The following information will be utilized in conjunction with the Generic Health and Safety Plan contained in the Generic Work Plan. Information with regard to contaminants of concern, personal protective equipment, exposure limits and monitoring requirements are provided in the Generic Health and Safety Plan.

Site Name:	RonHill Cleaners
Address:	71 Forest Avenue
	Glen Cove, New York
Telephone:	–
Date of HASP Preparation:	April 1999
Dates of Field Investigation:	June 1, 1999 – August 31, 1999
Entry Objectives:	To investigate and locate the source(s) and extent of soil and groundwater contamination

Site Organization Structure:	Name	Phone
Project Director:	Thomas Maher	516-364-9890
Project Manager:	Vasiliki Vassil	516-364-9890
Health and Safety Officer (HSO):	Dawn Hon	203-457-2100
Field Operations Manager/ Alternate HSO:	Keith Robins	516-364-9890
Field Team Staff:	Keith Klaus	516-364-9890
Field Subcontractors:	Resolution Resources, Inc.	612-824-3234
	YEC Surveying, Inc.	914-268-3203
	Hager-Richter Geoscience, Inc.	603-893-9944
	Zebra Environmental Corp.	516-371-4422
	Uni-Tech Drilling Company, Inc.	609-694-4200

Medical Assistance:

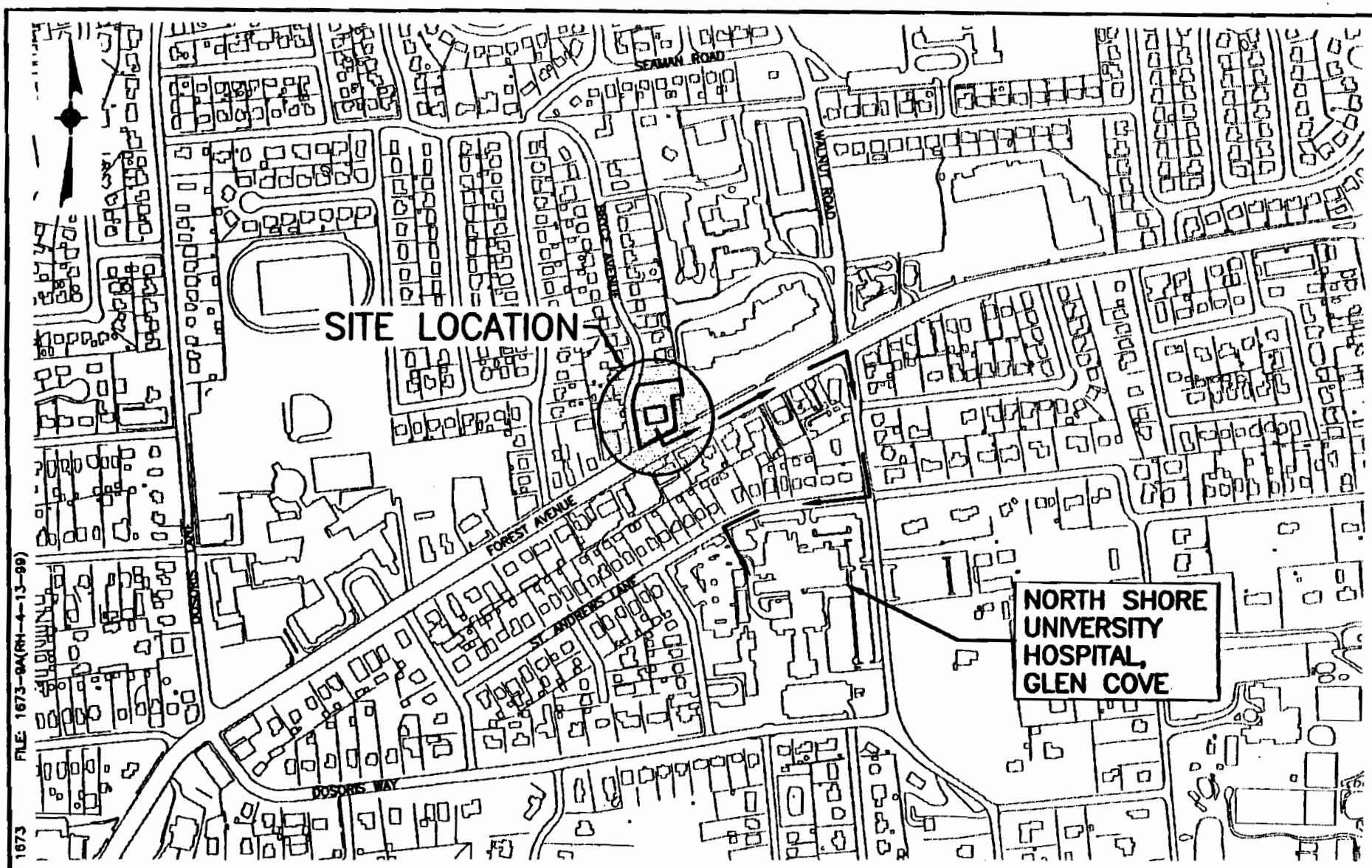
Physician:	Dr. Ronald Rosen
Address:	296-11 76th Avenue – CCC Building
	Third Floor – Room 313
	New Hyde Park, NY 11042
Telephone:	718-470-4435

