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DRAFT

REMEDIAL ACTION PLAN
FORMER WATCHCASE FACTORY SITE

BULOVA CORPORATION
SAG HARBOR, NEW YORK

SITE No. 152139

December 5, 2001

Prepared for:

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NYSDEC Region 1

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December 5, 2001

Girish Desai, P.E.
New York State Department of Environmental Conservation
Region One
Building 40 – SUNY
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RECEIVED
DEC - 6 2001
Hazardous Waste Remediation
NYSDEC Region 1

RE: Bulova Corporation
Former Watchcase Factory
Sag Harbor, New York
Site No. 152139

Dear Mr. Desai:

As you are aware, two specific additional interim remedial actions were recommended in the **Interior Courtyard Confirmatory Soil Boring Assessment Report** dated June 29, 2001 for the above-referenced Site:

1) Excavation of approximately 75 cubic yards of VOC-impacted soils from the western portion of the interior courtyard area of the Site to a depth of approximately 6 ft. bgs, as constrained by safety concerns and the proximity of the building foundation.

2) Reconfiguration of the existing air sparge/soil vapor extraction (AS/SVE) system in the interior courtyard to address the presence of VOCs in soils and groundwater in the westernmost portion of the interior courtyard area.

As has been discussed throughout this process, Bulova is interested in pursuing an aggressive strategy to remediate the Site. Towards this end, IT has proceeded to implement the Remedial Action Plan that was presented conceptually to the NYSDEC in the **Interior Courtyard Confirmatory Soil Boring Assessment Report**. IT has completed a limited soil removal action in the western area of the courtyard and initiated preparatory work on the reconfiguration of the AS/SVE system at the Site in accordance with the NYSDEC comment letter on the assessment report, dated September 4, 2001. This work has been completed in anticipation of NYSDEC approval of the **Remedial Action Plan** that accompanies this letter, and we would like to request permission to turn the system on as soon as possible to continue active remediation of the Site.

As always, please feel free to contact me at (518) 783-6088, ext. 283 if you have any questions, or if you require additional information.

Sincerely,
IT CORPORATION

Anthony M. Noce

Anthony M. Noce, CET, CHMM, IHIT
Project Manager

cc: Rebecca Mitchell (NYSDOH)
Carl Hoffman (NYSDEC)
Robert Weber (Bulova)
Mitchell H. Bernstein, Esq. (Counsel for Bulova)
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1.0 INTRODUCTION

The Bulova Watchcase Factory Site, New York State Inactive Hazardous Waste Site #152139, is located in the Village of Sag Harbor, Town of Southampton, Suffolk County, New York **(Figure 1, Site Location Map)**. Division Street borders the Site to the east, Washington Street to the north, Church Street to the west, and Sage Street to the south. The Site encompasses approximately 2.3 acres and at present contains one building. The building is an abandoned one to four story brick and timber structure located primarily at the north end of the Site. The building is irregular in shape and contains a number of courtyards, including the interior courtyard located in the central portion of the building **(Figure 2, Site Plan)**. The majority of the open space on the property is paved with either bituminous asphalt or concrete, while approximately 25% of the Site is unpaved. Access to the Site is restricted by chain link and iron fencing that completely surrounds the property.

1.1 Background Investigation and Remediation History

The New York State Department of Environmental Conservation (NYSDEC) characterized the Site as a Class 2 inactive hazardous Site in January 1993. Based on the data collected, the Site does not pose an immediate threat to the public because there are currently no receptors that come into contact with residual volatile organic compounds (VOCs) that have been detected in soils below ground surface (bgs), and groundwater at the Site is not in use. In 1993, cleanup activities were initiated at the Site that included the closure of sumps and dry wells. In 1994, additional cleanup action under an Interim Remedial Measure (IRM) utilizing a combination of air sparging and soil vapor extraction (AS/SVE) to remove residual VOCs from the soil and groundwater was initiated.

Dry well SU-8 was a catch basin located in the interior courtyard adjacent to monitoring wells MW-10 and MW-11. The catch basin was constructed with concrete block and mortar and received stormwater that accumulated in the western section of the interior courtyard, and in April 1994, both the catch basin structure and soils surrounding and beneath the structure were removed. The final dimensions of the excavation measured approximately 6 by 8 feet, with an average depth of 4.5 feet. Excavation of impacted soils ceased because the required slope for excavation walls could not be maintained; consequently, some residual impacted soils were left in place, and these soils exceeded the Recommended Soil Cleanup Objectives (RSCOs) listed in the NYSDEC Technical Administrative Guidance Memorandum (TAGM) #4046 (January 24, 1994).

A Remedial Investigation report was submitted in August 1996 detailing the nature and extent of chemical constituents present at the Site, including a Risk Assessment of potential health impacts. These studies and cleanup activities formed the basis for the Record of Decision (ROD) issued for the Site by the NYSDEC and dated December 1996, which stated the following (Section 3.2, page 13): "The IRM has proven to be effective in reducing VOC concentrations in site groundwater and soil. From the time of the system start-up through March 1996, the overall concentrations of VOCs in the site groundwater have decreased significantly."

In 1996, surface soils across one third of the interior courtyard were removed, and the entire courtyard was covered with 12 inches of clean soil. This scope of work (excavation of surface soils) was also considered part of the IRM for the interior courtyard, and the end result of this portion of the IRM was the following statement found in the ROD for the Site (also in Section 3.2, page 13): "As a result of this action, metal concentrations in surficial soils of the Interior Courtyard are now below soil cleanup guidelines."

In March 1998, the NYSDEC approved a request that allowed for the shutdown of the air sparging and soil vapor extraction systems. Residual VOCs were detected during soil gas surveys of the Interior Courtyard area conducted in both 1999 and 2000, indicating a need for additional investigation and possible remediation.

The Risk Assessment conducted in 1995 as part of the Remedial Investigation and included in the ROD concluded that no significant risk exists at the Site for use as residential housing. The results of an exposure model included in the July 1999 **Soil Gas Survey Report** also indicated that there are no significant risks at this Site as the result of compounds found in the soil gas, although the New York State Department of Health (NYSDOH) has not accepted this conclusion. In addition, neither the NYSDEC nor the NYSDOH were comfortable with allowing the presence of VOCs detected in soils and groundwater in the interior courtyard area to remain, particularly given the context of proposed residential development of the Site. The NYSDEC reviewed and approved a **Confirmatory Soil Boring Work Plan** dated February 8, 2001, which was designed to characterize the extent of VOCs in soil and groundwater beneath the western portion of the interior courtyard.

A draft **Interior Courtyard Confirmatory Soil Boring Assessment Report** dated June 29, 2001 was prepared and submitted to both the NYSDEC and NYSDOH to present the findings of the Site assessment as well as an evaluation of a range of potential remedial actions to achieve further reductions in VOCs in both soil and groundwater in this area. In this report, an area was identified as having high levels of VOCs outside the radius of influence of the original air sparging and soil vapor extraction systems. Two specific additional interim remedial actions were recommended in the report:

1. Excavation of approximately 75 cubic yards of VOC-impacted soils from the western portion of the interior courtyard area of the Site to a depth of approximately 6 ft. bgs, as constrained by safety concerns and the proximity of the building foundation.

2. Reconfiguration of the existing air sparge/soil vapor extraction (AS/SVE) system in the interior courtyard to address the presence of VOCs in soils and groundwater in the westernmost portion of the interior courtyard area.

As has been discussed throughout this process, Bulova is interested in pursuing an aggressive strategy to remediate the Site. Towards this end, IT has proceeded to implement the Remedial Action Plan that was presented conceptually to the NYSDEC in the **Interior Courtyard Confirmatory Soil Boring Assessment Report**. In accordance with the NYSDEC comment letter on the assessment report, dated September 4, 2001, IT has completed a limited soil removal action in the western area of the courtyard and initiated preparatory work on the reconfiguration of the AS/SVE system at the Site in anticipation of NYSDEC approval of this work plan.

1.2 Purpose and Objectives

Currently, there are no identified or likely potential receptors for VOCs contained in soil and groundwater at the Site associated with its current use. However, the Town of Sag Harbor has an interest in preserving and restoring the Site, and the preferred reuse scenario contemplated includes residential development. Under this scenario, the potential receptors of primary concern would include future residents of buildings on-Site. Bulova has completed risk and exposure modeling which indicate that there are no significant potential risks that could be associated with vapor transport to occupied buildings in the future, although the NYSDOH has not accepted this conclusion.

NYSDEC has indicated that additional remedial action must occur in order to:

1. Reduce concentrations of VOCs in soils which could potentially impact indoor air if residential development were to occur on the Property; and
2. Reduce concentrations of VOCs in groundwater that could also impact indoor air if residential development were to occur on the Property.

In developing numerical criteria for these objectives, the NYSDEC gives primary consideration to Standards, Criteria, and Guidance (SCGs). For groundwater, these SCGs include the drinking water standards included in Part 703.5 regulation. For soil, guidance is contained in TAGM 4046, developed to protect potable water supplies.

While these criteria are considered by NYSDEC as primary considerations in evaluation of remedial actions, the unique circumstances of the Bulova Site have been recognized by NYSDEC during the review and approval of previous remedial actions at the Site, including the absence of potable water supplies (surface water bodies or aquifers) located on or near the Site. Another major constraint is the fact that the Site is occupied by a significant historical structure that the Town of Sag Harbor has an interest in seeing preserved and restored, and any potential remedial action must be completed in a manner that does not substantially damage the existing building. The following sections of this report discuss the remedial actions that Bulova believe to be most consistent with these objectives, as well as documenting the results of both a soil gas and groundwater sampling event requested by the NYSDEC to provide a baseline prior to implementing the remedial actions outlined.

2.0 SUPPLEMENTAL SOIL GAS AND GROUNDWATER SAMPLING

The **Quality Assurance Project Plan** to identify procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action for the remediation was originally prepared as an integral part of the **Excavation, Shoring and Disposal Plan**. It applies to future sampling events as well, however, and therefore has been included in this **Remedial Action Plan** for the Site as **Appendix A**.

2.1 Soil Gas Sampling Results – Volatile Organic Compounds

On October 11, 2001, soil gas samples were collected from 13 locations within and surrounding the inner courtyard area as requested by NYSDEC. Of the 13 soil gas points, 12 were installed in approximately the same locations as those installed in the May 8, 2000 soil gas survey. These samples provided continuity with previous data and provided a baseline for current conditions prior to the resumption of air sparging activities at the Site. The remaining soil gas point was installed at a new location in the remediation equipment room as requested by the NYSDOH during the Confirmatory Soil Boring Program. All of the soil gas samples were collected at depths ranging from 3 to 4 feet below grade.

The soil gas sampling essentially duplicated the soil gas sampling event of May 8, 2000 and was performed in accordance with the revised work plan approved by the NYSDEC and dated May 10, 1999. At each of these locations, a soil gas sample was collected from a depth of approximately four feet below the foundation of the building using the vacuum provided by the SUMMA canister. A tabular summary of the results of the soil gas analyses may be found in **Table 1**, while **Figure 3** presents a graphical representation of the soil gas results. Included in the figure for the purpose of a reference, are the locations of the soil gas points installed in June 15, 1999 and May 8, 2000. A comparison of the June 15, 1999 soil gas analytical results and the May 8, 2000 soil gas results (showing the net changes in total VOC concentrations) are also presented in **Table 1**. Copies of the laboratory analytical reporting forms are included in **Appendix B**.

The soil gas points were installed utilizing an all-terrain vehicle (ATV) mounted Geoprobe™ direct-push equipment. At each location, a sacrificial soil gas point was installed into the subsurface to the desired depth (*i.e.*, approximately four feet below grade). Prior to the collection of each soil gas sample, the soil gas point was purged by inserting new Teflon ¼ inch tubing in soil gas sampler and connecting it to a vacuum pump. After purging to remove the ambient air, the soil gas samples were then collected with 6-liter SUMMA canisters equipped with in-line filters supplied by the laboratory. For the purposes of quality control, one ambient air sample was collected from the south parking lot and field duplicate samples were collected at SGP-6B and SGP-13B. All of the samples were shipped via overnight carrier to Air Toxics Limited of Folsom, California and analyzed for volatile organic compounds (VOCs) in accordance with EPA Method TO-14.

2.2 Groundwater Sampling Results – Volatile Organic Compounds

On October 15, 2001, IT Corporation personnel gauged and sampled eight (8) monitoring wells located at the subject site. Monitoring wells MW-2, MW-9, MW- 11, MW-12, MW-13, and MW-16 were measured for depth to water and the presence of liquid-phase hydrocarbons (LPH). Groundwater samples were collected from eight (8) of the remaining monitoring wells at the Site: MW-2, MW-3, MW-9, MW-11, MW-12, MW-13, MW-14 and MW-16. Monitoring wells MW-1 and MW-15 were gauged and determined to contain liquid-phase hydrocarbons (LPH) associated with one or more historical petroleum releases that are not the responsibility of Bulova and are being addressed by the current property owner.

Each well sampled was purged using a low-flow submersible pump when the initial round of gauging was completed, and the water discharge from the pump was measured for pH, temperature, conductivity and turbidity. When at least three (3) well volumes had been purged from each well, and the turbidity of the discharge measured 50 NTUs or less, the well was sampled. Groundwater samples were collected using dedicated, single-use Teflon bailers, and subsequently transferred into laboratory-provided glass jars with no headspace and placed in an ice filled cooler along with a trip blank for shipment to Chemtech for VOC analysis.

A tabular summary of the results of the groundwater analyses for VOCs may be found in **Table 2**, and the results of a blind field duplicate sample collected from MW-12 are also included in this data summary. The relative percent difference (RPD) data between the original sample results and the blind field duplicate sample results are presented in **Table 3**. Although there are no established QC limits for field duplicate RPD data, RPD values of 50% or less for aqueous samples are considered an indication of acceptable sampling and analytical precision. The RPD values presented in **Table 3** indicate excellent sampling and analytical precision.

The concentration of total VOCs in the samples ranged from non-detect in MW-3 to 2,335 micrograms per liter (ug/L, equivalent to parts per billion) in MW-11. The predominant compounds of concern detected include 1,1-dichloroethane, cis-1,2-dichloroethene, 1,1,1-trichloroethane and trichloroethene. **Figure 4** presents a graphical representation of the VOC results.

Based on the groundwater elevations measured during the groundwater sampling event on October 15, 2001, groundwater flow beneath site is in a north-northwesterly direction. Groundwater flow direction beneath the site has not changed since the December 1998 quarterly monitoring event. A summary of the groundwater depth-to-water measurements is presented in **Table 4**.

3.0 REMEDIAL ACTION PLAN

Remedial actions have been completed at the Site as listed in the ROD (Section 1 of this report), including excavation of shallow soils (zero to one foot in depth) from the interior courtyard, closure of dry wells and sumps, and air sparging/soil vapor extraction. Although these actions were largely successful in meeting their objectives, subsequent sampling efforts have detected residual concentrations of VOCs in soil and groundwater at the Site. Chlorinated VOCs were reported in soil and groundwater samples collected from the interior courtyard area of the Site (Section 3 of the **Interior Courtyard Confirmatory Soil Boring Assessment Report**). These compounds were detected in both shallow soils (*i.e.*, the impacted two to six ft. bgs interval at CB-3, CB-4, CB-6, and CB-8), and deeper soils (*i.e.*, the eight to 14 ft. bgs interval in these same locations, as well as CB-5).

Bulova has evaluated remedial actions that may further reduce the concentrations of VOCs present in these media, based on the data regarding the distribution of chlorinated VOCs in soil and groundwater. A number of potential extraction and *in-situ* destructive technologies were evaluated in order to develop remedial action designed to address both of these media in an expedited timeframe. The excavation and air sparging/soil vapor extraction remedial action was chosen based on its ability to meet the following remedial action objectives:

1. Provide additional reductions in VOCs in soil;
2. Provide additional reductions in VOCs in groundwater; and
3. Accomplish these objectives by the use of reliable technologies that have been proven capable of achieving these objectives in an expeditious manner.

3.1 Removal and Off-Site Disposal of Soils

Bulova prepared and implemented an **Excavation, Shoring and Disposal Plan** dated October 18, 2001 in accordance with the comments provided by the NYSDEC in a letter dated September 4, 2001. Samples collected during the Confirmatory Soil Boring Program had detected residual concentrations of chlorinated VOCs in the courtyard, and various remedial actions were evaluated to reduce the VOCs in the soil. One area outside of the area of influence of either existing soil venting system showed elevated levels of VOCs in the soil. The remedial action selected for this area was to remove the impacted soils to a depth of approximately six feet bgs, dispose of them off-site and backfill the area with clean soil.

Soil was removed from the area by use of a vacuum truck. A small excavator and hand digging assisted with the removal of soil from tight areas and highly compacted soils. Removal of the soils by vacuum was considered the most efficient method as compared with conventional methods due to the highly restricted access for conventional excavation and soil moving equipment as well as the elimination of the potential redistribution of VOC contaminated soils inside or outside the building during handling prior to disposal.

Soils were removed. All soils removed were transferred from the vacuum truck to roll-off containers staged on-site within the fenced area, and were replaced with clean local backfill material. The soils were placed in lifts with a maximum thickness of 18 inches and compacted using small mechanical compactors to a minimum of 90% of optimum soil compaction. Clean soils were transported from a staged location in the parking lot to the work area by use of a small loader.

