Supplemental Investigation Work Plan

Van Tassel Cleaners
River Plaza Shopping Center
130 Wildey Street
Tarrytown, New York

Prepared for:
The Robert Martin Company
Elmsford, New York
Project No.: RMC 0601

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Revised
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INTRODUCTION

J.R. Holzmacher P.E. LLC (JRH) is pleased to present this supplemental investigation work plan for the above referenced property. The scope of work presented in this plan is based on the review of: previous environmental due diligence investigations, the Site Characterization Report and Remedial Action Plan (SCR/RAP) dated January 2005, the March 2005 Geoprobe^{TM} Investigation Report, additional data we received from the Robert Martin Company (RMC) and your letters to RMC and JRH dated February 21, 2007 and July 16, 2007 in which you summarized NYSDEC and NYSDOH comments to previously submitted documents.

To move forward with the proposed remediation program for the property, an Order of Consent was executed and signed on May 12, 2005.

Site Description

The subject property is an approximate 3.3-acre parcel located on the southeast corner of the intersection of Wildey and Cortlandt Streets in Tarrytown, New York. The site is improved with two commercial/retail buildings. Building one is an approximate 24,000 square foot, one-story, masonry structure with no basement. It is now occupied by Walgreens. Building two is an approximate 9,000 square foot, one story masonry structure with no basement. Building two is a strip-mall divided into six units each occupied by separate tenants including Van Tassel Cleaners, the subject of previous and ongoing environmental investigations.

PREVIOUS INVESTIGATIONS

Property Solutions, Inc. - Phase I ESA

A Phase I Environmental Site Assessment (ESA) of the property conducted by Property Solutions, Inc. (PSI) in July 1998 identified three potential environmental concerns, which warranted additional investigation to determine if they presented a significant environmental risk to the property. The outstanding issues were as follows:

- Underground fuel oil storage tank - The site inspection conducted as part of the Phase I ESA revealed the presence of a 550-gallon underground fuel oil tank located on the north side of Building Two (west end). The tank was installed in 1976 and is used by the dry cleaning shop to provide steam for cleaning equipment. PSI recommended that a tightness test be performed to determine the integrity of the tank. Because the tank was less than 1,100-gallons in capacity, registration with the New York State Department of Environmental Conservation (NYSDEC) was not required.

- Suspect Asbestos Containing Materials (ACM) - Due to the age of the strip-mall building PSI indicated that there was a potential that asbestos containing materials were present. Sixteen samples were collected from the building and analyzed for asbestos. Floor tile located in the dry cleaning shop were determined to contain asbestos above regulatory limits. Because the materials were in good condition PSI recommended removal was not warranted, but that the ACM be managed under an Operations and Management (O&M) Plan.

- Dry Cleaning Operations - PSI indicated that the dry cleaning shop was operated with an open loop cleaning system from 1976 (building constructed) until 1980 when the facility was converted to a closed loop system. Due to the presence of the open loop system there is a potential that dry cleaning chemicals were discharged to the environment, therefore, PSI recommended that a limited subsurface investigation be performed to determine if historical dry cleaning operations have impacted the subsurface.

Property Solutions, Inc. - Limited Subsurface Investigation

In August 1998, PSI conducted a limited subsurface investigation of the site. The investigation consisted of drilling four soil borings in the vicinity of the dry cleaning shop to a depth of ten feet below grade (Figure 1). Two soil samples from each boring and groundwater samples from two borings were submitted for laboratory analysis of volatile organic compounds (VOCs) by EPA Method 8260.

Analytical results indicated that tetrachloroethene (a/k/a PCE and perc) was detected in three of the eight soil samples analyzed at concentrations from 136 ug/kg to 1,829 ug/kg and both of the groundwater samples analyzed indicated concentrations of 8 ug/l and 43 ug/l, respectively. Trichloroethene and cis-1, 2-dichloroethene, degradation products of PCE were also detected in each of the two groundwater samples collected, but at concentrations below their respective groundwater standards. PSI recommended that an additional investigation be conducted to determine the extent of PCE in groundwater at the site.

ATC, Inc. - Phase I ESA and Focused Subsurface Investigation

In July 2003, ATC Associates, Inc. (ATC) performed a Phase I ESA of the property on behalf of Noddle Development Company, a prospective buyer of the property. ATC identified the underground fuel oil tank and dry cleaning operations as potential concerns. ATC recommended that a subsurface investigation be performed to determine if leaks from the fuel oil UST or improper chemical disposal related to historic dry cleaning operations have impacted the subsurface.