Name of Hospital:	North Shore University Hospital - Glen Cove
Emergency Telephone:	516-674-7306
Directions:	From site: Forest Avenue NE one block. Turn right on Walnut Road, first right turn onto St. Andrews Lane Hospital located at SE corner of Walnut Road and St. Andrews Lane (see Figure 6-1)

Emergency Telephones:

Agent/Facility	Telephone	Emergency Number
Ambulance (dispatched by Police Department)	516-676-1000	911
Police Department	516-676-1000	911
Fire Department	516-671-3730	911
Hospital	516-674-7306	
Poison Control Center	516-542-2323	

Additional site related information (including special hazards, site control, waste storage and disposal, personal protective equipment, decontamination area location, special engineering controls, etc.)



RONHILL CLEANERS SITE
CITY OF GLEN COVE

MEDICAL CENTER EMERGENCY ROUTE

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 6-1

Section 7

7.0 SITE-SPECIFIC CITIZEN PARTICIPATION PLAN

This section presents the Citizens Participation Plan prepared by NYSDEC for the RonHill Cleaners Site.

Department of Environmental Conservation

Division of Environmental Remediation

RonHill Cleaners

Site Number 1-30-071

City of Glen Cove, Nassau County

Remedial Investigation/ Feasibility Study

Citizen Participation Plan

June 1999

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

1.0 INTRODUCTION

This Citizen Participation Plan (CPP) has been developed as a requirement of, and to ensure compliance with 6NYCRR Part 375-1.5, public participation requirements of New York State's Regulations for Inactive Hazardous Waste Disposal Sites. 6NYCRR Part 375 requires the New York State Department of Environmental Conservation (NYSDEC) to keep interested and/or affected public informed of progress on inactive hazardous waste site remedial projects. These regulations also require NYSDEC to solicit public comment before selecting a final remedy for a site.

This CPP consists of brief sections containing information about RonHill Cleaners (Site Information) and a brief summary of the remedial project (Project Description). These are followed by descriptions of activities planned for this project to inform the interested and/or affected public of remedial work, answer questions and obtain comments. The focus of this plan is the first phase of the project, the Remedial Investigation/ Feasibility Study. The CPP will be amended as necessary for future phases of the project.

This CPP was prepared for the RonHill Cleaners RI/FS by Kathleen McCue, P.E., Project Manager for NYSDEC.

2.0 SITE INFORMATION

RonHill Cleaners, Site No. 1-30-071 on the NYS Registry of Inactive Hazardous Waste Sites, is former commercial dry cleaner facility located in the city of Glen Cove, New York, on Forest Avenue at Bryce Avenue. The site area is less than one acre and is located on a strip of commercial businesses, surrounded by residential streets. The former dry cleaning building is now occupied by a Payless ShoeSource store.

RonHill Cleaners operated as a dry-cleaner since 1963, under various operators who leased the site from Bedford Affiliates, the land owner. The hazardous waste disposed of at the RonHill Cleaners site consists of perchloroethylene or "perc", a non-flammable, chlorinated solvent used in commercial dry-cleaning establishments to remove dirt and stains from clothing. Most dry cleaners attempt to recycle and reuse the solvent. At RonHill, until 1988 when environmentally-friendly equipment was installed, much perc appears to have been lost through leaks or spills. In 1978 the Nassau County Health Department sampled and reported perc contamination in the rear of the RonHill building, which was unpaved at that time. The NCHD was investigating possible local sources of perc after the discovery of perc in public supply wells at the Seaman Road Well Field. These supply wells were taken out of service.