The limited soil removal phase of the remedial action was implemented from October 22 to November 9, 2001, with a total of approximately 110 cubic yards of soil excavated. Soils were removed to a depth of 6 to 8 feet below grade to the limits shown in **Figure 5**. Soils that were removed from the westernmost area of the interior courtyard were located in close proximity to the foundation for the existing building. In order to excavate these soils, shoring and bracing was utilized because sloping or benching the excavation would not allow for soils to be removed close to the foundation. A New York State-registered Professional Engineer prepared an excavation plan specifying the soil locations and depths to be excavated, as well as the equipment used to complete the project. In accordance with 29 CFR Part 1926 Subpart P, a Competent Person with the authority and knowledge to make decisions regarding health and safety issues was also designated and present on Site during the course of the excavation. Post excavation confirmation samples were collected from the base and remaining side walls of the excavation in accordance with the procedures outlined in the **Excavation, Shoring and Disposal Plan**. Each excavated area was then lined with poly sheeting and backfilled to serve as support for the next row of shoring box locations.

A total of 29 samples were collected from the excavation: 16 samples from each of the remaining side walls, one per every five linear feet at a distance approximately one third up from the bottom of the excavation, and 12 samples and a blind field duplicate from the base of the excavation, one per every 25 square feet (*i.e.*, one per every five foot by five foot area), including one sample from each of the former confirmatory soil borings drilled in the interior courtyard.

Each sample was sealed in a laboratory-provided glass jar with a minimum of headspace and placed in an ice filled cooler for shipment to Chemtech Consulting Group, Inc. (Chemtech) of Mountainside, New Jersey for VOC analysis.

The excavated soils were transferred to a total of seven lined roll-offs staged in the parking lot and have been properly characterized. Once approval from the disposal facility has been received, the soils will be shipped off Site in accordance with all applicable laws and regulations for proper disposal. Copies of the manifests, certificates of disposal and other documentation associated with the disposal of these soils will be submitted under separate cover.

As requested by the NYSDOH, real-time monitoring for VOCs and particulates was conducted as per the NYSDOH Generic Community Air Monitoring Plan throughout the course of the soil removal action. Air monitoring included areas where excavated soils were transported and/or stored. There were neither elevated photoionization detector (PID) readings for total volatiles nor any elevated particulate readings in the breathing zone or at the perimeter of the Site.

3.1.1 Post-Excavation Soil Sampling Results – Volatile Organic Compounds

A tabular summary of the results of the post-excavation soil sample analyses for VOCs may be found in **Table 5**, and the results of a blind field duplicate sample collected from location PESS-22 and a reanalysis of sample PESS-21 requested by the NYSDEC are also included in this data summary. The RPD data between the original sample results for PESS-22 and the blind field duplicate sample results as well as the RPD data between the initial analysis and the requested reanalysis of sample PESS-21 are presented in **Table 6**. Although there are no established QC limits for field duplicate RPD data, RPD values of 100% or less for soil samples are considered an indication of acceptable sampling and analytical precision.

In accordance with EPA data validation criteria, both of the trichloroethene results reported for original analysis of PESS-21 and the reanalysis are considered estimated due to variance from quality control criteria. With respect to tetrachloroethene, if a compound is detected in the sample but not in the reanalysis, the RPD value is 200% by definition; it is not uncommon for a compound detected at a level near the contract required quantitation limit (CRQL) in a sample to be non-detect in the associated reanalysis, however, and no data are qualified based upon the RPD value for tetrachloroethene. The RPD data for PESS-22 are excellent, and since estimated data are considered valid and usable, the RPD values presented in **Table 6** are considered indicative of acceptable sampling and analytical precision.

A map depicting the location of each of the post-excavation sampling points has been included as **Figure 6**. It should be noted that due to elevated PID readings at six and a half and seven feet bgs, the excavation continued to eight feet bgs in the area of CB-3 and CB-8 (PESS-20 and PESS-21).

All of the final post-excavation soil sample results reported for this limited soil removal action are well below the NYSDEC RSCOs presented in TAGM #4046 (January 24, 1994).

3.2 Air Sparging/Soil Vapor Extraction (AS/SVE)

As previously indicated, the existing AS/SVE system was operated until 1997 as an IRM at the facility, and the components remain on-Site. This system is being reconfigured and will be operated in the interior courtyard with six new sparge points to remove VOCs from deeper soil (*i.e.*, 8-14' bgs) and groundwater. The remedial concept and design basis for these systems is presented in detail in the **Draft Final, Interim Remedial Measure (IRM) Work Plan** prepared for the Site. The modifications made to the interior courtyard remediation system were originally presented in the **Interior Courtyard Confirmatory Soil Boring Assessment Report**, and have been refined and presented here.

Pilot testing completed at the Site in June 1993 verified a 15 ft. radius of influence (ROI) for AS wells, and a 25 ft. ROI for SVE wells. The IRM system that was operated in the interior courtyard featured two co-located AS/SVE wells, a five horsepower (hp) regenerative SVE blower, and a rotary vane compressor. By contrast, the system that had operated in the northern courtyard featured four co-located AS/SVE wells, a 10-hp regenerative SVE blower, and a rotary lobe blower.

Based on the original pilot test results for the Site and on the most recent soil and groundwater data, providing effective AS/SVE influence to the area of greatest VOC impact in the interior courtyard and under the building to the northwest of the interior courtyard would require four (4) co-located AS/SVE wells. In the interest of aggressive, thorough treatment of both soils and groundwater the well network has been designed with significant overlap to allow better direction of airflow to target areas based on monitoring information. This provides increased coverage as well as flexibility in operation, and a total of six (6) co-located AS/SVE wells were installed as discussed in Sections 3.2.1 and 3.2.2 of this work plan (see **Figure 7**).

These wells were constructed as per the IRM Work Plan (*i.e.*, 2-inch PVC, and connected to the AS/SVE blower equipment with aboveground PVC connecting piping). Because soil impacts were observed to decrease significantly by 16 ft. bgs in the most recent sampling event, as well as the data from the installation of monitoring well MW-10, the AS well screens have been set at the 18 to 20 ft. bgs interval, which is a sufficient depth to allow the sparged air to disperse through the eight to 14 ft. bgs impacted zone. The blower equipment from the northwest courtyard system would be used to operate the revised interior courtyard AS/SVE system, as its capacity is more suited to the flow requirements of the revised interior courtyard system. Air discharge from the SVE would conform to permit number 1-4736-01698 00001-0, which was assigned to the Site in December 1993.

Vacuum and vapor monitoring will be conducted as outlined in Section 3.2.3.3 as requested by the NYSDEC. It should be noted, however, that there are constructability issues associated with the installation of the "Nested Soil Vapor Monitoring Probes" requested by the Department (in an e-Mail on November 14, 2001); namely, the need for a borehole to construct each point, and the inability to install true boreholes within the building or the interior courtyard. Therefore, the vapor monitoring points to be installed will not be nested, but instead will consist of clustered monitoring points.

On November 20 and 21, 2001, six air sparge wells (AS-1 through AS-6) and six vapor extraction wells (VE-1 through VE-6) were installed as part of the reconfiguration of the existing AS/SVE treatment system. The locations of these co-located well pairs are depicted on **Figure 5**, and the construction logs for these AS and SVE wells have been included as **Appendix C**.

3.2.1 Air Sparge (AS) Wells

Air sparge wells AS-1 through AS-6 were constructed with one-inch diameter, schedule 40 PVC, to approximately 20 feet below grade. All six AS wells were fitted with two feet of 0.010-inch slotted screen at depth, and a track-mounted Geoprobe unit was utilized to install these wells. After the AS wells were inserted into their respected borehole, quartzite sand was installed around the well screen and then a bentonite seal was installed. Following installation, each of these wells was developed using a peristaltic pump to remove silt/sand deposits from settling into the well screen.

3.2.2 Soil Vapor Extraction (SVE) Wells

Soil vapor extraction wells VE-1 through VE-6 were constructed with 2-inch diameter, schedule 40 PVC, to approximately 10 feet below grade. All six SVE wells were fitted with five feet of 0.010-inch slotted screen at depth. To install these wells, a track-mounted Geoprobe unit fixed with hollow stem augers was utilized. Once the SVE wells were inserted into its respected borehole, quartzite sand was installed around the well screen and then a bentonite seal was installed.

3.2.3 AS/SVE Operations, Maintenance and Monitoring

3.2.3.1 Operation, Maintenance, and Monitoring Overview

The goal of AS/SVE Operations, Maintenance, and Monitoring (O&M) is to maintain operation of the remediation system in a manner that minimizes downtime and maximizes the removal of subsurface VOCs. A description of critical O&M activities is included in the following sections of this Remedial Action Plan.

Conceptually, the AS/SVE system will initially be operated continuously, and then switched to a "pulsed" mode to effect additional VOC removal. The achievement of an asymptotic decline in VOCs in SVE off-gas (*i.e.*, no significant decrease in VOC concentrations on a month-to-month basis) is the indication that steady-state conditions have been reached in terms of removal efficiency. Upon reaching this plateau, which is defined as three months of continuous operation where VOC concentrations in the SVE effluent (pre-carbon) do not vary by more than 10%, the "pulsed" mode of operation will be utilized to create new airflow channels.

Pulsed operation will be achieved at the site by manually adjusting the airflow and pressures to the wells on the sparge and vapor extraction systems on a weekly basis to form new flow channels. After one continuous quarter where steady state conditions have been achieved by this method, the AS/SVE system will be shut off to evaluate potential "rebound" effects.

This will be done in consultation with the NYSDEC, and the system may either be reactivated or may remain shutdown depending on the degree of any observed rebound effect after the first quarter of shutdown. If significant rebound effects are noted, the system will be reactivated and the process repeated until three consecutive months of sampling indicate no significant rebound effect.

It is anticipated that steady state conditions will be reached approximately one year after start-up, and additional quarterly groundwater sampling will then be conducted for one full year (*i.e.*, four quarters) in order to further monitor for a potential rebound. In addition, after shutdown, quarterly soil gas sampling will be conducted as requested by the NYSDEC in the same manner as discussed in Section 2.1 of this report supplemented with the collection of samples from the clustered monitoring probes discussed in Section 3.2.

In order to collect the data required for these decisions and to maintain the equipment in optimal condition, system maintenance and monitoring activities will be performed weekly and monthly, and groundwater samples will be collected from monitoring wells on a quarterly basis for VOC analyses. Lists of tasks and the schedule for both maintenance and monitoring activities are summarized in **Tables 7** and **8**.

3.2.3.2 Remediation System Maintenance and Troubleshooting Procedures

Maintenance of the remediation system will occur with the goal of minimizing downtime and thereby removing the subsurface VOCs as rapidly as possible. A description of critical maintenance activities is included below, and is listed in **Table 7**. The maintenance table specifies the routine maintenance each component will receive and the frequency or schedule for maintenance. The maintenance frequencies stated are based on the current information regarding system operation and will be modified in response to changes in system operating parameters.

All site maintenance activities will be performed in accordance with the site **Health and Safety Plan**, including following such procedures as vapor monitoring of the work area and lock out/tagout (de-energizing) of the air, water, and electric-generating sources.

Air Sparging System: Major components of the air sparging system and critical preventative maintenance include:

- **Rotary Lobe Blower:** Preventative maintenance consists of checking the oil and changing at the specified frequency.
- **Air Inlet Filter:** Checked and replaced if necessary on a monthly basis.
- **Air Gauges:** Checked and replaced if necessary on a weekly basis.

Soil Vapor Extraction System: Major components of the soil vapor extraction system and critical preventative maintenance include:

- **Regenerative Soil Vapor Extraction Blower:** The soil vapor extraction system will be inspected weekly. Operating pressures are checked and recorded, making sure they are within the range desired for the remediation design. The unit may run quite warm but should not be too hot to touch. Any unusual noises (such as bearing or impeller noise) should be investigated and repaired as necessary.

- **Moisture Separator:** The contents of accumulator tank located on the influent side of the soil vapor extraction blower should be inspected. Solid material (primarily silt) should be removed and disposed of properly.

- **In-line Air Filter:** This filter is located inside the moisture separator and should be inspected and cleaned (it may be tapped out or rinsed off) on a monthly basis.

- **Granulated Activated Carbon (GAC) Liquid Filters:** The carbon filter media must be changed out as necessary, indicated by a change in air flow or air quality data.

3.2.3.3 Remediation System Monitoring

Data collected from the remedial system (flow rates, temperature, water level *etc.*) will be recorded on monitoring forms specifically prepared for the site, which will be retained and reported on a quarterly basis. A description of critical maintenance activities is included below, and is listed in **Table 8**.

Air Sparging System: Monitoring will consist of determining that the desired pressure and rate of airflow into the sparge wells is occurring. An interim indication of sparge performance will be obtained by observation of dissolved oxygen levels from monitoring wells and sparge/vapor monitoring points (SP/VPs). These multi-level points will be constructed as clusters of small-diameter (one-inch PVC) piezometers, such that the lower end bridges the water table zone (*i.e.*, screened approximately eight to 10 feet below ground surface) and that a second screened zone is placed at four feet below grade. The lower level will be used to monitor dissolved oxygen in groundwater as well as vacuum in soils just above the water table. The upper level will be used to monitor vacuum in shallower soils (*i.e.*, at four feet below grade). The SP/VPs will be placed so that they represent conditions at five, 10, and 15 feet from a few of the air sparge and soil vapor extraction wells.

The objective of air sparge operation will be to maintain elevated levels of dissolved oxygen in groundwater (as compared to baseline readings) as an indicator that the sparge system is maintaining airflow in the subsurface. If dissolved oxygen readings do not indicate that adequate pressure and airflow is occurring to a particular area, the flow rate to that area will be increased, within the limits of the design parameters.

Soil Vapor Extraction System: Monitoring of the soil vapor extraction system will be performed to measure the rate of airflow extracted, the VOC concentrations in the extracted soil vapor, and the vacuum radius in the subsurface. The quantities (pounds) of VOCs extracted by the soil vapor system will also be calculated. Changes in the extraction rate will be compared to the concentration of VOCs measured in groundwater in the adjacent remedial target area monitoring wells to determine if the extraction rate is limited by the diminishing mass of VOCs or by their diffusion rate through the soil matrix.

If VOC levels decrease within the system but corresponding decreases are not seen within the adjacent monitoring wells (diffusion-limited condition), airflow will be increased to the non-affected portions of the target remediation area, within the design parameters of the system.

Samples of off-gas will also be submitted for quarterly laboratory analyses so that the discharge of VOCs can be compared to the effluent guidelines in the air permit application filed with the **IRM Work Plan** (1994). If the levels are in excess of the guidelines, replacement of the carbon off-gas filters will be performed.

Groundwater Sampling: Monitoring wells MW-11 and MW-12 were compromised during the limited soil removal action outlined in Section 3.1 and were replaced with monitoring wells MW-11R and MW-12R, respectively. The proposed location of a new downgradient monitoring well, MW-22, is indicated on **Figure 4**, and sampling of groundwater from five monitoring wells on-site (MW-11R, MW-12R, MW-14, MW-16 and MW-22) for VOCs by NYSDEC Method 95-1 will be completed on a quarterly basis. The interim performance of the remediation system will be indicated by comparison of these quarterly groundwater samples to previous sampling data. In addition, these wells will also be sampled on a weekly basis for dissolved oxygen content.

3.3 Summary of Proposed Remedial Action Plan

The following actions to address the reduction of VOCs in soil and groundwater requested by NYSDEC have been implemented or are proposed:

1. Approximately 110 cubic yards of VOC-impacted soils were excavated from the interior courtyard area of the Site using a small excavator ("Bobcat") and vacuum truck. Soils were removed to a depth of six to eight ft. bgs, as constrained by safety concerns and the proximity of the building foundation. Brace and plate type shoring was used to

protect workers and the building foundation. These soils have been transferred to a total of seven lined roll-offs staged in the parking lot, and characterization samples were collected from each of the roll-offs on Thursday, November 8, 2001. The results have been received, and no soil will be sent off-site until an approval from the landfill is received. Each roll-off container will be provided with a generator signed manifest sheet prior to transport off-site, and copies of the manifests and soil volumes will be transmitted to the appropriate personnel at that time.

2. The air sparge/soil vapor extraction system existing on Site has been reconfigured to address the presence of VOCs in soils and groundwater. This involved the installation of six new co-located air sparge/soil vapor extraction wells. These wells will be connected to the existing blower equipment using aboveground piping. The achievement of an asymptotic decline in VOCs in SVE off-gas (*i.e.*, no significant decrease in VOC concentrations on a month-to-month basis) is the indication that steady-state conditions have been reached in terms of removal efficiency. Upon reaching this plateau, which is defined as three months of continuous operation where VOC concentrations in the SVE effluent (pre-carbon) do not vary by more than 10%, the "pulsed" mode of operation will be utilized to create new airflow channels. Monthly monitoring of the system and quarterly well sampling will be completed to measure the effectiveness of the air sparge/soil vapor extraction remedial action.