In September 2003, ATC conducted a focused subsurface site investigation of the site to address the outstanding issues related to the fuel oil tank and dry cleaning facility identified in their Phase I ESA Report. The investigation consisted of drilling four soil borings (B-1 through B-4) in the vicinity of the fuel oil tank and dry cleaning shop using a Geoprobe™. Boring locations are shown on Figure 1. One soil sample from each boring and groundwater samples from three borings were submitted for laboratory analysis of VOCs by Method 8260 and semivolatile organic compounds (SVOCs) by Method 8270 (STARS List).

Analytical results indicate that one or more SVOCs were detected in three of the four soil samples (B-2, B-3, and B-4) at concentrations above their respective Recommended Soil Cleanup Objectives (RSCOs). No SVOCs were detected in sample B-1 (3'-4'). PCE was detected in the sample from boring B-2, but at a concentration significantly below its RSCO. No VOCs were detected in the three other soil samples.

PCE (5 ug/l) was detected in the groundwater sample collected from boring B-2 (GW-1) and vinyl chloride (13 ug/l) was detected in the groundwater sample collected from boring B-3 (GW-2) at concentrations equal to or above their respective groundwater standards. No SVOCs were detected in the three-groundwater samples analyzed.

ATC concluded that the presence of SVOCs in soil at the site may be related to fill materials or possibly leaks from the fuel oil tank and that the presence of PCE and vinyl chloride are likely attributable to dry cleaning operations. ATC recommended tightness testing the UST and additional delineation of VOCs in groundwater.

*CNS Management Corp, Inc. - Limited Subsurface Investig*ation

In October 2003, Acadia Realty Trust retained CNS Management Corporation (CNS) to conduct a limited subsurface investigation of the site. The CNS investigation consisted of drilling five soil borings (SB-01 through SB-05) in the vicinity of the fuel oil tank and dry cleaning shop using a Geoprobe™. Soil samples from each boring (eleven total samples) and four groundwater samples from borings SB-02 through SB-05) were submitted for laboratory analysis of VOCs by Method 8260 and semivolatile organic compounds by Method 8270 (STARS List). Samples SB-2, SB-2A, SB-5A were not analyzed for SVOCs.

Analytical results indicated that one or more SVOCs were detected in five of the eight samples analyzed at concentrations exceeding their respective RSCOs. Several additional SVOCs were also present in these samples but at concentrations below their respective RSCOs. No SVOCs were detected in samples SB-1, SB-3B, and SB-4A. It is also important to note that at boring locations SB-3 and SB-4, where both shallow and deep soil samples, SVOC concentrations are significantly lower or non-detect in the deepest sample interval.

PCE was detected in six of the eleven samples (12 ug/kg to 420 ug/kg), but at concentrations significantly below the RSCO of 1,300 ug/kg. Vinyl chloride was detected in samples SB-2B (18 ug/kg) and SB-3A (24 ug/kg), but at concentrations below the RSCO of 200 ug/kg. Cis-1, 2-dichloroethene (11 ug/kg) was detected in sample SB-3A and naphthalene (15 ug/kg) was detected in sample SB-2A, but at concentrations below their RSCOs of 200 ug/kg and 13,000 ug/kg respectively. Acetone was detected in samples SB-3B and SB-4A and methyl ethyl ketone was detected in sample SB-3B. As these compounds are common laboratory contaminants and have not been detected in previous investigations, they are likely attributable to laboratory cross contamination. No VOCs were detected in samples SB-5 and SB-5A.

Groundwater analytical results indicated that methyl tertial butyl ether (MTBE) was detected in the sample from boring SB-2 (GW-1) at a concentration (13 ug/l) slightly exceeding its groundwater standard of 10 ug/l. This compound is not a compound of concern at the site and has not been detected in previous investigations. CNS believed its groundwater results were inconclusive due to difficulties with collection, which may have caused the dissolved VOCs to volatilize. No VOCs were detected in samples SB-5 and SB-5A.

Underground Storage Tank Removal/Replacement

RMC retained JRH to address the underground storage tank issue. Tank removal/replacement operations began on March 8, 2004 and were completed on March 16, 2004. The tank removal was performed by EGS, Inc. of White Plains, New York in accordance with the procedures set forth in the American Petroleum Institute (API) Recommended Practice 1604, entitled “Removal and Disposal of Used Underground Storage Tanks” and overseen by JRH. Representatives of the Village of Tarrytown were on-site to inspect the installation of the new tank.