Another source of perc contamination appears to be from a pipe trough inside the building in which perc was recirculated for reuse. High levels of perc were discovered in this trough, and in 1994 approximately 72 tons of contaminated soil were removed. Some of the contaminated soil remains in difficult-to-access areas, such as under the building foundation. Since 1996, the site owner has operated a soil vapor extraction (SVE) system to draw perc out of the soil with a vacuum blower, with the goal of reducing or eliminating perc in the soil.

Despite efforts to clean up source areas of perc at the RonHill site, there is still groundwater contamination. Levels of perc up to 170,000 micrograms per liter were found at the water table in a 1998 study, approximately 80 feet below the site, and deeper groundwater contamination may exist. The plume of perc in groundwater may extend a considerable distance from the site, especially toward Glen Cove Creek, but possibly north and east of the site also. To date, all local supplies of commercial and domestic water are monitored and have shown no impacts. The potential of perc to migrate, however, means that the extent of the plume must be investigated and appropriate measures taken to protect area water supply aquifers.

The documented disposal of hazardous waste at RonHill Cleaners, and the evidence of it impacting water quality, led NYSDEC in 1995 to classify the site as posing a "significant threat to human health and/or the environment" (Class 2), requiring a remedial program consisting of a Remedial Investigation/ Feasibility Study (RI/FS), followed by the selection of a remedy, if appropriate, and its design, construction and operation.

3.0 PROJECT DESCRIPTION

The Remedial Program required for RonHill Cleaners consists of four phases: (1) Remedial Investigation/ Feasibility Study, (2) Remedial Design, (3) Remedial Construction, and (4) Operation, Maintenance and Monitoring. The scope of each phase depends on the results of the previous phase. The Glossary (Appendix 5) describes these phases. The Remedial Investigation / Feasibility Study, and an optional phase, an Interim Remedial Measure, are described in more detail below. The New York State Department of Health (NYSDOH) reviews reports, data, and decisions during these phases to ensure that public health concerns are adequately addressed (see Appendix 5).

Remedial Investigation/ Feasibility Study (RI/FS):

The **Remedial Investigation** is a thorough investigation of the nature and extent of contamination from the site. Groundwater, air, soil, waste, and other site media as appropriate, are sampled. Geological and climatological data are obtained. An analysis of potential health impacts is conducted. During the **Feasibility Study**, which is performed alongside the Remedial Investigation, a wide range of alternatives for cleanup of the site is assembled varying in effectiveness, practicability, and cost. As more and more data become available, some of these alternatives are rejected. If the Remedial Investigation has confirmed the need for site remediation, the remaining alternatives are subjected to a thorough analysis based on seven criteria in the regulations. One alternative is determined to best meet the remedial goals for the site and balance other concerns such as cost. The State will then present the recommended cleanup alternative to the public in a document called the Proposed Remedial Action Plan (PRAP). After a mandated comment period and a Public Meeting, the State will issue a Record of Decision (ROD) outlining the selected remedy, the basis for selection, and any changes made in response to public concerns. A typical RI/FS up to the Record of Decision takes from two to three years.

Some of the specific activities planned for the RI/FS for RonHill Cleaners include:

- Records searches (deeds, utilities, land use, etc.)
- Analysis of aerial photographs
- Radar and magnetic sensing of underground tanks or leach pools
- Taking soil cores for laboratory analysis on the former RonHill property
- Exploratory borings to confirm geology around the site
- Installation of monitoring wells
- Laboratory analysis of groundwater samples
- Development of maps of the site and impacted soil and groundwater in horizontal and vertical dimensions
- Air samples for perc and other site contaminants
- Assessing the effectiveness of the soil vapor extraction system to date
- Human health exposure assessment
- Developing remedial alternatives (as necessary and appropriate)

Interim Remedial Action:

Sometimes a cleanup action need not wait until a site-wide remedial plan is approved. During investigations, it may become obvious that certain activities can take place immediately to reduce the threat of the site. The SVE system is an example of an Interim Remedial Measure (IRM) for RonHill Cleaners. Sometimes an IRM will reduce site hazards to the point where no further remedial action is needed, except for perhaps monitoring. NYSDEC would issue a "No Further Action" ROD in that case. An IRM includes activities such as remedial design and construction (described further in Appendix 5), but usually in a compressed time frame during the RI/FS, such as six months to a year.