TABLES

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	Ambient Air			SGP-1B			SGP-2B			SGP-3B		
	Sample ID # 0110228A-01A			Sample ID # 0110228C-13A			Sample ID # 0110228C-12A			Sample ID # 0110228C-11A		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Freon 12	3.7		ND	230		ND	140		ND	140		ND
Freon 114	5.2		ND	330		ND	200		ND	200		ND
Chloromethane	1.5		ND	97		ND	58		ND	58		ND
Vinyl Chloride	1.8		ND	120		ND	72		ND	72		ND
Bromomethane	2.8		ND	180		ND	110		ND	110		ND
Chloroethane	2.0		ND	120		ND	74		ND	74		ND
Freon 11	4.2		ND	260		ND	160		ND	160		ND
1,1-Dichloroethene	2.9		ND	190		ND	110		ND	110		ND
Freon 113	5.7		ND	360	1200		220	280		220	260	
Methylene Chloride	2.6	2.6		160		ND	98		ND	98		ND
1,1-Dichloroethane	3.6		ND	190		ND	110		ND	110	180	
cis-1,2-Dichloroethene	2.9		ND	190	440		110	250		110	310	
Chloroform	3.6		ND	230		ND	140		ND	140		ND
1,1,1-Trichloroethane	4.0		ND	260	59000		150	32000		150	30000	
Carbon Tetrachloride	4.7		ND	300		ND	180		ND	180		ND
Benzene	2.4		ND	150		ND	90		ND	90		ND
1,2-Dichloroethane	3.0		ND	190		ND	110		ND	110		ND
Trichloroethene	4.0		ND	260	36000		160	23000		160	24000	
1,2-Dichloropropane	3.4		ND	220		ND	130		ND	130		ND
cis-1,3-Dichloropropene	3.4		ND	210		ND	130		ND	130		ND
Toluene	2.8		ND	180		ND	110	120		110		ND
trans-1,3-Dichloropropene	3.4		ND	210		ND	130		ND	130		ND
1,1,2-Trichloroethane	4.0		ND	260		ND	150		ND	150		ND
Tetrachloroethene	5.0		ND	320	740		180	280		180	200	
Ethylene Dibromide	5.7		ND	360		ND	220		ND	220		ND
Chlorobenzene	3.4		ND	220		ND	130		ND	130		ND
Ethyl Benzene	3.2		ND	200		ND	120		ND	120		ND
m,p-Xylene	3.2	3.5		200		ND	120		ND	120		ND
o-Xylene	3.2		ND	200		ND	120		ND	120		ND
Styrene	3.2		ND	200		ND	120		ND	120		ND
1,1,2,2-Tetrachloroethane	5.1		ND	320		ND	180		ND	180		ND
1,3,5-Trimethylbenzene	3.6		ND	230		ND	140		ND	140		ND
1,2,4-Trimethylbenzene	3.6		ND	230		ND	140		ND	140		ND
1,3-Dichlorobenzene	4.5		ND	280		ND	170		ND	170		ND
1,4-Dichlorobenzene	4.5		ND	280		ND	170		ND	170		ND
Chlorotoluene	3.8		ND	240		ND	150		ND	150		ND
1,2-Dichlorobenzene	4.5		ND	250		ND	170		ND	170		ND
1,2,4-Trichlorobenzene	5.5		ND	350		ND	210		ND	210		ND
Hexachlorobutadiene	7.9		ND	500		ND	300		ND	300		ND
Propylene	5.1		ND	320		ND	190		ND	190		ND
1,3-Butadiene	6.6		ND	420		ND	250		ND	250		ND
Acetone	7.0	10		450		ND	270		ND	270		ND
Carbon Disulfide	9.2		ND	590		ND	350		ND	350		ND
2-Propanol	7.3		ND	460		ND	280		ND	280		ND
trans-1,2-Dichloroethene	12		ND	750		ND	450		ND	450		ND
Vinyl Acetate	10		ND	660		ND	400		ND	400		ND
2-Butanone (Methyl Ethyl Ketone)	8.8	48		560		ND	330		ND	330		ND
Hexane	10		ND	660		ND	400		ND	400		ND

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	Ambient Air			SGP-1B			SGP-2B			SGP-3B		
	Sample ID # 0110228A-01A			Sample ID # 0110228C-13A			Sample ID # 0110228C-12A			Sample ID # 0110228C-11A		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Tetrahydrofuran	8.8	9.3		560		ND	330		ND	330		ND
Cyclohexane	10		ND	650		ND	390		ND	390		ND
1,4-Dioxane	11		ND	680		ND	410		ND	410		ND
Bromodichloromethane	20		ND	1300		ND	760		ND	760		ND
4-Methyl-2-pentanone	12		ND	770		ND	460		ND	460		ND
2-Hexanone	12		ND	770		ND	460		ND	460		ND
Dibromochloromethane	25		ND	1600		ND	980		ND	980		ND
Bromoform	31		ND	1900		ND	1200		ND	1200		ND
4-Ethyltoluene	14		ND	930		ND	560		ND	560		ND
Ethanol	5.6		ND	360		ND	210		ND	210		ND
Methyl tert-Butyl Ether	11		ND	680		ND	410		ND	410		ND
Heptane	12		ND	770		ND	460		ND	460		ND

October 11, 2001 - TOTAL VOCs	67	96,180	55,930	54,950
May 8, 2000 - TOTAL VOCs	23	12,306	37,405	24,230
Reduction in TOTAL VOCs per Location (05.08.00 - 10.11.01)	*N/A*	*-83,874*	*-18,525*	*-30,720*
Reduction in TOTAL VOCs per Location (06.15.99 - 05.08.00)	*N/A*	*137,584*	*14,175*	*13,470*
June 15, 1999 - TOTAL VOCs	8	149,890	51,580	37,700
Reduction in TOTAL VOCs per Location (06.15.99 - 10.11.01)	*N/A*	*53,710*	*-4,350*	*-17,250*

Notes:

1) Samples analyzed in accordance with EPA Method TO-14.
2) All results reported in micrograms per cubic meter (ug/m^3).
3) ND - Not Detected at or above laboratory detection limit
4) N/A - Not Applicable
5) J - Estimated Value

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-4B			SGP-5B			SGP-6B			SGP-6B Duplicate		
	Sample ID # 0110228B-10A			Sample ID # 0110228B-09A			Sample ID # 0110228B-08A			Sample ID # 0110228A-08AA		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Freon 12	46		ND	14		ND	14		ND	14		ND
Freon 114	66		ND	20		ND	20		ND	20		ND
Chloromethane	19		ND	5.9		ND	5.9		ND	5.9		ND
Vinyl Chloride	24		ND	7.3		ND	7.3		ND	7.3		ND
Bromomethane	36		ND	11		ND	11		ND	11		ND
Chloroethane	25		ND	7.6		ND	7.6		ND	7.6		ND
Freon 11	53		ND	16		ND	16		ND	16		ND
1,1-Dichloroethene	37		ND	11		ND	11		ND	11		ND
Freon 113	72		ND	22		ND	22		ND	22		ND
Methylene Chloride	33		ND	10		ND	10		ND	10		ND
1,1-Dichloroethane	38	47		12	18		12	160		12	150	
cis-1,2-Dichloroethene	37		ND	11	76		11	320		11	310	
Chloroform	46		ND	14	54		14	110		14	110	
1,1,1-Trichloroethane	51	14000		16	2200		16	2800		16	2800	
Carbon Tetrachloride	59		ND	18	54		18	190		18	180	
Benzene	30		ND	9.2		ND	9.2	9.9		9.2	9.7	
1,2-Dichloroethane	38		ND	12		ND	12		ND	12		ND
Trichloroethene	50	8400		15	4000		15	5700		15	5600	
1,2-Dichloropropane	43		ND	13		ND	13		ND	13		ND
cis-1,3-Dichloropropene	43		ND	13		ND	13		ND	13		ND
Toluene	35	46		11	100		11	220		11	220	
trans-1,3-Dichloropropene	43		ND	13		ND	13		ND	13		ND
1,1,2-Trichloroethane	51		ND	16		ND	16		ND	16		ND
Tetrachloroethene	64	210		19	350		19	260		19	250	
Ethylene Dibromide	72		ND	22		ND	22		ND	22		ND
Chlorobenzene	43		ND	13		ND	13		ND	13		ND
Ethyl Benzene	41		ND	12	18		12	26		12	28	
m,p-Xylene	41		ND	12	80		12	110		12	110	
o-Xylene	41		ND	12	24		12	30		12	30	
Styrene	40		ND	12		ND	12		ND	12		ND
1,1,2,2-Tetrachloroethane	64		ND	20		ND	20		ND	20		ND
1,3,5-Trimethylbenzene	46		ND	14		ND	14		ND	14		ND
1,2,4-Trimethylbenzene	46		ND	14	22		14	25		14	26	
1,3-Dichlorobenzene	56		ND	17		ND	17		ND	17		ND
1,4-Dichlorobenzene	56		ND	17		ND	17		ND	17		ND
Chlorotoluene	49		ND	16		ND	16		ND	16		ND
1,2-Dichlorobenzene	56		ND	17		ND	17		ND	17		ND
1,2,4-Trichlorobenzene	70		ND	21		ND	21		ND	21		ND
Hexachlorobutadiene	100		ND	30		ND	30		ND	30		ND
Propylene	65		ND	20		ND	20		ND	20		ND
1,3-Butadiene	83		ND	25		ND	25		ND	25		ND
Acetone	89		ND	27		ND	27	100		27	100	
Carbon Disulfide	120		ND	36		ND	36		ND	36		ND
2-Propanol	92		ND	28		ND	28		ND	28		ND
trans-1,2-Dichloroethene	150		ND	45		ND	45		ND	45		ND
Vinyl Acetate	130		ND	40		ND	40		ND	40		ND
2-Butanone (Methyl Ethyl Ketone)	110		ND	34		ND	34		ND	34		ND
Hexane	130		ND	40		ND	40		ND	40		ND

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-4B			SGP-5B			SGP-6B			SGP-6B Duplicate		
	Sample ID # 0110228B-10A			Sample ID # 0110228B-09A			Sample ID # 0110228B-08A			Sample ID # 0110228A-08AA		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Tetrahydrofuran	110		ND	34		ND	34		ND	34		ND
Cyclohexane	130		ND	39		ND	39		ND	39		ND
1,4-Dioxane	140		ND	41		ND	41		ND	41		ND
Bromodichloromethane	250		ND	77		ND	77		ND	77		ND
4-Methyl-2-pentanone	150		ND	47		ND	47		ND	47		ND
2-Hexanone	150		ND	47		ND	47		ND	47		ND
Dibromochloromethane	320		ND	98		ND	98		ND	98		ND
Bromoform	390		ND	120		ND	120		ND	120		ND
4-Ethyltoluene	180		ND	56		ND	56		ND	56		ND
Ethanol	71		ND	22		ND	22		ND	22		ND
Methyl tert-Butyl Ether	140		ND	41		ND	41	46		41	46	
Heptane	150		ND	47		ND	47		ND	47		ND

	SGP-4B	SGP-5B	SGP-6B	SGP-6B Duplicate
October 11, 2001 - TOTAL VOCs	**22,703**	**6,996**	**10,107**	**9,970**
May 8, 2000 - TOTAL VOCs	**7,495**	**2,779**	**862**	**N/A**
Reduction in TOTAL VOCs per Location (05.08.00 - 10.11.01)	***-15,208***	***-4,218***	***-9,245***	***N/A***
Reduction in TOTAL VOCs per Location (06.15.99 - 05.08.00)	***15,615***	***1,325***	***7,603***	***N/A***
June 15, 1999 - TOTAL VOCs	**23,110**	**4,103**	**8,465**	**N/A**
Reduction in TOTAL VOCs per Location (06.15.99 - 10.11.01)	***407***	***-2,893***	***-1,642***	***N/A***

Notes:
1) Samples analyzed in accordance wit
2) All results reported in micrograms p
3) ND - Not Detected at or above labor
4) N/A - Not Applicable
5) J - Estimated Value

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-7B			SGP-8B			SGP-9B			SGP-10B		
	Sample ID # 0110228B-07A			Sample ID # 0110228B-06A			Sample ID # 0110228B-05A			Sample ID # 0110228A-04A		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Freon 12	72		ND	46		ND	7.1		ND	3.5		ND
Freon 114	100		ND	66		ND	10		ND	5.0		ND
Chloromethane	30		ND	19		ND	3.0		ND	1.5		ND
Vinyl Chloride	37		ND	24		ND	3.7		ND	1.8		ND
Bromomethane	57		ND	36		ND	5.6		ND	2.8		ND
Chloroethane	39		ND	25		ND	3.8		ND	1.9		ND
Freon 11	82		ND	53		ND	8.0		ND	4.0		ND
1,1-Dichloroethene	58		ND	37		ND	6.7		ND	2.8		ND
Freon 113	110		ND	72		ND	11		ND	5.5		ND
Methylene Chloride	51		ND	33		ND	5.0		ND	2.5		ND
1,1-Dichloroethane	59	150		38		ND	5.8		ND	2.9		ND
cis-1,2-Dichloroethene	58	420		37	64		5.7		ND	2.8		ND
Chloroform	71		ND	46		ND	7.0	13		3.5	4.8	
1,1,1-Trichloroethane	80	7200		51	1500		7.8	220		3.9	110	
Carbon Tetrachloride	92	100		59		ND	9.0	25		4.5	11	
Benzene	47		ND	30		ND	4.8		ND	2.3	2.8	
1,2-Dichloroethane	59		ND	38		ND	5.8		ND	2.9		ND
Trichloroethene	78	18000		50	11000		7.7	2400		3.8	820	
1,2-Dichloropropane	68		ND	43		ND	6.6		ND	3.3		ND
cis-1,3-Dichloropropene	66		ND	43		ND	6.5		ND	3.2		ND
Toluene	55	69		35	100		5.4	84		2.7	100	
trans-1,3-Dichloropropene	66		ND	43		ND	6.6		ND	3.2		ND
1,1,2-Trichloroethane	80		ND	51		ND	7.8		ND	3.9		ND
Tetrachloroethene	99	150		64	97		9.7	17		4.9	6.5	
Ethylene Dibromide	110		ND	72		ND	11		ND	5.5		ND
Chlorobenzene	67		ND	43		ND	6.6		ND	3.3		ND
Ethyl Benzene	64		ND	41		ND	6.2	16		3.1	20	
m,p-Xylene	64		ND	41	76		6.2	69		3.1	93	
o-Xylene	64		ND	41		ND	6.2	23		3.1	37	
Styrene	62		ND	40		ND	6.1		ND	3.0		ND
1,1,2,2-Tetrachloroethane	100		ND	64		ND	9.8		ND	4.9		ND
1,3,5-Trimethylbenzene	72		ND	46		ND	7.0	7.5		3.5	6.8	
1,2,4-Trimethylbenzene	72		ND	46		ND	7.0	34		3.5	22	
1,3-Dichlorobenzene	88		ND	56		ND	8.6		ND	4.3		ND
1,4-Dichlorobenzene	88		ND	56		ND	8.6		ND	4.3		ND
Chlorotoluene	76		ND	49		ND	7.4		ND	3.7		ND
1,2-Dichlorobenzene	88		ND	56		ND	8.6		ND	4.3		ND
1,2,4-Trichlorobenzene	110		ND	70		ND	11		ND	5.3		ND
Hexachlorobutadiene	160		ND	100		ND	15		ND	7.6		ND
Propylene	100		ND	65		ND	9.9		ND	4.9		ND
1,3-Butadiene	130		ND	83		ND	13		ND	6.3		ND
Acetone	140		ND	89		ND	14		ND	8.8	18	
Carbon Disulfide	180		ND	120		ND	18		ND	8.9		ND
2-Propanol	140		ND	92		ND	14		ND	7.0		ND
trans-1,2-Dichloroethene	230		ND	150		ND	23		ND	11		ND
Vinyl Acetate	210		ND	130		ND	20		ND	10		ND
2-Butanone (Methyl Ethyl Ketone)	170		ND	110		ND	17		ND	8.4	20	
Hexane	210		ND	130		ND	20		ND	10		ND

Table 1

Soil Gas Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-7B			SGP-8B			SGP-9B			SGP-10B		
	Sample ID # 0110228B-07A			Sample ID # 0110228B-06A			Sample ID # 0110228B-05A			Sample ID # 0110228A-04A		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Tetrahydrofuran	170		ND	110		ND	17		ND	8.4		ND
Cyclohexane	200		ND	130		ND	20		ND	9.8		ND
1,4-Dioxane	210		ND	140		ND	21		ND	10		ND
Bromodichloromethane	390		ND	250		ND	38		ND	18		ND
4-Methyl-2-pentanone	240		ND	150		ND	23		ND	12		ND
2-Hexanone	240		ND	150		ND	23		ND	12		ND
Dibromochloromethane	500		ND	320		ND	49		ND	24		ND
Bromoform	600		ND	390		ND	59		ND	30		ND
4-Ethyltoluene	280		ND	180		ND	28		ND	14	24	
Ethanol	110		ND	71		ND	11		ND	5.4	7.0	
Methyl tert-Butyl Ether	210		ND	140		ND	21		ND	10		ND
Heptane	240		ND	150		ND	23		ND	12		ND