On March 8, 2004, EGS excavated overlying soils to expose the top of the tank to facilitate inspection and cleaning. Residual product in the tank was transferred into the temporary 275-gallon AST for use by the dry cleaning facility. Following the pump out the tank was cut open and EGS personnel entered the tank with protective equipment to remove residual liquid/sludge and perform a final cleaning. Residual un-pumpable liquids (50 gallons of a fuel oil/ sludge mixture) was transferred into one 55-gallon drum and transported off-site by EGS for disposal. Following cleaning, the tank was removed from the ground, staged on polyethylene sheeting, and later removed from the site by EGS for off-site disposal.

Upon removal the tank was visually inspected and documented to be intact with no evidence of leaks or holes. No evidence of impacted soils was noted in the excavation. The final dimensions of the tank excavation were 7 feet by 10 feet and extended to a depth of seven feet below grade. Prior to backfilling the excavation, JRH collected five endpoint samples, one from each side wall (NW-1, SW-1, EW-1, and WW-1) and one from the bottom of the excavation (B-1), to document soil conditions.

Endpoint soil samples were characterized by a JRH hydrogeologist and field screened for the presence of VOCs using a photo ionization detector (PID). Non-disposable sampling equipment was cleaned using a distilled water and Alconox detergent wash followed by a distilled water rinse prior to the collection of each sample. The samples were placed in pre-cleaned laboratory supplied glassware and stored in a cooler packed with ice for transport to American Analytical Laboratories (NYSDOH Certification No. 11418) in Farmingdale, New York for analysis.

Soil samples were analyzed for VOCs by EPA Method 8260 and SVOCs by EPA Method 8270 (STARS List). Analytical results were compared to the NYSDEC’s Recommended Soil Cleanup Objectives (RSCOs) specified in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) guidance document to determine if additional investigation and/or remediation are warranted.

Analytical results for the excavation endpoint samples indicated that four SVOCs (benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoroanthene and dibenzo (a, h) anthrancene) were detected in each of the five-endpoint samples at concentrations exceeding their respective RSCOs. Chrysene was detected in samples NW-1, EW-1 and B-1 at concentrations (440 ppm to 1,900 ppm) exceeding the RSCO of 400 ppm and benzo (k) fluoranthene (770 ppm) was detected in sample EW-1 at a concentration exceeding the RSCO of 610 ppm). Although the detected SVOC compounds can be associated with fuel oil, based on visual inspection of the tank, tank excavation, and soil boring data, they are most likely attributable to the fill materials (creosote treated wood, brick, concrete, metal fragments) beneath the site. The concentrations of these compounds, while above the NYSDEC RSCOs do not warrant significant environmental concern. Based on the potential toxicological effects of these compounds, guidance values are extremely low (typically below common laboratory detection limits). However, these compounds are poorly soluble, do not typically migrate far from their source areas, and naturally attenuate.

Five VOCs (1,2,4,5-tetramethylbenzene, 1,3,5-trimethylbenzene, naphthalene, p-diethylbenzene, and p-ethyltoluene) were detected in sample B-1 at concentrations significantly below their respective NYSDEC RSCOs. PCE was detected in sample WW-1 (38 mg/kg), but at a concentration significantly below the RSCO of 1,300 mg/kg. Analytical results for the endpoint samples are summarized in Appendix A of the SCR/RAP.

JRH Subsurface Soil Investigation

Previous investigations at the site revealed the presence of surficial fill material and low concentrations of dry cleaning solvents and SVOCs. In order to delineate the extent of impacted soils and determine if fill materials and/or prior uses of the property have impacted the subsurface, a soil boring investigation was conducted in March 2004.

Land, Air, Water Environmental Services, Inc. (LAWES) of Center Moriches drilled four soil borings (MW-1 through MW-4), New York using a truck-mounted Mobile B-3500 drill rig equipped with 4.25-inch I.D. hollow stem augers. Boring locations were chosen based on the results of previous investigations, proximity to the fuel oil UST, the locations of site utilities, and discussions between JRH and CNS field personnel, to provide representative coverage with respect to groundwater flow direction across the site. Soil boring locations are shown on Figure 1.