In all phases of the remedial project, final plans and reports such as the RI/FS Work Plan, this CPP, the RI Report and FS Report will be made available to the public through the Document Repositories (Appendix 3). In addition, announcements and fact sheets will be mailed during every phase to keep people on the contact list and the media apprised of progress. State representatives in Appendix 1 may be contacted any time with questions or comments. These and other citizen participation activities are further described in the next section.

4.0 CITIZEN PARTICIPATION ACTIVITIES - Remedial Investigation/ Feasibility Study

The means of keeping the public informed, and giving opportunity for comment, are described below. These activities will primarily be conducted by NYSDEC staff with review and assistance by NYSDOH.

4.1 Project Mailing List

A preliminary list of potentially interested or affected public has been created as required by 6NYCRR Part 375 prior to starting the RI/FS. The list contains government representatives, civic organizations, environmental groups, adjacent property and easement owners, potentially

responsible parties and other individuals and groups (see Appendix 2). This list will be updated as needed during the RI/FS. Anyone may request to be added to the Project Mailing List by contacting the NYSDEC Project Manager (see Appendix 1. Project Contacts).

4.2 Document Repositories

Three *document repositories* will be set up to house administrative record documents and other final site documents such as the Preliminary Site Assessment reports. One repository will be located in the Stony Brook offices of NYSDEC Region 1. The other will be located at City Hall in Glen Cove in the offices of the City Clerk. The third repository will be located at the Glen Cove Public Library. Locations, contact people and hours are listed in Appendix 3.

The *Administrative Record* is the collection of documents (reports, correspondence, data) from the RI/FS that supports NYSDEC's decision concerning how to remediate the site. It is important to organize this backup information and make it readily available for perusal by anyone concerned about the basis for NYSDEC's action. Not all publicly-available documents concerning the site will become part of the Administrative Record; only those that directly support the Record of Decision. Other documents can be requested from the Project Manager through the Freedom of Information Act. Comments from the public on the proposed remedy become part of the Administrative Record, along with NYSDEC responses.

4.3 Fact Sheets

Fact sheets are informational papers describing the site and progress, giving the names of primary contact people for more information and announcing a public meeting or availability of a final document. They are concise (one to four pages), readable and suitable for mass mailing to the Project Mailing List and faxing to media. Fact sheets will be the primary means of communicating with the public on this project. The Citizen Participation Schedule (Appendix 4) shows mandatory and optional occasions for issuing fact sheets. Fact sheets will be generated and mailed by the NYSDEC Project Manager with assistance from Citizen Participation staff, and must be reviewed by NYSDOH prior to mailing.

4.4 Public Meetings

Public informational meetings are used to present large amounts of information and to obtain comments. A public meeting will be held at the start of the RI/FS, after a work plan is developed for the study. A second public meeting will be held when the RI/FS is complete and a Proposed Remedial Action Plan (PRAP) has been issued. If interest is high and issues warrant, or if a long time period will elapse until the final RI/FS report, a third, optional public meeting would occur when preliminary RI results become available (see schedule in Appendix 4). A public meeting or availability session (see Section 4.6) would be conducted if an Interim Remedial Measure (IRM) is authorized.

Public meetings are informal, opened with short presentations on the site and progress to date by NYSDEC and NYSDOH staff followed by the question and answer period. The consulting engineer may be requested to give the detailed technical presentation and/or to assist with

answering questions. The consultant may also be requested to prepare visual aids. Detailed notes should be obtained of all speakers' questions and comments, along with a sign-in sheet of attendees. A responsiveness summary will be prepared after all meetings and distributed to attendees (see below under Responsiveness Summaries).

4.5 Responsiveness Summaries

A *responsiveness summary* is a paper responding to questions and comments received during a designated public comment period. Specific responses are given to individual questions or comments (although similar questions and comments may be combined for one response). Responses may be organized by topic of the inquiry or comment, such as "Health" questions or "Cost of Remedy" comments. Both oral comments from public meetings, and written comments are addressed in the responsiveness summary. Comment letters, statements and other written comment documents are referenced or attached and become part of the Administrative Record along with the responsiveness summary.