October 11, 2001 - TOTAL VOCs	**26,089**	**12,837**	**2,909**	**1,303**
May 8, 2000 - TOTAL VOCs	**7,739**	**14,576**	**1,986**	**781**
Reduction in TOTAL VOCs per Location (05.08.00 - 10.11.01)	***-18,350***	***1,739***	***-923***	***-522***
Reduction in TOTAL VOCs per Location (06.15.99 - 05.08.00)	***8,033***	***53***	***N/A***	***N/A***
June 15, 1999 - TOTAL VOCs	**15,772**	**14,629**	**N/A**	**N/A**
Reduction in TOTAL VOCs per Location (06.15.99 - 10.11.01)	***-10,317***	***1,792***	***N/A***	***N/A***

Notes:

1) Samples analyzed in accordance wit
2) All results reported in micrograms p
3) ND - Not Detected at or above labor
4) N/A - Not Applicable
5) J - Estimated Value

Table 1

Soil Gas Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-11B			SGP-12B			SGP-13B			SGP-13B Duplicate		
	Sample ID # 0110228A-03A			Sample ID # 0110228A-02A			Sample ID # 0110228C-14A			Sample ID # 0110228C-14AA		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Freon 12	7.5		ND	7.3		ND	230		ND	230		ND
Freon 114	10		ND	10		ND	330		ND	330		ND
Chloromethane	3.1		ND	3.1		ND	97		ND	97		ND
Vinyl Chloride	3.9		ND	3.8		ND	120		ND	120		ND
Bromomethane	5.9		ND	5.8		ND	180		ND	180		ND
Chloroethane	4.0		ND	3.9		ND	120		ND	120		ND
Freon 11	8.5		ND	8.3		ND	260		ND	260		ND
1,1-Dichloroethene	6.0		ND	5.9		ND	190		ND	190		ND
Freon 113	12		ND	11		ND	360		ND	360		ND
Methylene Chloride	5.3		ND	5.2		ND	160		ND	160		ND
1,1-Dichloroethane	6.1		ND	6.0		ND	190	300		190	310	
cis-1,2-Dichloroethene	6.0	24		5.9	11		190	900		190	930	
Chloroform	7.4	9.6		7.2		ND	230		ND	230		ND
1,1,1-Trichloroethane	8.3	110		8.1	42		260	32000		260	33000	
Carbon Tetrachloride	9.5	11		9.3	21		300		ND	300		ND
Benzene	4.8		ND	4.7		ND	150		ND	150		ND
1,2-Dichloroethane	6.1		ND	6.0		ND	190		ND	190		ND
Trichloroethene	8.1	2000		6.0	2800		260	61000		260	62000	
1,2-Dichloropropane	7.0		ND	6.8		ND	220		ND	220		ND
cis-1,3-Dichloropropene	6.9		ND	6.7		ND	210		ND	210		ND
Toluene	5.7	97		5.6	6.0		180		ND	180		ND
trans-1,3-Dichloropropene	6.8		ND	6.7		ND	210		ND	210		ND
1,1,2-Trichloroethane	8.3		ND	8.1		ND	260		ND	260		ND
Tetrachloroethene	10		ND	10	14		320	440		320	440	
Ethylene Dibromide	12		ND	11		ND	360		ND	360		ND
Chlorobenzene	7.0		ND	6.8		ND	220		ND	220		ND
Ethyl Benzene	6.6	18		6.4		ND	200		ND	200		ND
m,p-Xylene	6.6	71		6.4		ND	200		ND	200		ND
o-Xylene	6.6	24		6.4		ND	200		ND	200		ND
Styrene	6.4		ND	6.3		ND	200		ND	200		ND
1,1,2,2-Tetrachloroethane	10		ND	10		ND	320		ND	320		ND
1,3,5-Trimethylbenzene	7.4		ND	7.3		ND	230		ND	230		ND
1,2,4-Trimethylbenzene	7.4	38		7.3	7.7		230	1.5		230	1.5	
1,3-Dichlorobenzene	9.1		ND	8.9		ND	280		ND	280		ND
1,4-Dichlorobenzene	9.1		ND	8.9		ND	280		ND	280		ND
Chlorotoluene	7.8		ND	7.7		ND	240		ND	240		ND
1,2-Dichlorobenzene	9.1		ND	8.8		ND	250		ND	250		ND
1,2,4-Trichlorobenzene	11		ND	11		ND	350		ND	350		ND
Hexachlorobutadiene	16		ND	16		ND	500		ND	500		ND
Propylene	10		ND	10		ND	320		ND	320		ND
1,3-Butadiene	13		ND	13		ND	420		ND	420		ND
Acetone	14	32		14	16		450		ND	450		ND
Carbon Disulfide	18		ND	18		ND	590		ND	590		ND
2-Propanol	15		ND	14		ND	460		ND	460		ND
trans-1,2-Dichloroethene	24		ND	24		ND	750		ND	750		ND
Vinyl Acetate	21		ND	21		ND	660		ND	660		ND
2-Butanone (Methyl Ethyl Ketone)	18		ND	18		ND	560		ND	560		ND
Hexane	21		ND	21		ND	660		ND	660		ND

Table 1
Soil Gas Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

	SGP-11B			SGP-12B			SGP-13B			SGP-13B Duplicate		
	Sample ID # 0110228A-03A			Sample ID # 0110228A-02A			Sample ID # 0110228C-14A			Sample ID # 0110228C-14AA		
	Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001			Sample Date: 10/11/2001		
COMPOUND NAME	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags	Detection Limit	Result	Data Flags
Tetrahydrofuran	18		ND	18		ND	560		ND	560		ND
Cyclohexane	21		ND	20		ND	650		ND	650		ND
1,4-Dioxane	22		ND	21		ND	680		ND	680		ND
Bromodichloromethane	40		ND	40		ND	1300		ND	1300		ND
4-Methyl-2-pentanone	25		ND	24		ND	770		ND	770		ND
2-Hexanone	25		ND	24		ND	770		ND	770		ND
Dibromochloromethane	52		ND	50		ND	1600		ND	1600		ND
Bromoform	63		ND	61		ND	1900		ND	1900		ND
4-Ethyltoluene	30		ND	29		ND	930		ND	930		ND
Ethanol	11		ND	11		ND	360		ND	360		ND
Methyl tert-Butyl Ether	22	31		21		ND	680		ND	680		ND
Heptane	25		ND	24		ND	770		ND	770		ND

	SGP-11B	SGP-12B	SGP-13B	SGP-13B Duplicate
October 11, 2001 - TOTAL VOCs	2,466	2,918	94,642	96,682
May 8, 2000 - TOTAL VOCs	1,410	1,143	N/A	N/A
Reduction in TOTAL VOCs per Location (05.08.00 - 10.11.01)	*-1,056*	*-1,775*	*N/A*	*N/A*
Reduction in TOTAL VOCs per Location (06.15.99 - 05.08.00)	*N/A*	*N/A*	*N/A*	*N/A*
June 15, 1999 - TOTAL VOCs	N/A	N/A	N/A	N/A
Reduction in TOTAL VOCs per Location (06.15.99 - 10.11.01)	*N/A*	*N/A*	*N/A*	*N/A*

Notes:

1) Samples analyzed in accordance wit
2) All results reported in micrograms p
3) ND - Not Detected at or above labor
4) N/A - Not Applicable
5) J - Estimated Value

Table 2
Groundwater Analytical Data Summary - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sampling Date - October 15, 2001

Sample ID **Compound**	**MW-2**	**MW-3**	**MW-9**	**MW-11**	**MW-12**	**New York State Groundwater Standard/GV**
Chloromethane	10 U	10 U	10 U	10 U	10 U	5
Bromomethane	10 U	10 U	10 U	10 U	10 U	5
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	2
Chloroethane	10 U	10 U	10 U	10 U	10 U	5
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	5
Acetone	10 U	10 U	10 U	10 U	10 U	50
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	NS
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	5
1,1-Dichloroethane	**18**	10 U	10 U	**7.3 J**	**20**	5
trans-1,2-Dichloroethene	10 U	10 U	10 U	10 U	10 U	5
cis-1,2-Dichloroethene	**66**	10 U	10 U	**94**	**200 D**	5
Chloroform	10 U	10 U	10 U	10 U	10 U	7
1,2-Dichloroethane	**8.9 J**	10 U	10 U	10 U	10 U	5
2-Butanone	10 U	10 U	10 U	10 U	10 U	50 GV
1,1,1-Trichloroethane	**110**	10 U	10 U	**920 JD**	**220 D**	5
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	5
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	5
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	1
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	0.4*
Trichloroethene	**160**	10 U	3.1 J	**1300 D**	**170**	5
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	5
1,1,2-Trichloroethane	10 U	10 U	10 U	1.5 J	10 U	5
Benzene	10 U	10 U	10 U	10 U	10 U	1
t-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	0.4*
Bromoform	10 U	10 U	10 U	10 U	10 U	5
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	NS
2-Hexanone	10 U	10 U	10 U	10 U	10 U	50 GV
Tetrachloroethene	10 U	10 U	10 U	**12**	10 U	5
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	5
Toluene	10 U	10 U	10 U	10 U	10 U	5
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	5
Ethyl Benzene	10 U	10 U	10 U	10 U	10 U	5
Styrene	10 U	10 U	10 U	10 U	10 U	5
m/p-Xylenes	10 U	10 U	10 U	10 U	10 U	5**
o-Xylene	10 U	10 U	10 U	10 U	10 U	5**
Total VOCs	*363*	*Non-Detect*	*3.1*	*2,335*	*610*	NS

Notes:

All results expressed in micrograms per liter (ug/L, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

NS indicates No Standard.

GV indicates that the value listed is a Guidance Value rather than a Standard.

* Standard applies to the sum of the *cis* and *trans* isomers.

** Standard applies to the sum of the isomers.

Results in **bold** typeface exceed the applicable NYS groundwater standard/GV.

Table 2
Groundwater Analytical Data Summary - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sampling Date - October 15, 2001

Sample ID Compound	DUPLICATE	MW-13	MW-14	MW-16	TRIPBLANK	New York State Groundwater Standard/GV
Chloromethane	10 U	10 U	10 U	10 U	10 U	5
Bromomethane	10 U	10 U	10 U	10 U	10 U	5
Vinyl Chloride	10 U	31	10 U	10 U	10 U	2
Chloroethane	10 U	10 U	10 U	10 U	10 U	5
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	5
Acetone	10 U	10 U	10 U	10 U	10 U	50
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	NS
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	5
1,1-Dichloroethane	**21**	2.7 J	**20**	3.7 J	10 U	5
trans-1,2-Dichloroethene	10 U	10 U	10 U	10 U	10 U	5
cis-1,2-Dichloroethene	**210 D**	**7.7 J**	**250 D**	10 U	10 U	5
Chloroform	10 U	10 U	10 U	10 U	10 U	7
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	5
2-Butanone	10 U	10 U	10 U	10 U	10 U	50 GV
1,1,1-Trichloroethane	**230 D**	10 U	**240 D**	**6.1 J**	10 U	5
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	5
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	5
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	1
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	0.4^{*}
Trichloroethene	**160**	**14**	**170**	**36**	10 U	5
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	5
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	5
Benzene	10 U	**13**	10 U	10 U	10 U	1
t-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	0.4^{*}
Bromoform	10 U	10 U	10 U	10 U	10 U	5
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	NS
2-Hexanone	10 U	10 U	10 U	10 U	10 U	50 GV
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	5
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	5
Toluene	10 U	**200**	10 U	10 U	10 U	5
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	5
Ethyl Benzene	10 U	**75**	10 U	10 U	10 U	5
Styrene	10 U	10 U	10 U	10 U	10 U	5
m/p-Xylenes	10 U	**170**	10 U	10 U	10 U	5^{**}
o-Xylene	10 U	**98**	10 U	10 U	10 U	5^{**}
Total VOCs	*621*	*611*	*680*	*46*	*Non-Detect*	NS

Notes:

All results expressed in micrograms per liter (ug/L, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

NS indicates No Standard.

GV indicates that the value listed is a Guidance Value rather than a Standard.

* Standard applies to the sum of the *cis* and *trans* isomers.

** Standard applies to the sum of the isomers.

Results in **bold** typeface exceed the applicable NYS groundwater standard/GV.

Table 3

Groundwater Field Duplicate Sampling Results - Relative Percent Difference Values

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sampling Date - October 15, 2001

Sample ID **Compound**	**MW-12**	**DUPLICATE**	**RPD**
Chloromethane	10 U	10 U	
Bromomethane	10 U	10 U	
Vinyl Chloride	10 U	10 U	
Chloroethane	10 U	10 U	
Methylene Chloride	10 U	10 U	
Acetone	10 U	10 U	
Carbon Disulfide	10 U	10 U	
1,1-Dichloroethene	10 U	10 U	
1,1-Dichloroethane	**20**	**21**	4.9%
trans-1,2-Dichloroethene	10 U	10 U	
cis-1,2-Dichloroethene	**200 D**	**210 D**	4.9%
Chloroform	10 U	10 U	
1,2-Dichloroethane	10 U	10 U	
2-Butanone	10 U	10 U	
1,1,1-Trichloroethane	**220 D**	**230 D**	4.4%
Carbon Tetrachloride	10 U	10 U	
Bromodichloromethane	10 U	10 U	
1,2-Dichloropropane	10 U	10 U	
cis-1,3-Dichloropropene	10 U	10 U	
Trichloroethene	**170**	**160**	6.1%
Dibromochloromethane	10 U	10 U	
1,1,2-Trichloroethane	10 U	10 U	
Benzene	10 U	10 U	
t-1,3-Dichloropropene	10 U	10 U	
Bromoform	10 U	10 U	
4-Methyl-2-Pentanone	10 U	10 U	
2-Hexanone	10 U	10 U	
Tetrachloroethene	10 U	10 U	
1,1,2,2-Tetrachloroethane	10 U	10 U	
Toluene	10 U	10 U	
Chlorobenzene	10 U	10 U	
Ethyl Benzene	10 U	10 U	
Styrene	10 U	10 U	
m/p-Xylenes	10 U	10 U	
o-Xylene	10 U	10 U	
Total VOCs	*610*	*621*	1.8%

Notes:

All results expressed in micrograms per liter (ug/L, equivalent to parts per billion).
Standard Organic Data Qualifiers have been used.
Results in **bold** typeface exceed the applicable NYS groundwater standard/GV.

Table 4
Groundwater Depth-to-Water and Field Parameter Measurements

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sampling Date - October 15, 2001

Well Identification	Depth to Product (ft)	Depth to Water (ft)	Depth to Bottom (ft)	pH (S.U.)	Specific Cond. (umhos/cm)	Turbidity (NTU)	Temperature (°C)	TDS (g/L)
MW-1	15.48	16.85	*Not Measured due to presence of Light Phase Hydrocarbons*					
MW-2	N/A	12.51	22.71	6.74	0.245	6.4	14.9	0.16
MW-3	N/A	11.84	20.69	6.69	0.568	3.4	15.5	0.36
MW-4	*abandoned*							
MW-5	*abandoned*							
MW-6	*abandoned*							
MW-7	*abandoned*							
MW-8	*abandoned*							
MW-9	N/A	14.20	23.55	6.11	0.257	27.8	13.8	0.17
MW-10	*abandoned*							
MW-11	N/A	9.47	16.72	*Not Analyzed (purged to dryness)*				
MW-12	N/A	9.75	19.70	*Not Analyzed (purged to dryness)*				
MW-13	N/A	14.28	23.71	6.57	0.336	12.5	14.1	0.22
MW-14	N/A	17.38	25.01	*Not Analyzed (purged to dryness; sheen noted on purge water)*				
MW-15	9.37	9.80	*Not Measured due to presence of Light Phase Hydrocarbons*					
MW-16	N/A	9.56	24.20	*Not Analyzed (purged to dryness)*				
MW-17	*abandoned*							
MW-18	*abandoned*							
MW-19	*abandoned*							
MW-20	*abandoned*							
MW-21	*abandoned*							

Table 5
Post-Excavation Soil Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sample ID	**PESS-01**	**PESS-02**	**PESS-03**	**PESS-04**	**PESS-05**	**PESS-06**	**PESS-07**	**PESS-08**	**RSCO ***
PID Screening Result (ppm)	*0.0*	*10.5*	*1.2*	*0.7*	*6.5*	*0.0*	*5.9*	*1.3*	
Compound									
Chloromethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Bromomethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Vinyl Chloride	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	200
Chloroethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	1,900
Methylene Chloride	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	100
Acetone	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	200
Carbon Disulfide	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	2,700
1,1-Dichloroethene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	400
1,1-Dichloroethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	200
trans-1,2-Dichloroethene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	550
cis-1,2-Dichloroethene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	550
Chloroform	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	300
1,2-Dichloroethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	100
2-Butanone	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	300
1,1,1-Trichloroethane	5.4 J	6 J	3.1 J	4.9 J	4.9 J	5.2 J	20	6.4 J	800
Carbon Tetrachloride	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	600
Bromodichloromethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
1,2-Dichloropropane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
cis-1,3-Dichloropropene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Trichloroethene	48	41	27	120	18	41	58	30	700
Dibromochloromethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
1,1,2-Trichloroethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Benzene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	60
trans-1,3-Dichloropropene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Bromoform	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
4-Methyl-2-Pentanone	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	1,000
2-Hexanone	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
Tetrachloroethene	13 U	13 U	13 U	12 U	12 U	2.2 J	2.6 J	3 J	1,400
1,1,2,2-Tetrachloroethane	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	600
Toluene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	1,500
Chlorobenzene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	1,700
Ethylbenzene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	5,500
Styrene	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	N/A
m/p-Xylenes	13 U	13 U	13 U	12 U	12 U	2.2 J	11 U	12 U	1,200
o-Xylenes	13 U	13 U	13 U	12 U	12 U	12 U	11 U	12 U	1,200

Notes:

All results expressed in ug/Kg (micrograms per kilogram, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

* New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objective (RSCO), as presented in TAGM 4046 (January 24, 1994).