At each boring location, soil samples were collected at various depths from grade to the top of the clay layer previously documented at the site (approximately twelve feet below grade) using a standard 2-inch by 24-inch split-spoon sampler. No soil samples were collected from the shallow soils (4 to 5 feet below grade), as the borings were hand excavated to ensure clearance of underground utilities. Groundwater was encountered at approximately seven feet below grade at each of the four soil boring locations. Soil samples were characterized in the field by a JRH hydrogeologist and information was recorded in a bound field notebook.

One soil sample, below groundwater and above the clay layer, from each boring (MW-1 10'-12', MW-2 10'-12', MW-3 8'-10', and MW-4 10'-12') was selected for laboratory analysis based on visual observations and/or PID responses. In addition, one shallow soil sample within the fill material and above groundwater (4'-6') was submitted from the upgradient boring MW-4 for analysis. The deep samples were collected for analysis to determine if SVOCs were present below the fill layer and to determine if VOCs were represent is saturated soils that could represent a potential source for impacts to groundwater. The shallow sample from boring MW-4 was selected to represent upgradient, background conditions and was used to determine if the SVOCs detected in the tank excavation endpoint samples are indigenous to the fill and not related to a release from the former fuel oil UST.

The samples were placed in pre-cleaned laboratory supplied glassware and stored in a cooler packed with ice for transport to American Analytical Laboratories (NYSDOH Certification No. 11418) in Farmingdale, New York for analysis of VOCs by EPA Method 8260 and SVOCs by EPA Method 8270 (STARS List). Analytical results were compared to the RSCOs specified in the NYSDEC TAGM guidance document to determine if additional investigation and/or remediation are warranted.

Analytical results that six SVOCs (benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoroanthene, benzo (k) fluoroanthene, chrysene, and dibenzo (a, h) anthrancene) were detected in the shallow soil sample MW-4 (4'-6') at concentrations exceeding their respective RSCOs. Six other SVOCs were also detected in sample MW-4 (4'-6'), but at concentrations below their respective RSCOs. The deep sample (10'-12') collected from boring MW-4 shows the presence of three SVOCs, but at concentration below their respective RSCOs. None of the six SVOCs that were detected above RSCOs in the shallow sample were detected in the deep sample. In addition, concentrations of the detected compounds in the deep sample MW-4 (10'-12') were significantly less than the concentrations of these compounds detected in the shallow sample MW-4 (4'-6').

Benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoroanthene were detected in sample MW-3 (8'-10') and benzo (a) pyrene and benzo (b) fluoroanthene were detected in sample MW-3 (8'-10') at concentrations exceeding their respective RSCOs. Several other SVOCs were also detected in samples MW-2 (10'-12') and MW-3 (8'-10'), but at concentrations below their respective RSCOs. No SVOCs were detected in sample MW-1 (10'-12'). The concentrations of SVOCs detected in samples MW-2 (10'-12') and MW-3 (8'-10') while elevated, were notably less than the concentrations of SVOCs detected in sample MW-4 (4'-6').

PCE (1 ug/kg) was detected in sample MW-2 (10'-12'), but at a concentration significantly below the RSCO of 1,300 ug/kg). No VOCs were detected above their respective laboratory detection limits in the four other samples collected/analyzed MW-1 (10'-12'), MW-3 (8'-10'), MW-4 (4'-6'), and MW-4 (10'-12'). This indicates that there is no source of VOCs, specifically PCE in saturated zone soils. Analytical results for the soil samples are summarized on Tables 3 and 4 and the laboratory reports included in Appendix A of the January 2005 SCR/RAP.

Monitoring Well Installation

At each of the four soil borings LAWES installed shallow groundwater monitoring wells (MW-1 through MW-4). The groundwater monitoring wells were installed at the site on March 16 and 17, 2004 and overseen by a JRH hydrogeologist. CNS personnel were also on-site to observe the well installation and agreed with selected screen depths.

The wells were constructed of two-inch diameter PVC and installed to a depth of five feet below the water table. Seven feet of 0.010 slot screen was installed to intersect the perched water table to allow for groundwater fluctuations and free product (if present) on the water table to enter the well. Well construction logs are provided in the January 2005 SCR/RAP.

The wells were developed on March 17, 2004 by surging and hand bailing. Attempts to develop the wells using a submersible pump were unsuccessful due to poor recharge related to the silty/clayey formation in which the wells were installed. Approximately ten well volumes were removed from each well during development and the water from the wells was slightly to moderately turbid and gray.