The Record of Decision (ROD) must contain a responsiveness summary for the preceding 30-day comment period. The notice or fact sheet should be issued to the project contact list when the ROD and responsiveness summary become available in the Document Repositories after the close of the comment period. Depending on interest, copies of the responsiveness summary should also be mailed to meeting attendees and other commentors.

The NYSDEC Project Manager will obtain the input of NYSDOH in responding to questions or comments pertaining to public health.

4.5 Remedy Selection Comment Period

The most crucial period for interaction between NYSDEC and the public during a hazardous waste site cleanup is during selection of the final remedy. 6NYCRR Part 375 mandates a minimum thirty-day comment period before issuance of the Record of Decision. During this period a public meeting must be held, as described previously, to present the remedial alternatives and the proposed remedy.

To facilitate public comment, the NYSDEC will issue a paper called the "Proposed Remedial Action Plan" (PRAP) at the beginning of the comment period. The PRAP follows a standard format, incorporating a concise history of the site, summary of the remedial investigation, brief descriptions of the alternatives, and the recommended alternative. Maps and data tables are attached. The NYSDEC Project Manager will prepare the PRAP and place it in the Document Repositories. A Fact Sheet announcing availability of the PRAP and the date and place of the public meeting will then be issued.

Following the close of the comment period, the Project Manager will prepare the draft Record of Decision and responsiveness summary. After formal concurrence by NYSDOH, the Division Director signs the ROD on behalf of the Commissioner. A notice must be sent to the contact list to inform them of the availability of the signed ROD.

4.6 Other Activities

Informal Contacts: This CPP emphasizes that although there are designated comment periods and meetings for milestone events, concerned members of the public are welcome to contact NYSDEC or DOH at any time during the RI/FS. Contacts are listed in Appendix 1. Sample results and other site data are public information and available at any time through the Freedom of Information Act. If data are preliminary (i.e., not yet audited) the project manager will indicate so to the requestor.

Availability Sessions: Availability sessions provide a forum for the public to meet with NYSDEC and NYSDOH staff, but unlike a public meeting, do not include a formal presentation. Instead, site information is displayed at a public location, with staff present, for a longer period of time such as an afternoon, evening, or over several days. Concerned citizens can view site information and discuss it one-on-one or in small groups with staff. Attendees are encouraged to sign in, and notes are taken of questions and comments. As with a public meeting, a responsiveness summary should be issued after the availability session. Availability sessions especially lend themselves to public review and interaction on design and construction documents. No availability sessions are planned for the RI/FS for RonHill Cleaners, but if an IRM is conducted, an availability session or public meeting would be appropriate for this activity.

Appendix 1
Project Contacts

Kathleen McCue, P.E.
NYSDEC Project Manager
NYS Department of Environmental Conservation
50 Wolf Road, Room 228
Albany, NY 12233-7010
(518) 457-5637 or toll-free (800) 342-9296

Robert Stewart
NYS Department of Environmental Conservation
Region 1
SUNY Campus
Loop Road, Building 40
Stony Brook, NY 11790-2356
(516) 444-0240

Wendy Kuehner
NYS Department of Health
Center for Environmental Health
Flanigan Square, Room 300
547 River Street
Troy, NY 12180
(518) 402-7880 or toll-free (800) 458-1158

Mark VanDeusen
NYS Department of Health
Health Liaison Program
Flanigan Square, Room 300
547 River Street
Troy, NY 12180
toll-free (800) 458-1158

Appendix 2
Affected and/or Interested Public
RonHill Cleaners

2.A Government Officials, Community Organizations and Concerned Groups

Charles Schumer
U.S. Senator
26 Federal Plaza
31-100
New York, NY 10278

Steven Worth
Councilman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Daniel Patrick Moynihan
U.S. Senator
405 Lexington Avenue
New York, NY 10174

Michael Norman
Councilman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Peter King
U. S. Congressman
1003 Park Blvd.
Massapequa Park, NY 11762

Maryanne Holzkamp
Councilwoman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Gary L. Ackerman
U.S. Congressman
218-14 Northern Boulevard
Bayside, NY

Mario Capobianco
Councilman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Carl L. Marcellino
State Senator
Townsend Square
Oyster Bay, NY 11771