N/A indicates Not Applicable.

Table 5
Post-Excavation Soil Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sample ID	**PESS-09**	**PESS-10**	**PESS-11**	**PESS-12**	**PESS-13**	**PESS-14**	**PESS-15**	**PESS-16**	**RSCO** [*]
PID Screening Result (ppm)	*1.8*	*0.0*	*0.0*	*4.5*	*0.0*	*0.0*	*5.5*	*7.2*	
Compound									
Chloromethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Bromomethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Vinyl Chloride	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	200
Chloroethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,900
Methylene Chloride	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	100
Acetone	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	200
Carbon Disulfide	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	2,700
1,1-Dichloroethene	13 U	12 U	12 U	1.4 J	1.4 J	13 U	12 U	11 U	400
1,1-Dichloroethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	200
trans-1,2-Dichloroethene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	550
cis-1,2-Dichloroethene	13 U	12 U	12 U	1.7 J	12 U	13 U	12 U	11 U	550
Chloroform	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	300
1,2-Dichloroethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	100
2-Butanone	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	300
1,1,1-Trichloroethane	14	4.9 J	2.5 J	13	12 U	3.2 J	6.8 J	7.1 J	800
Carbon Tetrachloride	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	600
Bromodichloromethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
1,2-Dichloropropane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
cis-1,3-Dichloropropene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Trichloroethene	110	26	16	94	1.3 J	16	67	57	700
Dibromochloromethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
1,1,2-Trichloroethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Benzene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	60
trans-1,3-Dichloropropene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Bromoform	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
4-Methyl-2-Pentanone	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,000
2-Hexanone	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
Tetrachloroethene	2.5 J	12 U	12 U	2.7 J	12 U	13 U	1.6 J	3.5 J	1,400
1,1,2,2-Tetrachloroethane	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	600
Toluene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,500
Chlorobenzene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,700
Ethylbenzene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	5,500
Styrene	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	N/A
m/p-Xylenes	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,200
o-Xylenes	13 U	12 U	12 U	12 U	12 U	13 U	12 U	11 U	1,200

Notes:

All results expressed in ug/Kg (micrograms per kilogram, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

[*] New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objective (RSCO), as presented in TAGM 4046 (January 24, 1994).

N/A indicates Not Applicable.

Table 5
Post-Excavation Soil Sampling Results - Volatile Organic Compounds
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sample ID	**PESS-17**	**PESS-18**	**PESS-19**	**PESS-20**	**PESS-21**	**PESS-21RE**	**PESS-22**	**X-1**	**RSCO** *
PID Screening Result (ppm)	*15.0*	*25.3*	*6.8*	*16.3*	*63.5*	*63.5*	*26.2*	*26.2*	
Compound									
Chloromethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Bromomethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Vinyl Chloride	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	200
Chloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,900
Methylene Chloride	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	100
Acetone	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	200
Carbon Disulfide	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	2,700
1,1-Dichloroethene	3.5 J	11 U	12 U	11 U	11 U	11 U	11 U	11 U	400
1,1-Dichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	200
trans-1,2-Dichloroethene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	550
cis-1,2-Dichloroethene	6.7 J	11 U	27	11 U	11 U	11 U	11 U	11 U	550
Chloroform	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	300
1,2-Dichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	100
2-Butanone	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	300
1,1,1-Trichloroethane	64	14	16	4.1 J	10 J	4.3 J	4 J	3.5 J	800
Carbon Tetrachloride	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	600
Bromodichloromethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
1,2-Dichloropropane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
cis-1,3-Dichloropropene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Trichloroethene	240 D	74	480 D	1.6 J	54 V	4.1 JV	11 U	11 U	700
Dibromochloromethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
1,1,2-Trichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Benzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	60
trans-1,3-Dichloropropene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Bromoform	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
4-Methyl-2-Pentanone	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,000
2-Hexanone	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
Tetrachloroethene	18	8 J	2.2 J	11 U	9.4 J	11 U	11 U	11 U	1,400
1,1,2,2-Tetrachloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	600
Toluene	4.2 J	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,500
Chlorobenzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,700
Ethylbenzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	5,500
Styrene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	N/A
m/p-Xylenes	2.1 J	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,200
o-Xylenes	1.3 J	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1,200

Notes:

All results expressed in ug/Kg (micrograms per kilogram, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

* New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objective (RSCO), as presented in TAGM 4046 (January 24, 1994).

N/A indicates Not Applicable.

Table 5

Post-Excavation Soil Sampling Results - Volatile Organic Compounds

IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sample ID	**PESS-23**	**PESS-24**	**PESS-25**	**PESS-26**	**PESS-27**	**PESS-28**			**RSCO** *
PID Screening Result (ppm)	*8.4*	*2.4*	*0.0*	*5.1*	*4.8*	*0.0*			
Compound									
Chloromethane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Bromomethane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Vinyl Chloride	11 U	11 U	11 U	11 U	11 U	11 U			200
Chloroethane	11 U	11 U	11 U	11 U	11 U	11 U			1,900
Methylene Chloride	11 U	11 U	11 U	11 U	11 U	11 U			100
Acetone	11 U	11 U	11 U	11 U	11 U	11 U			200
Carbon Disulfide	11 U	11 U	11 U	11 U	11 U	11 U			2,700
1,1-Dichloroethene	11 U	11 U	11 U	11 U	11 U	11 U			400
1,1-Dichloroethane	11 U	11 U	11 U	11 U	11 U	11 U			200
trans-1,2-Dichloroethene	11 U	11 U	11 U	11 U	11 U	11 U			550
cis-1,2-Dichloroethene	11 U	11 U	11 U	11 U	11 U	11 U			550
Chloroform	11 U	11 U	11 U	11 U	11 U	11 U			300
1,2-Dichloroethane	11 U	11 U	11 U	11 U	11 U	11 U			100
2-Butanone	11 U	11 U	11 U	11 U	11 U	11 U			300
1,1,1-Trichloroethane	2.3 J	3.1 J	11 U	11 U	11 U	11 U			800
Carbon Tetrachloride	11 U	11 U	11 U	11 U	11 U	11 U			600
Bromodichloromethane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
1,2-Dichloropropane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
cis-1,3-Dichloropropene	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Trichloroethene	1.5 J	11 U	21	11 U	3.1 J	11 U			700
Dibromochloromethane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
1,1,2-Trichloroethane	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Benzene	11 U	11 U	11 U	11 U	11 U	11 U			60
trans-1,3-Dichloropropene	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Bromoform	11 U	11 U	11 U	11 U	11 U	11 U			N/A
4-Methyl-2-Pentanone	11 U	11 U	11 U	11 U	11 U	11 U			1,000
2-Hexanone	11 U	11 U	11 U	11 U	11 U	11 U			N/A
Tetrachloroethene	11 U	11 U	11 U	11 U	11 U	11 U			1,400
1,1,2,2-Tetrachloroethane	11 U	11 U	11 U	11 U	11 U	11 U			600
Toluene	11 U	11 U	11 U	11 U	11 U	11 U			1,500
Chlorobenzene	11 U	11 U	11 U	11 U	11 U	11 U			1,700
Ethylbenzene	11 U	11 U	11 U	11 U	11 U	11 U			5,500
Styrene	11 U	11 U	11 U	11 U	11 U	11 U			N/A
m/p-Xylenes	11 U	11 U	11 U	11 U	11 U	11 U			1,200
o-Xylenes	11 U	11 U	11 U	11 U	11 U	11 U			1,200

Notes:

All results expressed in ug/Kg (micrograms per kilogram, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

* New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objective (RSCO), as presented in TAGM 4046 (January 24, 1994).

N/A indicates Not Applicable.

Table 6
Post-Excavation Field Duplicate Sampling Results - Relative Percent Difference Values
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Sample ID Compound	PESS-21	PESS-21RE	RPD	PESS-22	X-1	RPD
Chloromethane	11 U	11 U		11 U	11 U	
Bromomethane	11 U	11 U		11 U	11 U	
Vinyl Chloride	11 U	11 U		11 U	11 U	
Chloroethane	11 U	11 U		11 U	11 U	
Methylene Chloride	11 U	11 U		11 U	11 U	
Acetone	11 U	11 U		11 U	11 U	
Carbon Disulfide	11 U	11 U		11 U	11 U	
1,1-Dichloroethene	11 U	11 U		11 U	11 U	
1,1-Dichloroethane	11 U	11 U		11 U	11 U	
trans-1,2-Dichloroethene	11 U	11 U		11 U	11 U	
cis-1,2-Dichloroethene	11 U	11 U		11 U	11 U	
Chloroform	11 U	11 U		11 U	11 U	
1,2-Dichloroethane	11 U	11 U		11 U	11 U	
2-Butanone	11 U	11 U		11 U	11 U	
1,1,1-Trichloroethane	10 J	4.3 J	79.7%	4 J	3.5 J	13.3%
Carbon Tetrachloride	11 U	11 U		11 U	11 U	
Bromodichloromethane	11 U	11 U		11 U	11 U	
1,2-Dichloropropane	11 U	11 U		11 U	11 U	
cis-1,3-Dichloropropene	11 U	11 U		11 U	11 U	
Trichloroethene	54	4.1 J	**171.8%**	11 U	11 U	
Dibromochloromethane	11 U	11 U		11 U	11 U	
1,1,2-Trichloroethane	11 U	11 U		11 U	11 U	
Benzene	11 U	11 U		11 U	11 U	
trans-1,3-Dichloropropene	11 U	11 U		11 U	11 U	
Bromoform	11 U	11 U		11 U	11 U	
4-Methyl-2-Pentanone	11 U	11 U		11 U	11 U	
2-Hexanone	11 U	11 U		11 U	11 U	
Tetrachloroethene	9.4 J	11 U	200.0%	11 U	11 U	
1,1,2,2-Tetrachloroethane	11 U	11 U		11 U	11 U	
Toluene	11 U	11 U		11 U	11 U	
Chlorobenzene	11 U	11 U		11 U	11 U	
Ethylbenzene	11 U	11 U		11 U	11 U	
Styrene	11 U	11 U		11 U	11 U	
m/p-Xylenes	11 U	11 U		11 U	11 U	
o-Xylenes	11 U	11 U		11 U	11 U	

Notes:

All results expressed in ug/Kg (micrograms per kilogram, equivalent to parts per billion).

Standard Organic Data Qualifiers have been used.

Table 7
Remediation System Monitoring Table
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Component	Maintenance Activity	Maintenance Schedule
Air Sparging System		
Rotary Lobe Blower	Check oil level	Weekly
	Change oil	Monthly
Air Inlet Filter	Check; clean or if necessary replace	Monthly
Air Gauges	Check for proper operation (sight gauge intact; dial reading properly)	Weekly
Soil Vapor Extraction System		
Soil Vapor Extraction Blower	Listen for unusual noises; check operating temperature	Weekly
Moisture Separator	Check tank contents; clean if necessary	Weekly
In-line Air Filter	Check for silt, clean if necessary	Monthly
Granular Activated Carbon Liquid Filters	Change carbon	As indicated by change in flow or air quality data.

Table 8
Remediation System Monitoring Table
IT Project Number 824088
Former Watch Case Factory Site
Sag Harbor, New York

Component	Monitoring Activity	Schedule
Air Sparging System		
Piping to sparge wells	Record pressures along each sparge leg, adjust to design specification; record flow along each piping leg using airflow meter.	Weekly
Dissolved oxygen (wells and SP/VPs)	Measure dissolved oxygen at MW-11R; MW-12; MW-14; MW-16; MW-22; SP/VP 1 though SP/VP-4.	Weekly
Soil Vapor Extraction System		
Sampling Port, Influent Lines	With system shut down, measure VOCs with PID and record. With system operating, measure airflow and vacuum and record.	Weekly
Vacuum gauges, Influent lines	Measure and record line vacuum.	Weekly
Sampling Port, Main Trunk Effluent Line (before carbon)	With system operating, fill a tedlar bag with system off-gas; measure VOCs with PID and record. Measure airflow rate and vacuum and record. Fill SUMMA canister with off-gas for laboratory analysis (first and second quarter only).	Monthly
Sampling Port, Main Trunk Effluent Line (after carbon)	With system operating, fill SUMMA canister with system off-gas and forward for laboratory analysis.	Monthly for first quarter, then quarterly thereafter
System Performance Monitoring ***(including vacuum, dissolved oxygen and soil gas)***		
Groundwater	Measure vacuum at each monitoring location.	Weekly
Monitoring Wells	Measure depth to water MW-11R; MW-12R; MW-14; MW-16; MW-22.	Monthly
Monitoring Wells	Sample for VOCs (NYSDEC Method 95-1) MW-11R; MW-12R; MW-14; MW-16; MW-22.	~~Quarterly~~ Every two month next June
Soil Gas	Following the shutdown of the system, conduct quarterly soil gas sampling in general accordance with the sampling outlined in Section 2.1 as well as vapor soil monitoring points.	Quarterly, post-shutdown of the system - A wk after shutdown twice

Organic Data Qualifiers

U - The compound was analyzed for but not detected at or above the quantitation limit indicated.

J - The compound was analyzed for and determined to be present in the sample because the mass spectrum of the compound meets the identification criteria of the method. The concentration reported is an estimated value, less than the practical quantitation limit for the sample.

B - The compound is also found in an associated blank.

V - The reported value is considered estimated due to variance from quality control criteria

S - The reported value is suspected to be due to laboratory contamination.

R - The reported value is unusable and rejected due to variance from quality control criteria.

D - The reported value is taken from the analysis of a diluted sample.

E - The reported value exceeds the calibration range of the instrument.

N - Indicates presumptive evidence for compound identification.

A - Indicates that the compound is an aldol condensation product.

C - Compound identification has been qualitatively confirmed by GC/MS.

P - Indicates that the percent difference between the results from the two analytical columns is greater than 25%.

FIGURES

Scale: 1:24,000

Reference:
DeLorme 3-D Topo Quads, 1999
Yarmouth, Me.
Datum WGS84

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Bulova Corporation
Sag Harbor, NY

Figure 1
Site Location Map

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Format Revised: 12/15/99

Image: .
Xref: .

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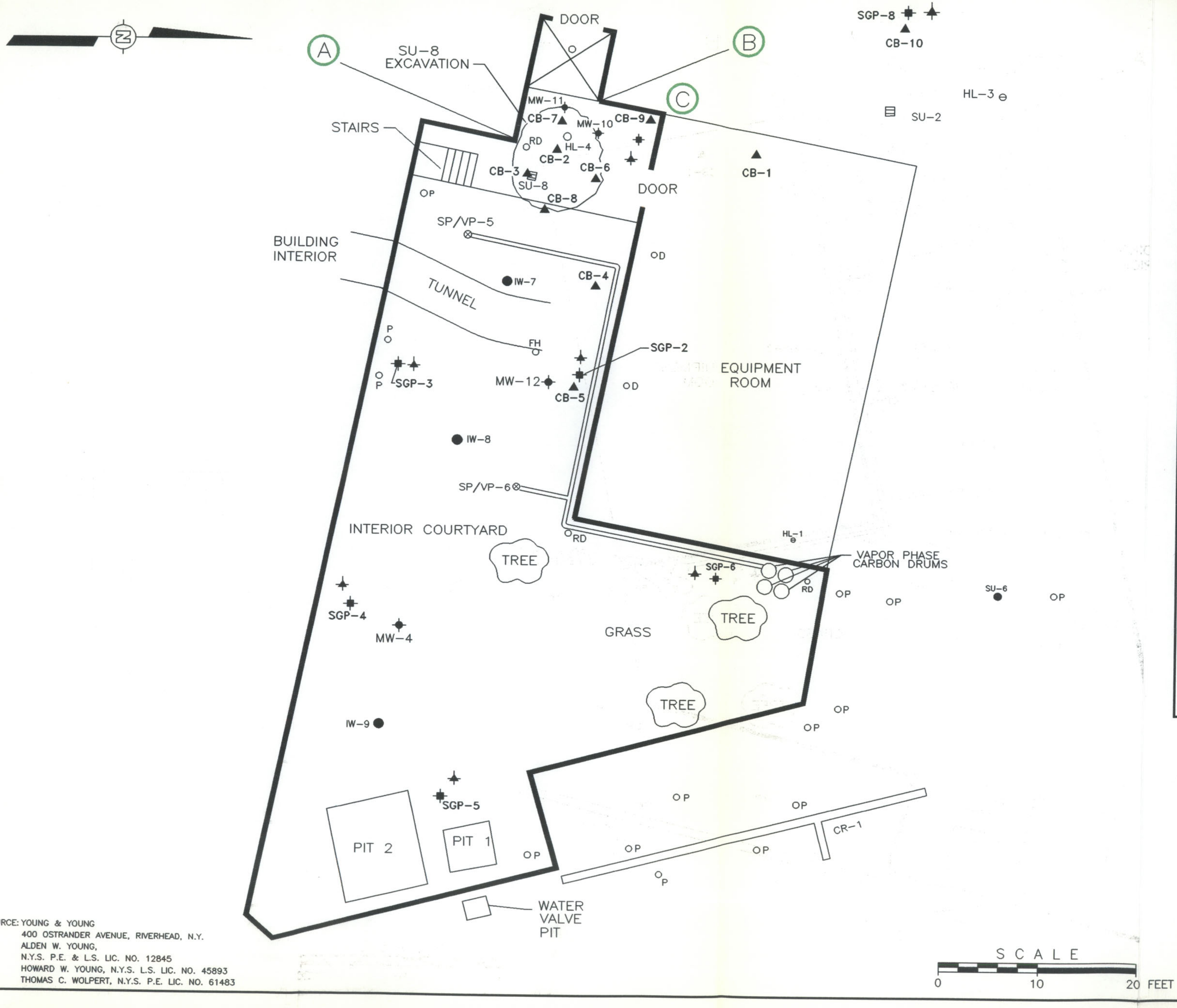

SOURCE: YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG,
N.Y.S. P.E. & L.S. LIC. NO. 12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

LEGEND

✦	SOIL GAS POINT (MAY 8, 2000)
✚	SOIL GAS POINT (JUNE 15, 1999)
✚	MONITORING WELL
⊗	SPARGE POINT/VAPOR POINT
○FH	FIRE HYDRANT
⊟	SUMP
○D	DRAIN
⊖	HOLE IN FLOOR
○P	PIPE
○RD	ROOF DRAIN
●	DRYWELL AT GRADE WITH SOLID COVER
▲	FEBRUARY 2001 BORING/TEMPORARY WELL LOCATIONS
CB	CONFIRMATORY BORINGS
Ⓑ	BORING LOCATION MEASUREMENT REFERENCE

NOTES:

1) PIPE LOCATIONS ARE NOT SURVEYED LOCATIONS THEY ARE ESTIMATED LOCATIONS.