Groundwater Sampling

On March 22, 2004, JRH conducted gauging and collected groundwater samples from the four monitoring wells MW-1 through MW-4. Depth to water and total depth measurements were obtained from each well using a Solinst Model 101 interface probe accurate to 0.01 foot. No evidence of petroleum sheens or floating product was detected in the four wells.

Prior to sampling, each well was purged a minimum of three casing volumes of water using a dedicated disposable bailer. This was performed to ensure representative samples from the formation surrounding the wells were obtained and to eliminate standing water in the wells. Non-disposable sampling equipment (i.e. interface probe, pump) was cleaned using a distilled water and Alconox detergent wash followed by a distilled water rinse prior to purging each well. Groundwater samples were collected using dedicated, disposable bailers. Well sampling logs are included in Appendix A of the January 2005 SCR/RAP.

Samples were placed directly into pre-cleaned laboratory supplied bottles and placed in a cooler packed with ice for transport to the laboratory. The samples were hand delivered to American Analytical Laboratories for analysis of VOCs by Method 8260 and SVOCs by Method 8270 (STARS List).

Analytical results indicate that vinyl chloride was detected in the samples collected from wells MW-1, MW-2 and MW-3 at concentrations (5.1 ug/l to 11 ug/l) above the groundwater standard of 2 ug/l. Tetrachloroethene (PCE) was detected in the sample collected from well MW-3 at a concentration (5.4 ug/l) slightly above the groundwater standard of 5 ug/l. PCE (0.8 J) and cis-1, 2-dichloroethene (4.7 ug/l) were also detected in sample MW-2, but at concentrations below their respective groundwater standards. No VOCs were detected above their respective groundwater standards in sample MW-4.

The SVOC acenaphthalene (8 ug/l) was detected in sample MW-3, but at concentration below the NYSDEC guidance value of 20 ug/l (there is no groundwater standard for acenaphtahlene). No SVOCs were detected above their respective laboratory detection limits in the three other samples collected/analyzed (MW-1, MW-2 and MW-4).

On October 7, 2004, JRH conducted gauging and collected groundwater samples from the four monitoring wells MW-1 through MW-4. The samples were hand delivered to American Analytical Laboratories for analysis of VOCs by Method 8260 and SVOCs by Method 8270 (STARS List).

Analytical results indicate that vinyl chloride was detected in the samples collected from wells MW-1, MW-2 and MW-3 at concentrations (3 ug/l to 12 ug/l) above the groundwater standard of 2 ug/l. Vinyl chloride (5.1 ug/l to 11 ug/l) was also detected in these three wells during the March 2004 sampling event. Tetrachloroethene (PCE) was detected in the sample collected from well MW-3 at a concentration (6.8 ug/l) slightly above the groundwater standard of 5 ug/l and the March 2004 sampling result of 5.6 ug/l. PCE was also detected in sample MW-2, but at a concentration (1.7 ug/l) below the groundwater standard. Cis-1, 2-dichloroethene was detected in the samples from well MW-2 (7.9 ug/l) and MW-3 (9.0 ug/l) at concentrations slightly exceeding the groundwater standard of 5 ug/l. Cis-1, 2-dichloroethene was also detected in the sample from well MW-1 (4.8 ug/l), but at a concentration below the groundwater standard. Trichloroethene (TCE) was detected in samples MW-2 and MW-3, but at concentrations below the groundwater standard. No VOCs were detected above their respective groundwater standards in sample MW-4.

Methylene chloride was detected in each of the four samples at concentrations between 14 and 15 ug/l. However, methylene chloride is a common laboratory contaminant and was also detected in the associated laboratory blank sample. Methylene chloride was not detected in the samples collected in March 2004. Therefore, the presence of this compound is likely attributable to laboratory cross contamination.

October 2004 groundwater analytical results are summarized on Table 1 and the laboratory reports included in Appendix B of the January 2005 SCR/RAP.

Additional Subsurface Investigations-2005

Inside the Dry Cleaner

On December 29th, 2004, CNS observed the drilling and completion of one subsurface boring (IB1) inside the Van Tassel Dry Cleaners space. Zebra Environmental Inc. utilized a truck-mounted hydraulic pneumatic direct push Geoprobe™ with hollow stem augers to complete the drilling. Two soil samples were collected from boring IB1 at 9 foot and 12’ below floor surface.