John Maccarone
Councilman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

David Sidikman
State Assemblyman
146A Manetto Hill Road
Plainview, NY 11803

Albert Granger
Councilman
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Thomas R. Suozzi
Mayor
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Anita L. Rasch
City Clerk
The City of Glen Cove
City Hall
Glen Cove, NY 11542

Ms. Patricia A. Bourne
Executive Director
Glen Cove Community
Development Agency
126 Glen Street
Glen Cove, NY 11542

Nassau County Department of Health
240 Old Country Road
Mineola, NY 11501

Mr. Jack Guy
Empire State Redevelopment
45 Executive Drive
Plainview, NY 11803

Mrs. Joan Meehan
Community Development Agency
5 Raynham Road
Glen Cove, NY 11542

Mr. David Williams
Department of Transportation-
Region 10
State Office Building
Veterans Memorial Highway
Hauppauge, NY 11788

Mr. Joe Schmidt
Chairman
Glen Cove Zoning Board of Appeals
23 Inwood Road
Glen Cove, NY 11542

Mr. Norman Dorf
Glen Cove Planning Commission
September Lane
Glen Cove, NY 11542

Mr. Joseph DeFranco
Division of Environmental Health
Nassau County Department of Health
240 Old Country Road
Mineola, NY 11501

Mr. Tim Mulvihill
Nassau County Department of Health
240 Old Country Road
Mineola, NY 11501
(516) 571-3571 / Fax: (516) 571-1475

Mr. Donald Campbell
Nassau County Department of
Housing and Intergovernment
Affairs
250 Fulton Avenue
Hempstead, NY 11550

Mr. Brian Schneider
Nassau County Department of
Public Works
170 Cantiague Road
Hicksville, NY 11801

Ms. Patricia Sasso
County Executive's Office
One West Street
Mineola, NY 11501

Ms. Amy Emerick
Assistant to the Director
of Legislative Affairs
Long Island Association
80 Hauppauge Road
Commack, NY 11725

Mr. Anzelmo Graziosi
City Attorney's Office
City Hall
Glen Cove, NY 11542

The Honorable Mary Ann Holzcamp
City Hall
Glen Street
Glen Cove, NY 11542

Appendix 3
Document Repository Locations

Glen Cove Public Library
4 Glen Cove Avenue
Glen Cove, NY 11542
(516) 676-2130
Hours: Monday through Thursday, 9am-9pm; Friday 9am to 5pm; Saturday 9am-1pm (summers); contact Michael Freedman, Librarian

City of Glen Cove Clerk's Office
City Hall
Glen Cove, NY 11542
Hours: Monday through Friday, 9am to 4pm
(516) 676-2000
Appointment needed; contact Anita L. Rasch, City Clerk

NYS Department of Environmental Conservation
Region 1
SUNY Campus
Loop Road, Building 40
Stony Brook, NY 11790-2356
(516) 444-0240
Hours: Monday through Friday, 8:30 am to 4:45 pm
Appointment needed; contact Robert Stewart

NYS Department of Environmental Conservation
50 Wolf Road, Room 242
Albany, NY 12233-7010
Hours: Monday through Friday, 8:30 am to 4:45 pm
Appointment needed; contact Kathleen McCue, P.E.
(518) 457-7924 or toll-free (800) 342-9296

The Honorable John Maccarone
City Hall
Glen Street
Glen Cove, NY 1542

The Honorable David Sidikman
146A Manetto Hill Road
Plainview, NY 11803

The Honorable John Canning
Nassau County Legislator
One West Street
Mineola, NY 11501

Mr. Rosemary Olsen
Deputy Mayor
City Hall
Glen Cove, NY 11542

Mr. Gerald Gardrvits, P.E.
Public Works Director
City of Glen Cove
City Hall
Glen Cove, NY 11542

Mr. Jeff Fullmer
Citizen's Campaign for the
Environment
550 Smithtown Bypass
Suite 205
Smithtown, NY 11787

Richard Leland
Rosenman & Collin
575 Madison Avenue
New York, NY 10022-2585

Robert G. DelGadio
DelGadio & Tomao
EAB Plaza
Uniondale, NY 11556

Bedford Affiliates
185 Great Neck Road
Great Neck, NY 11021

Charlotte Biblow
Rivkin, Radler & Kremer
EAB Plaza
Uniondale, NY 11556-0111

Thomas Maher
Dvirka & Bartilucci
330 Crossways Park Drive
Woodbury, NY 11797-2015