SOIL BORING LOCATION MEASUREMENTS

BORING ID	Ⓐ	Ⓑ	Ⓒ
CB-1	NA	NA	10 FEET FROM WALL IN EQUIPMENT ROOM
CB-2	4'6"	5'9"	8'8"
CB-3	2'6"	9'9"	13'11"
CB-4	14'6"	17'5"	16'7"
CB-5	23'8"	27'5"	26'8"
CB-6	7'8"	6'10"	8'4"
CB-7	4'9'	3'7"	8'10"
CB-8	6'4"	10'11"	13'7"
CB-9	10'7"	3'4"	2'11"
CB-10	NA	NA	LOCATION NEXT TO SGP-8

IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 2
SITE PLAN

15 CHURCH STREET
SAG HARBOR, NEW YORK

OFFICE	DRAWN BY		CHECKED BY	APPROVED BY	DRAWING NUMBER
ALBANY, NY	SSH/JSS	11-29-01			824088D2

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Format Revised: 11/23/99

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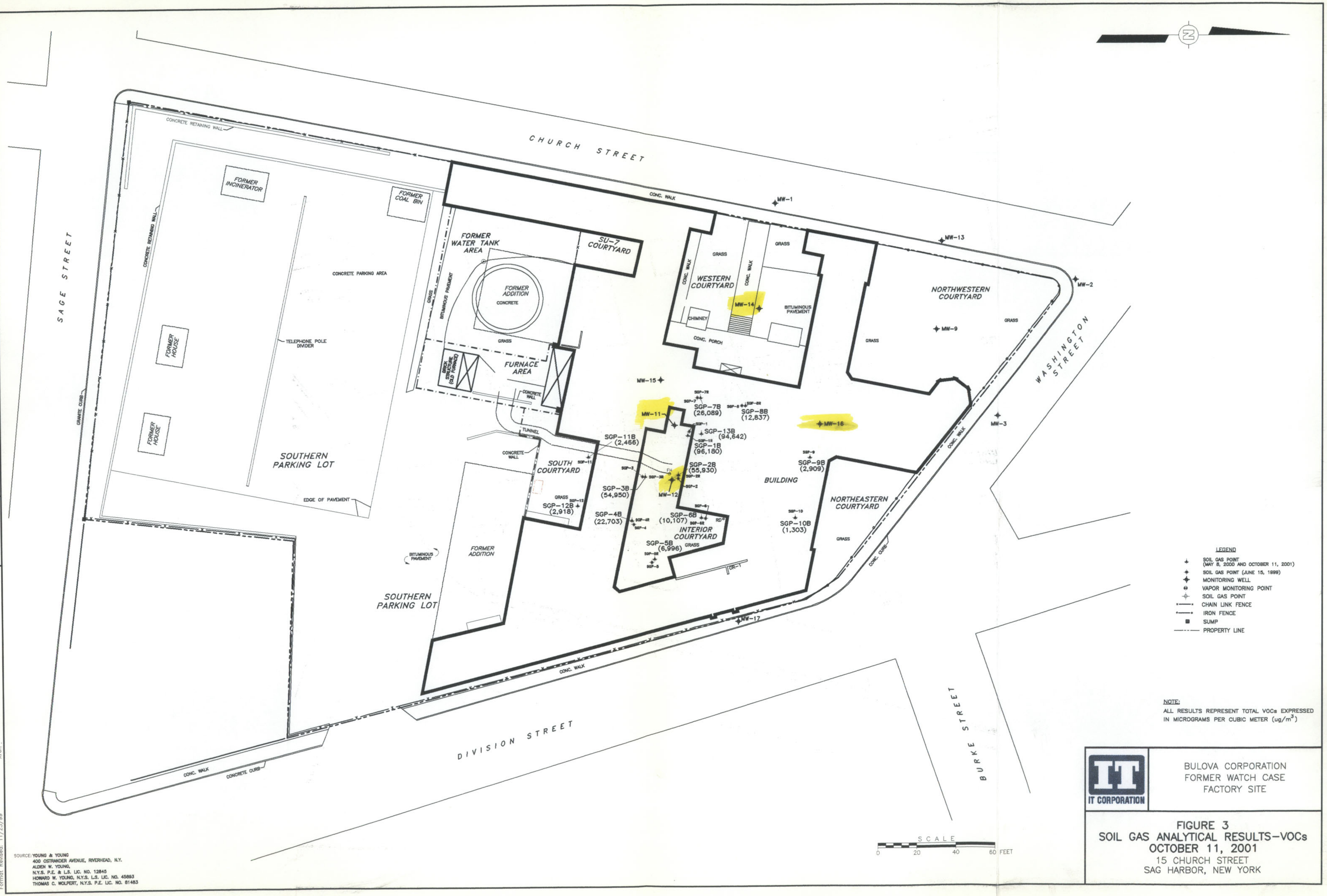


SOURCE: YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG,
N.Y.S. P.E. & L.S. LIC. NO. 12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 81483

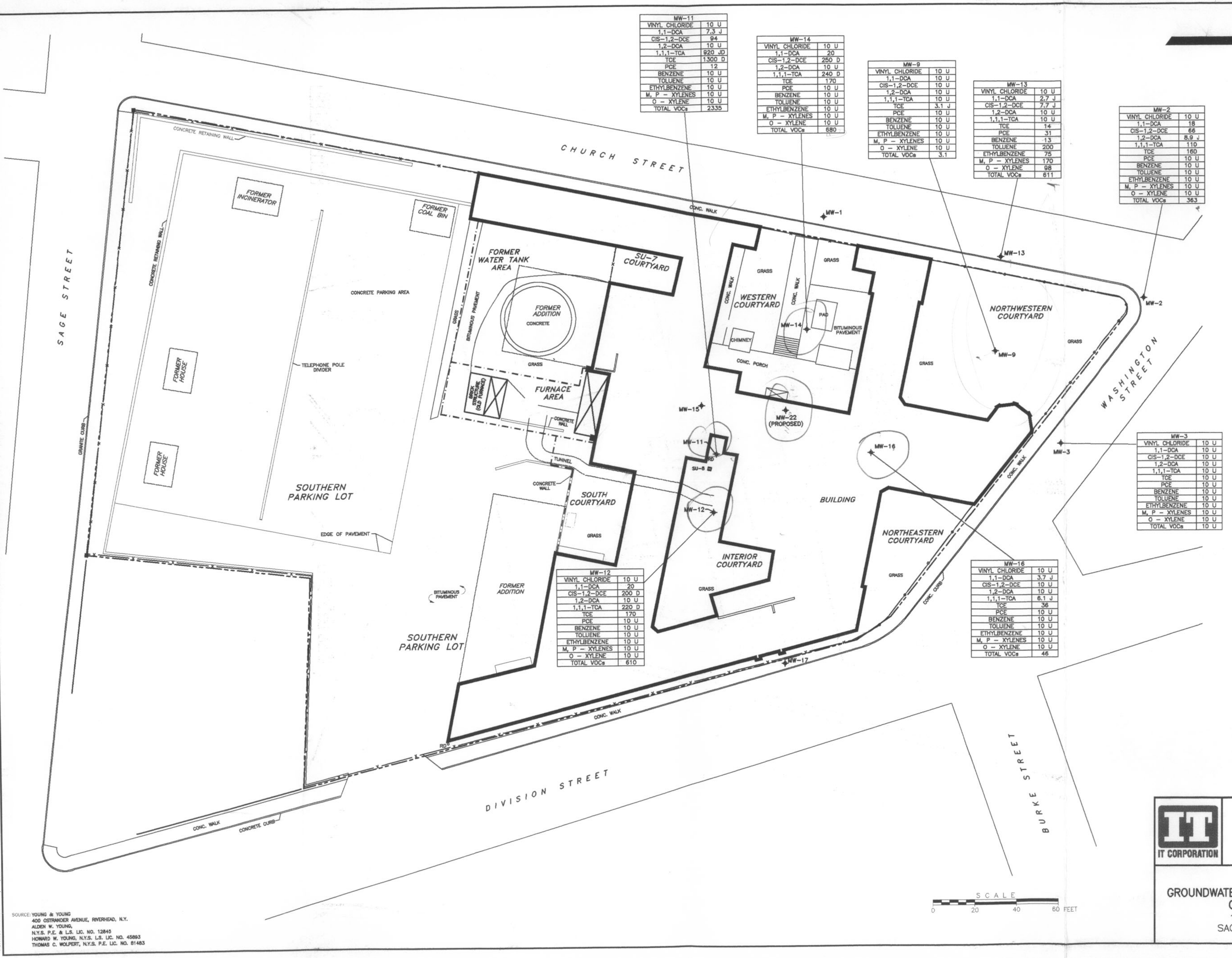
NOTE:
ALL RESULTS REPRESENT TOTAL VOCs EXPRESSED IN MICROGRAMS PER CUBIC METER (ug/m^3)

IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 3
SOIL GAS ANALYTICAL RESULTS-VOCs
OCTOBER 11, 2001
15 CHURCH STREET
SAG HARBOR, NEW YORK

OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
ALBANY, NY	SSH/JSS 11-20-01			824088D1



MW-11	
VINYL CHLORIDE	10 U
1,1-DCA	7.3 J
CIS-1,2-DCE	94
1,2-DCA	10 U
1,1,1-TCA	920 JD
TCE	1300 D
PCE	12
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	2335

MW-14	
VINYL CHLORIDE	10 U
1,1-DCA	20
CIS-1,2-DCE	250 D
1,2-DCA	10 U
1,1,1-TCA	240 D
TCE	170
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	680

MW-9	
VINYL CHLORIDE	10 U
1,1-DCA	10 U
CIS-1,2-DCE	10 U
1,2-DCA	10 U
1,1,1-TCA	10 U
TCE	3.1 J
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	3.1

MW-13	
VINYL CHLORIDE	10 U
1,1-DCA	2.7 J
CIS-1,2-DCE	7.7 J
1,2-DCA	10 U
1,1,1-TCA	10 U
TCE	14
PCE	31
BENZENE	13
TOLUENE	200
ETHYLBENZENE	75
M, P - XYLENES	170
O - XYLENE	98
TOTAL VOCs	611

MW-2	
VINYL CHLORIDE	10 U
1,1-DCA	18
CIS-1,2-DCE	66
1,2-DCA	8.9 J
1,1,1-TCA	110
TCE	160
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	363

MW-3	
VINYL CHLORIDE	10 U
1,1-DCA	10 U
CIS-1,2-DCE	10 U
1,2-DCA	10 U
1,1,1-TCA	10 U
TCE	10 U
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	10 U

MW-16	
VINYL CHLORIDE	10 U
1,1-DCA	3.7 J
CIS-1,2-DCE	10 U
1,2-DCA	10 U
1,1,1-TCA	6.1 J
TCE	36
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	46

MW-12	
VINYL CHLORIDE	10 U
1,1-DCA	20
CIS-1,2-DCE	200 D
1,2-DCA	10 U
1,1,1-TCA	220 D
TCE	170
PCE	10 U
BENZENE	10 U
TOLUENE	10 U
ETHYLBENZENE	10 U
M, P - XYLENES	10 U
O - XYLENE	10 U
TOTAL VOCs	610

LEGEND

✦	MONITORING WELL
—x—	CHAIN LINK FENCE
—•—	IRON FENCE
▪	SUMP
—·—·—	PROPERTY LINE

NOTE:
ALL RESULTS EXPRESSED IN MICROGRAMS PER LITER (ug/L, EQUIVALENT TO PARTS PER BILLION)

IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 4
GROUNDWATER ANALYTICAL RESULTS-VOCs
OCTOBER 15, 2001

15 ~~CHURCH~~ STREET
SAG HARBOR, NEW YORK

SOURCE: YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG,
N.Y.S. P.E. & L.S. LIC. NO. 12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

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Format Revised: 11/23/99
Image: .
Xref: .

L:\project\824088\824088B7.dwg
Plot Date/Time: 12/04/01 03:35pm
Format Revised: 12/15/99

Image: .
Xref: .

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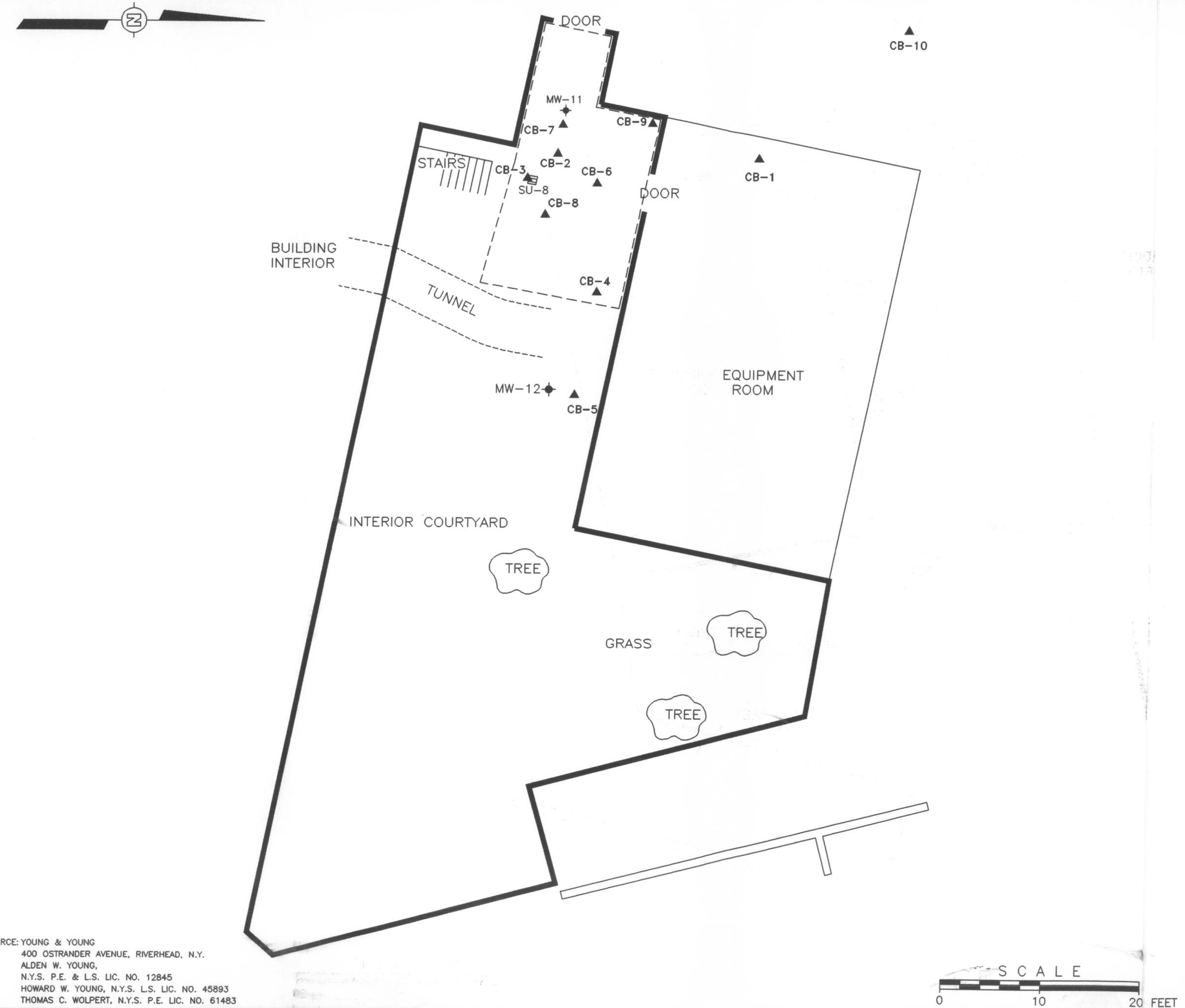
HOLBR./ALBANY	ED/SSH	11-29-01					824088B7



SOURCE: YOUNG & YOUNG
400 OSTRANDER AVENUE, RIVERHEAD, N.Y.
ALDEN W. YOUNG,
N.Y.S. P.E. & L.S. LIC. NO. 12845
HOWARD W. YOUNG, N.Y.S. L.S. LIC. NO. 45893
THOMAS C. WOLPERT, N.Y.S. P.E. LIC. NO. 61483

LEGEND

✦	MONITORING WELL
⊟	SUMP
▲	FEBRUARY 2001 BORING/TEMPORARY WELL LOCATIONS
CB	CONFIRMATORY BORINGS
⌜⌟	APPROXIMATE LIMIT OF SOIL EXCAVATION

IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 5
LIMITS OF SOIL EXCAVATION

15 CHURCH STREET
SAG HARBOR, NEW YORK

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
HOLBR./ALBANY	TS/SSH	11-15-01					824088B6

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Format Revised: 12/15/99

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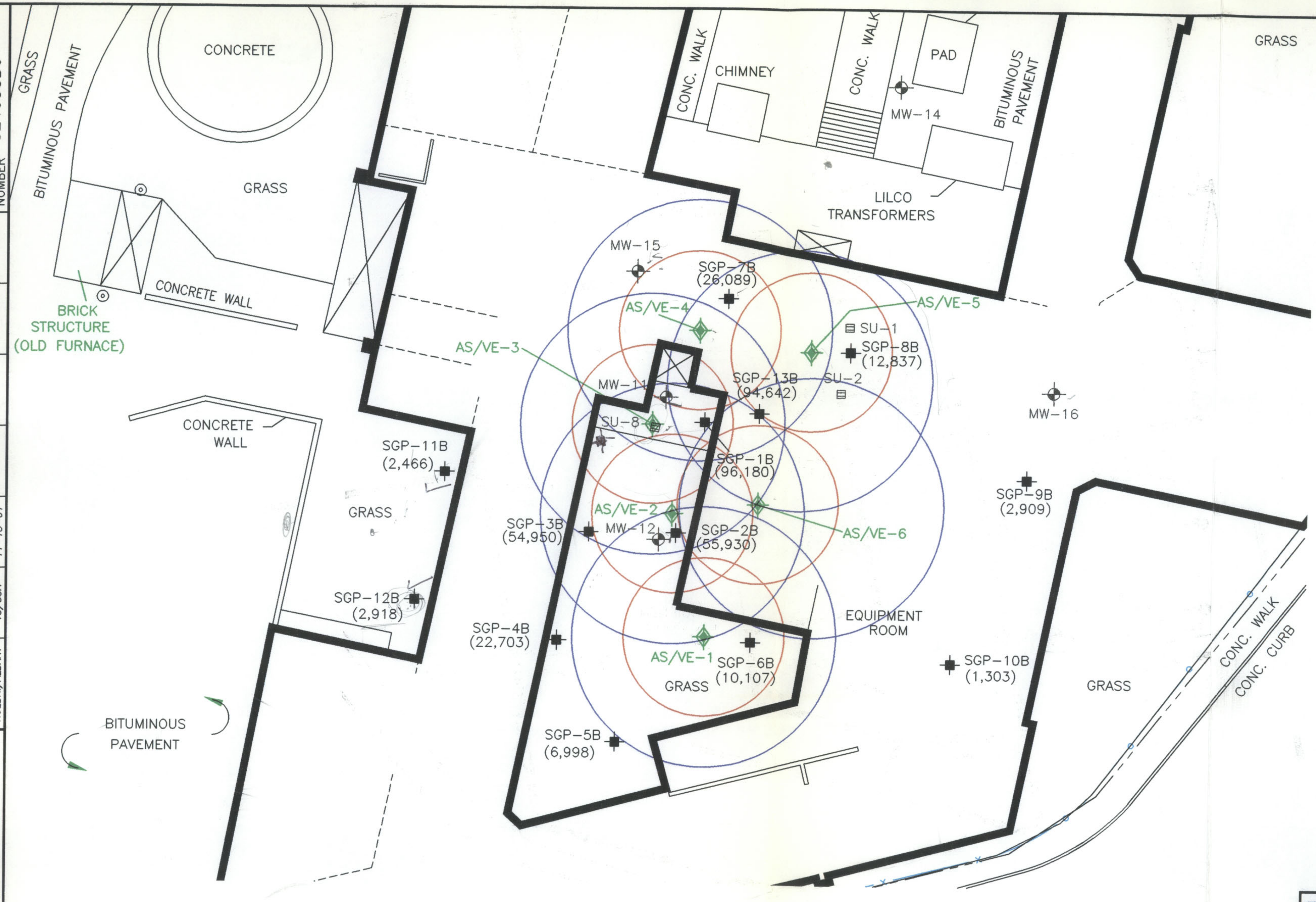


APPROXIMATE SCALE

0 20 40 FEET

LEGEND

- ⊕ MONITORING WELL
- ■ SOIL GAS RESULTS IN ug/m^3 (OCTOBER 11, 2001)
- —x— CHAIN LINK FENCE
- —•— IRON FENCE
- ⊟ SUMP
- — - — PROPERTY LINE
- ◆ PROPOSED AIR SPARGE
- ○ AIR SPARGING RADIUS OF INFLUENCE = 15'
- ○ SOIL VAPOR EXTRACTION RADIUS OF INFLUENCE = 25'

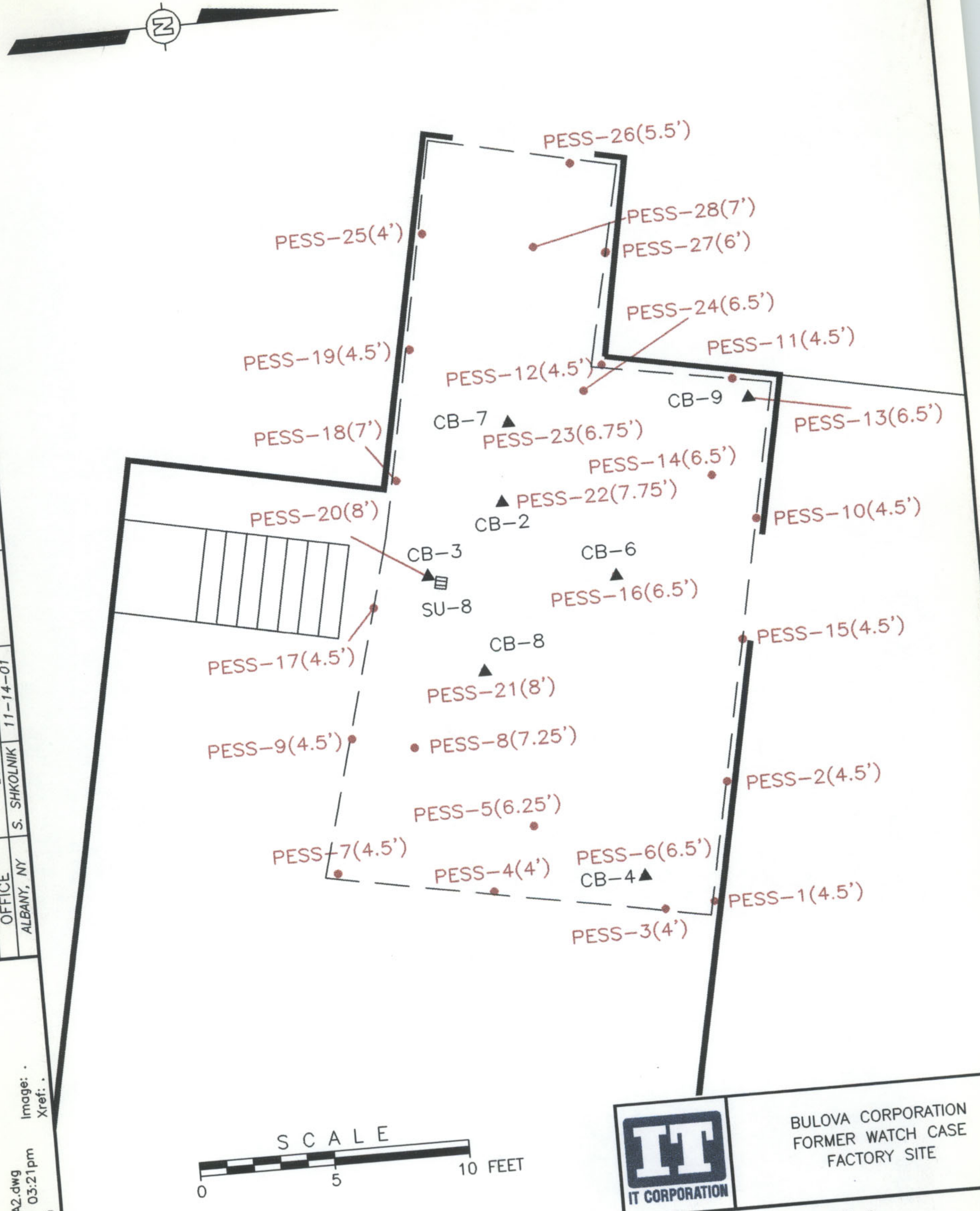
IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 7
AIR SPARGE/SOIL VAPOR EXTRACTION
LOCATION MAP
15 CHURCH STREET
SAG HARBOR, NEW YORK

REFERENCE:

BASE MAP SOURCE: YOUNG & YOUNG
400 OSTRANDER AVENUE
RIVERHEAD, NEW YORK.



NOTES:
1) ESTIMATED DEPTH BELOW ORIGINAL GRADE PRESENTED IN PARENTHESES.
2) ALL SAMPLING LOCATIONS ARE APPROXIMATE.
3) DOTTED LINE INDICATES APPROXIMATE LIMITS OF EXCAVATION.

IT CORPORATION

BULOVA CORPORATION
FORMER WATCH CASE
FACTORY SITE

FIGURE 6
POST-EXCAVATION SAMPLING LOCATIONS

15 CHURCH STREET
SAG HARBOR, NEW YORK

OFFICE
ALBANY, NY
DRAWN BY
S. SHKOLNIK 11-14-01
CHECKED BY
APPROVED BY
DRAWING NUMBER 824088A2

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Xref: .

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPjP) was originally prepared as an integral part of the **Excavation, Shoring and Disposal Plan**, but it applies to future sampling events as well and therefore has also been included in this **Remedial Action Plan** for the Site. The overall objective is to identify procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action. It presents the field and laboratory quality assurance/quality control (QA/QC) policies and procedures that will be followed during the implementation of the project.

1.1 Sample Labeling, Handling, and Shipping

1.1.1 Sample Identification/Labeling

All samples will be assigned a unique identification code consisting of two to four parts. These parts generally consist of the project, sample type, boring number or location, and additional identification codes (as needed). Examples of the codes used for each sample type are identified below.

Environmental Samples

Post-Excavation Soil Samples

Example	**BSH-PESS-03 [West Wall, 4-4.5’]**			
	BSH-	PESS-	03	[West Wall, 4-4.5’]
	project	sample type	sample number	sample location and approximate depth bgs

Soil Gas Samples

Example	**BSH-SG-04**		
	BSH-	SG-	04
	project	sample type	sample number

Monitoring Well Installation Soil Boring Samples

Example **BSH-MWSB-22 (8.5-9')**

BSH-	MWSB-	22	(8.5-9')
project	sample type	monitoring well identification	sample depth

Groundwater Monitoring Well Samples

Example **BSH-MW-4**

BSH-	MW-4
project	monitoring well identification

Quality Assurance/Quality Control Samples

Matrix Spike/Matrix Spike Duplicate Samples: QA/QC samples will include a matrix spike (MS) and matrix spike duplicate (MSD) sample at a frequency of not less than 5% (one MS/MSD pair per every 20 samples collected) for each matrix type (aqueous and soil). They will receive the following code:

Example **BSH-MW-9 MS** and **BSH-MW-9 MSD**
BSH-PESS-02 [Bottom, 6-1.5'] MS and **BSH-PESS-02 [Bottom, 6-1.5'] MSD**

Blind Field Duplicate Samples: Field duplicate samples are sent blind to the laboratory. They will receive the following code:

Examples
X-1
X-2
X-3
•
•
•
X-*n*

The sample location where a blind field duplicate is collected will be marked both in the field notebook and on the copy of the chain-of-custody record retained by the sampling. A blind field duplicate sample will be collected at a frequency of one per every 20 samples for each matrix (aqueous and soil).

Equipment Blanks: Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the soil sampling program, equipment blanks will be analyzed at a frequency of not less than 5% (one equipment blank per every 20 samples collected). In either case, they receive the following code:

Example EB-*mm/dd-#* (where *mm/dd* represents the date the field blank was collected and # represents the order collected, if more than one equipment blank is collected on any given day)

<u>Trip Blanks:</u> Trip blanks are used to monitor potential aqueous sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will submitted for analysis for each day aqueous matrix volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous matrix volatile organic samples, therefore all volatile organic samples and containers will be shipped to and from the laboratory in the smallest number of coolers possible in order to minimize the number of trip blanks required.

Example TB -*mm/dd-#* (where *mm/dd* represents the date the trip blank was collected and # represents the order collected, if more than one equipment blank is collected on any given day)

All sample containers will be labeled prior to sample collection. A non-removable label on which the following information is recorded with a permanent water-proof marker (pen for volatile samples) will be affixed to each sample container for shipment to the laboratory:

- Project name/location (BSH);
- Sample identification code;
- Date and time the sample was collected (except for blind field duplicates, where the time will be omitted);
- Sample type (soil or aqueous); and
- Analysis requested.

1.1.2 Containers, Preservation, and Holding Times

All sample containers used will be of traceable quality purchased and supplied by the laboratory. The selection of sample containers used to collect the samples is based on the following considerations:

- Sample matrix;
- Analytical methods;
- Potential contaminants of concern;
- Reactivity of container material with sample; and
- QA/QC requirements.

The required containers, preservatives and holding times will conform to the **NYSDEC Analytical Services Protocol (10/95)**. No chemical preservative is required for soil samples, although the samples will be kept on ice in a cooler at a temperature of 4°C (±2°C).

1.1.3 Chain-of-Custody Protocol and Shipping Requirements

A chain-of-custody record will be initiated by IT Corporation personnel upon sample collection and by the laboratory providing the sample containers. The laboratory record traces the path of the initial sample bottles and preservation at the laboratory to the field for sample collection. The IT chain of custody is initiated at the point of sample collection and documents their return to the laboratory for analysis.

The IT Project Manager or designated representative will notify the laboratory of the anticipated schedule of upcoming field sampling activities. This notification will include information concerning the number and type of samples, as well as the anticipated date(s) of shipment of samples to the laboratory. The laboratory will be responsible for supplying insulated containers (typically coolers) for storing and shipping the samples. Field samplers receiving the sample containers check each cooler and inspect the contents for breakage upon receipt. All sample bottles within each shipping container are individually labeled with an adhesive identification label provided by the laboratory.

Once the sample containers are filled, they are immediately placed in the cooler with sealed bags of ice (“wet ice”) or synthetic ice packs (“blue ice”) to maintain the samples at 4°C (±2°C). To the extent possible, the chain of custody is filled out prior going in the field. Following sample collection, the field sampler properly completes the chain of custody for each sample. The chain-of-custody forms are then signed and placed in a sealed plastic Ziploc bag in the cooler. The shipping containers are then closed and properly sealed and the cooler is shipped to the laboratory via an overnight courier or hand delivered under appropriate chain-of-custody procedures. Whenever possible, the samples will be shipped within 24 hours of collection. Samples will not be shipped later than 48 hours following collection. Upon receipt of the coolers at the laboratory, the cooler’s contents are inspected and the chain of custody signed, thus accepting custody of the samples.

1.1.4 Cleaning of Field Sampling Equipment

All non-dedicated equipment and tools used to collect samples for chemical analyses (including trowels, spatulas, spoons, scoops, hand augers, and split-spoons) will be decontaminated using the following procedures:

- Non-phosphate detergent wash;
- Tap water rinse; and
- Distilled/deionized water rinse.

If equipment is to be stored for future use, allow it to air dry, and then wrap it in aluminum foil (shiny-side out) or seal in plastic bags. Decontamination fluid will be discharged directly to the ground away from any surface water or containerized on-site if necessary.

1.1.5 Cleaning of Pumps and Pumping Equipment

In general, all suction-lift pumps and pumping equipment that have come in contact with the water column during well development and/or purging will use dedicated and pre-cleaned tubing. If submersible pumps are used, the following cleaning procedure will be employed:

- Wash the exteriors of the pump, wiring, and cables with non-phosphate detergent;
- Rinse with potable water;
- Pump a minimum of 25 gallons of potable water through the pump housing and through the pump tubing if a dedicated pre-cleaned discharge hose is not used for each well;
- Perform a final rinse by pumping 5 gallons of distilled/deionized water through the pump and pump tubing.

1.2 ANALYTICAL LABORATORY/ANALYTICAL METHODS

The analytical laboratory contracted to perform the sample analyses is Chemtech, a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory holding the Analytical Services Protocol (ASP) certification. The Quality Assurance Plan (QAP) for the laboratory is available upon request.

All samples will be analyzed using NYSDEC ASP (10/95) analytical procedures for Superfund-CLP Volatile Organics (NYSDEC Method 95-1), Semivolatile Organics (NYSDEC Method 95-2), Pesticides/Aroclors (NYSDEC Method 95-3) and/or the appropriate Analytical Methods for CLP Inorganics deliverables, as necessary.

1.3 DATA QUALITY REQUIREMENTS

1.3.1 Data Quality Objectives

Data quality objectives (DQO) for data measurement are generally defined in terms of six parameters: precision, accuracy, representativeness, comparability and completeness

(PARCC). The following DQO have been established to ensure that the data collected as part of this program are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPjP are used to assess the uncertainty associated with decisions related to the Site.

1.3.2 Precision

Precision measures the reproducibility of measurements under a given set of conditions. To maximize precision, established sampling and analytical procedures are consistently followed. Analytical precision is monitored through analysis of matrix spike duplicates and field duplicates. Matrix spike duplicates for organic compounds are analyzed at a frequency of once for every 20 samples as specified by the ASP. Precision is expressed as the relative percent difference (%RPD):

$$\%RPD = 100 \times 2[(X_1 - X_2)/(X_1 + X_2)]$$

where X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values. The equation is taken from *"Data Quality Objectives for Remedial Response Activities"* (EPA/540/G-87/003, March 1987).

1.3.3 Accuracy

Accuracy measures the bias in a measurement system. Laboratory accuracy is assessed through use of laboratory internal QC samples, matrix spikes, and surrogate recovery. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on similar samples. A matrix spike and matrix spike blank are analyzed once for every twenty samples, as specified in the ASP.

Accuracy values can be presented in a variety of ways. Average error is one way of presenting this information; however, more commonly, accuracy is presented as percent bias or percent recovery. Percent bias is a standardized average error (the average error divided by the actual or spiked concentration and converted to a percentage). Percent bias is unit-less and allows accuracy of analytical procedures to be compared easily. Percent recovery provides the same information as percent bias. Routine organic analytical protocols require a surrogate spike in each sample. Percent recovery is defined as:

$$\% \text{Recovery} = (R/S) \times 100$$

Where

S = spike surrogate concentration

R = reported surrogate concentration

and % Bias = % Recovery - 100

This equation is taken from *"Data Quality Objectives for Remedial Response Activities"* (EPA/540/G-87/003, March 1987). Percent recovery criteria published by the NYSDEC as part of the NYSDEC ASP (10/95) and those determined from laboratory performance data are used to evaluate accuracy in matrix spike and blank spike quality control samples.

1.3.4 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent actual conditions. In the field, the representativeness of the data depends on selection of appropriate sampling locations, collection of an adequate number of samples, and use of consistent sampling procedures. The sampling procedures, as described in the FSP, are designed with the goal of obtaining representative samples for each of the different matrices.

In the analytical laboratory, the representativeness of the analytical data is a function of the procedures used in processing the samples. The objective for representativeness is to provide data of the same high quality as other analyses of similar samples using the same methods during the same time period within the laboratory. Representativeness is determined by comparing the quality control data for these samples against other data for similar samples analyzed at the same time.

1.3.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Analytical results are comparable to results of other laboratories with the use of the following procedures/programs: Instrument standards traceable to National Institute of Standards and Testing (NIST), Environmental Protection Agency (EPA) or NYSDEC sources; the use of standard methodology; reporting results from similar matrices in consistent units; applying appropriate levels of quality control within the context of the laboratory quality assurance program; and participation in inter-laboratory studies to document laboratory performance. By using traceable standards and standard methods, the analytical results can be compared to other laboratories operating similarly. The QA program documents internal performance, and the inter-laboratory studies document performance compared to other laboratories. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

1.3.6 Completeness

Completeness is the percentage of measurements made that are judged to be valid measurements. The completeness goal is to generate the maximum amount possible of useable data (*i.e.*, 100% usable data). Data is considered usable unless qualified during validation as “R,” rejected.

1.3.7 Reporting Limits

The estimated reporting limits or practical quantification limits that are desired for each analysis are the Contract Required Detection Limits specified in the NYSDEC ASP (10/95). All such limits are dependent upon matrix interferences and reporting limits may vary as a result of dilution.

1.4 Field Quality Assurance Samples

1.4.1 Blind Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. Field duplicate samples are defined as a second sample collected from the same location, at the same time, in the exact same manner as the first and placed into a separate container with no prior mixing. Field duplicate samples are collected at a frequency of one per every twenty (20) samples per matrix. Each duplicate sample is analyzed for the same parameters as the samples collected that day. Thus, both field and laboratory variability are evaluated. Acceptance and control limits for the laboratory follow NYSDEC ASP guidelines for organic analyses. However, any deviations in the data with respect to the limits will be discussed in the report. Although there are no established QC limits for field duplicate RPD data, IT considers RPD values of 50% or less for aqueous samples and 100% or less for soil samples an indication of acceptable sampling and analytical precision.

1.4.2 Split Samples

Split samples are usually used for performance audits or inter-laboratory comparability of data. The collection of split samples is not anticipated during the course of this project. However, if the NYSDEC or other appropriate agency requests split samples to be collected, then the following applies: A split sample is defined as two separate samples taken from a single aliquot that has been thoroughly mixed or homogenized prior to the formation of the two separate samples.

1.4.3 Equipment Blanks

Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used for the soil sampling program, equipment blanks will be analyzed at a frequency of not less than 5% (*i.e.*, one equipment blank per every 20 samples collected).

1.4.4 Trip Blanks

Trip blanks are used to monitor potential sample volatile organic contamination during shipment to and from the laboratory. It also provides information on laboratory water quality since the laboratory provides the trip blank water. One trip blank will be submitted for analysis for each day that aqueous volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous volatile organic samples, therefore all aqueous volatile organic samples and containers will be shipped to and from the laboratory in the smallest possible number of coolers in order to minimize the number of trip blanks required.

1.5 Laboratory Quality Assurance Samples

1.5.1 Method Blanks

Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instrument as the sample is prepared and analyzed in the laboratory. A method blank is defined as an aliquot of laboratory deionized water on which every step of the method is performed and analyzed along with the samples. Method blanks are analyzed at a frequency of one (1) for every 20 samples analyzed, or every analytical batch, whichever is more frequent.

1.5.2 Spiked Samples

Two types of spiked samples are analyzed as part of the analytical QA/QC program, and include matrix spikes (MS) and matrix spike duplicates (MSD). Matrix spike samples are analyzed to evaluate instrument and method performance on samples of similar matrix. Matrix spike duplicates are analyzed to determine the precision of the method and instrument. These samples are analyzed and the percent recovery is determined to assess matrix interferences affects on the methods. One MS/MSD sample pair will be analyzed for every 20 samples.

1.6 Equipment Calibration and Maintenance

1.6.1 Field Equipment

1.6.1.1 Calibration

Field equipment that may be used during collection of environmental samples at the Site includes the Horiba U-10 Water Quality Checker or equivalent, a Photovac 2020 photoionization detector (PID) or equivalent equipped with an minimum 10.2 eV lamp, and an MIE *personal*DataRAM™ (pDR) or equivalent to measure real-time concentrations of airborne particulates.

Field QC check control limits (pH, conductivity and turbidity) for the Horiba U-10 Water Quality Checker are outlined below. In addition, field determinations of pH, conductivity, turbidity, temperature, salinity and redox potential will be obtained in duplicate once for every 20 aqueous samples collected.

pH: If the pH QC sample (pH 7.0 or pH 10.0 buffer after initial automatic calibration with pH 4.0 buffer) exceeds ± 0.5 pH units from the true value, the source of the error is determined and the instrument re-calibrated. If a continuing calibration check with pH 7.0 buffer is off by ± 0.5 pH unit, the instrument is re-calibrated.

Conductivity: QC samples must be within ±10% of the true values. The true value for conductivity in the automatic calibration solution is 4,490 micromhos per centimeter (umhos/cm).

Turbidity: QC samples must be within ± 10% of the true values. Turbidity QC samples are commercially prepared polymer standards such as those available from Advanced Polymer System, Inc. or equivalent. The initial automatic calibration solution has a turbidity value of 0 NTU.

The PID and pDR are each calibrated according to the manufacturer's instructions at the beginning of the day, whenever the instrument is turned off for more than two hours and at the discretion of the Site Safety Officer (SSO).

1.6.1.2 Maintenance

Prior to field sampling events, each piece of field equipment is inspected to ensure it is operational. If necessary, the equipment is serviced. Meters that require charged batteries are fully charged or have fresh batteries. Due to IT's relationship with a number of firms which rent instrumentation, safety and sampling equipment, significant downtime should not occur. In addition to this, field personnel carry key spare parts and equipment into the field to prevent downtime.

1.6.2 Laboratory Equipment

All laboratory equipment is calibrated according to the requirements of the respective NYSDEC ASP (10/95) method for each analysis and/or in accordance with the manufacturer's specifications. In general, preventative maintenance of laboratory equipment follows the guidelines recommended by the manufacturer. Generally speaking, a malfunctioning instrument which cannot be repaired directly by laboratory personnel is repaired following a service call to the manufacturer.

1.7 Data Documentation

1.7.1 Field Notebook

Field notes will be initiated at the start of on-site work. All original forms and notebooks used during field activities become part of the permanent project file. Field notes will include the following daily information, where applicable:

- Date;
- Meteorological conditions;
- Crew members;
- Brief description of proposed field activities for that day;
- Locations where work is performed;
- Problems and corrective actions taken;
- Records of all field measurements;
- A description of all modifications to the work plan;
- A record of all field data sampling point locations;
- Pertinent sample collection information;
- Chain-of-custody information; and
- Documentation of the calibration of field instrumentation used.

1.8 Corrective Actions

Corrective actions are required when a problem arises that impedes the progress of the investigation as detailed in the project plans, or when field or analytical data are not within the objectives specified in the Work Plan or QAPjP. Corrective actions include those actions implemented to promptly identify, document, and evaluate the problem and its source, as well as those actions taken to correct the problem. These corrective actions are documented in the project file. Prior to implementing any deviations from the approved procedures contained in the QAPjP, the Project Manager must be notified.

1.8.1 Field Procedures

Project personnel continuously monitor ongoing work performance as part of their daily responsibilities. If a condition is noted that would have an adverse impact on data quality, corrective actions are taken. Situations that require corrective action include the following:

- Standard operating procedures and or protocols identified in the project-specific work plan or QAPjP have not been followed;
- Equipment is not calibrated properly or in proper working order;
- QC requirements have not been met; and
- Performance or system audits identify issues of concern.

The problem, its cause, and the corrective action implemented are documented. The PM is responsible for initiating and approving corrective actions.

1.8.2 Laboratory Procedures

During all investigations/studies, instrument and method performance and data validity are monitored by the analytical laboratory performing the analyses. The laboratory calibrates its instruments and documents the calibration data. Laboratory personnel continuously monitor the performance of its instruments to ensure that performance data fall within acceptable limits. If instrument performance or data fall outside acceptable limits, or when any condition is noted that has an adverse effect on data quality, then the laboratory implements appropriate corrective actions. Situations that require corrective action include the following:

- Protocols defined by the project-specific QAPjP have not been followed;
- Identified data acceptance standards are not obtained;
- Equipment is not calibrated properly or in proper working order;
- Sample and test results are not completely traceable;
- QC requirements have not been met; and
- Performance or system audits identify issues of concern.

The laboratory QA Officer is responsible for initiating and approving corrective actions. The corrective actions may include one or more of the following:

- Re-calibration or standardization of instruments;
- Acquiring new standards;
- Repairing equipment; and
- Reanalyzing samples or repeating portions of work.

System audits and calibration procedures with data review are conducted by the laboratory at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work. IT provides independent data validation and/or data review and summary, and the laboratory is notified as soon as possible of any situation which requires corrective action so that the corrective action may be implemented in a timely manner.

1.9 Data Reduction, Review and Reporting

1.9.1 Laboratory Data

The laboratory is required to meet all applicable documentation, data reduction, and reporting protocols as specified in the NYSDEC ASP (10/95) CLP deliverable format. Calculations of sample concentrations are performed using the appropriate regression analysis program, response factors, and dilution factors, where applicable. The laboratory, through its assigned QAO, conducts its own internal review of the analytical data generated for a specific project prior to sending the data to IT. Deficiencies discovered during the laboratory internal data validation, as well as the corrective actions used to correct the deficiency, are documented in the laboratory Case Narrative submitted with each data package.

The laboratory reports the data in tabular form by method and sample. The laboratory is required to submit analytical results that are supported by a complete NYSDEC ASP CLP data package to enable the quality of the data to be determined. This standard backup data includes supporting documentation (chromatograms, raw data, *etc.*), sample preparation information, and sample handling information (*i.e.*, chain-of-custody documentation).

1.9.2 Data Review

In addition to the laboratory's in-house review of the data, IT chemists will review the laboratory standard quality control summary forms prior to its incorporation into a final report and complete a **Data Usability Summary Report (DUSR)**. This data review will follow the NYSDEC Guidance for Development of Data Usability Reports; complete validation of the data in accordance with the National Functional Guidelines will not be performed. Upon receipt of the laboratory data analytical package, the data reviewer:

1. Reviews the data package to determine completeness. It must contain all sample chain-of-custody forms, case narratives including sample/analysis summary forms, QA/QC summaries with supporting documentation, relevant calibration data, instrument and method performance data, documentation of the laboratories ability to attain the method detection limits for target analytes in required matrices, data report forms with examples of calculations, and raw data. The laboratory is promptly notified of any deficiencies, and must produce the documentation necessary to correct the deficiencies within 10 calendar days.

2. Reviews the data package to determine compliance with the applicable portions of the work plan. The data reviewer confirms that the data is produced and reported consistent with the QAPJP and laboratory quality control program, protocol-required QA/QC criteria are met, instrument performance and calibration requirements were met, protocol required calibration data are present and documented, data reporting forms are complete, and problems encountered during the analytical process and actions taken to correct the problems are reported. Field duplicate data are evaluated to determine field variability.

3. Prepares a tabular summary of the reported data. The data reviewer summarizes the data in a tabular format to provide the data in more accessible format.

1.9.3 Field/Engineering Data

Field data (*i.e.*, information collected in the field through observation, manual measurement, and/or field instrumentation) is recorded in a dedicated project field notebook, on the appropriate field data sheets, and/or on the appropriate field data forms. This data is reviewed by the field manager and the project manager for adherence to the work plan and QAPjP requirements. The final reporting of the data is reviewed by the project field personnel, who also participate in data reduction and evaluation.

Field documentation, data calculations, transfers, and interpretations are conducted by field personnel, and reviewed for accuracy by the project manager and/or his designee for:

- General completeness;
- Readability;
- Usage of appropriate procedures;
- Appropriate instrument calibration and maintenance;
- Reasonableness in comparison to present and past data collected;
- Correct sample locations; and
- Correct calculation and interpretations.

Approximately 5% of all calculations are checked through recalculation. If appropriate, field data forms and/or calculations are included in project report appendices. All of the original field notebooks, logs, forms and documents are kept in the project file.

1.10 Quality Assurance Controls

The Project Manager and the QAO are responsible for ensuring that quality QA/QC records such as chain-of-custody forms, field notebooks, and data summaries are being properly prepared. The Project Manager is responsible for ensuring that all records are properly filed. Information received from outside sources, such as laboratory analytical reports, is retained at Rust. Access to working project files is restricted to project personnel.

1.10.1 Field Audits

The Project Manager is responsible for ensuring that all field investigations are performed in accordance with the requirements and specifications outlined in this QAPjP. As part of IT's field QA/QC program, a field audit is performed by IT's Quality Assurance Officer (QAO) or a designated representative on projects where sampling activities extend for more than two weeks. The primary purpose of the field audit is to monitor project sampling practices. The QA/QC field audit is performed during sampling to evaluate the performance of work during the collection of samples for laboratory analysis.

For projects of relatively short duration (*i.e.*, continuous field work of less than two week), a formal audit of field activities is not performed. The field team leader or appropriate task manager monitor field performance and document all work performed in field notes, a narrative, and/or a checklist of tasks, as appropriate. The Project Manager and/or QAO review this documentation to ensure the necessary information has been recorded and conduct discussions with field team members to verify that field activities were performed according to the project Work Plan, QAPP and HASP. The QAO communicates any concerns to the field team as appropriate. A formal field audit will not be performed in conjunction with this project.

1.10.2 Meetings

Periodic meetings between the Project Manager and QAO will be held to review quality assurance procedures, field work, laboratory performance and data documentation and review. Any potential problems identified during the review are documented and addressed. If necessary, they are reported to management for review and appropriate corrective action.