In addition one groundwater sample was collected from boring IB1. Five additional soil borings (IB2 through IB6) were attempted, however, refusal was encountered at shallow depths.

The two soil samples and one groundwater sample were placed in laboratory-supplied glassware, packed in ice-filled coolers, accompanied by chain-of-custody documentation and transported to Analytics Corporation in Richmond, Virginia. The soil and groundwater samples were analyzed for Volatile Organic Compounds (VOCs) in accordance with USEPA Method 8260.

VOC analytical results for the two soil samples only identified acetone, a common laboratory artifact, in IB1-S1 (9' below grade sample).

Analytical results for the groundwater sample indicated tetrachloroethene (PCE) at 2.78 ug/l, below the NYSDEC Groundwater Standard. Acetone, a common laboratory artifact was also detected.

Subsurface Investigation -Outside

The outside borings were drilled on January 21, 2005 using a track-mounted (Model DT-66) Geoprobe™. The Geoprobe™ uses direct push technology to drive core samplers to the desired depth for soil sample collection. This method can be performed quickly, so if refusal occurs, a new location can be accessed with minimal effort. Geoprobe™ services were provided by Land, Air, Water Environmental Services of Center Moriches, New York and were conducted in accordance with the operation and sampling procedures outlined in the United States Environmental Protection Agency (EPA) Standard Operating Procedure SOP No. 2050.

At each location a boring was hand cleared from grade to a depth of five feet below grade (due to the high density of underground utilities). There was no visual and olfactory evidence of soil contamination. Three borings were attempted at location GP-1 with consistent refusal at six feet below grade (no groundwater encountered). Groundwater was encountered at depths of 6.5 feet below grade in each of the three other borings (designated GP-2, GP-3 and GP-4) and temporary well screens were set from 6 to 10 feet below grade.

One groundwater sample from each completed boring was submitted to Chemtech Laboratories of Mountainside, New Jersey (NYSDOH Cert. #10624& 11376) for analysis of VOCs by EPA Method 8260.

Groundwater analytical results indicate that one VOC was detected above its New York State Groundwater Standard. Vinyl chloride was detected at 8.9 ug/l in the sample collected from GP-2. The NYS Groundwater Standard is 2 ug/l. PCE and several other breakdown products were detected but below standards. Groundwater analytical results are summarized on Table 1 and the laboratory reports are included in Appendix A of the SCR/RAP.

SITE GEOLOGY

A consistent layer of heterogeneous fill underlies the site. The fill consists predominantly of coarse demolition debris such as concrete, asphalt, bricks, wood and railroad ties. ATC (2003) encountered refusal at 4 to 8 feet below grade in the four borings that they drilled and documented the refusal as caused by dense, weathered schist bedrock. Five borings drilled by CNS (2004) inside the drycleaner indicated shallow refusal also thought to be bedrock. Therefore, it was assumed that the only significant thickness of soil (and groundwater) was on the north or Wildey Street side of the dry cleaner (where the four monitoring wells were installed).

On the Wildey Street side of the property behind the dry cleaner, the fill is approximately 5 to 7-feet thick and consists of asphalt, brick, wood and railroad ties in a sandy and silty matrix. Below the fill is a thin layer of brown silt and fine sand. Groundwater is present within the lower fill and silt and fine sand layers. Below the layer of sand and silt is a gray silt and clay, which becomes progressively drier to 13 feet below grade. JRH did not want to penetrate this layer and cause affected groundwater to reach deeper soil levels.

RMC provided JRH with geologic logs of soil borings drilled in 1982 at River Plaza. Apparently the shopping center was demolished at grade in the late seventies and existing basements were filled in with the demolition debris. We were also told that the basements continually flooded with groundwater. A new plaza would be constructed without basements.

Langan Engineering of Elmwood Park, New Jersey drilled six soil borings for geotechnical/structural purposes to support the rebuild of the plaza. Unfortunately there is no surviving map showing the exact locations of these borings, however, the logs provide valuable hydrogeologic data (Attachment A). The borings were drilled until good bearing sand was encountered (12 to 33 feet below grade). Most significantly, no bedrock was encountered to those depths. The thickness of the fill varied from 8 to 11 feet and groundwater was consistently observed in the bottom of the fill. The fill was underlain in five of the borings by a thin, saturated layer of dark fine to medium sand. Below the sand were layers of moist to dry, silt, silty clay and peat. This low permeability assemblage varied in thickness from 4 to 20 feet. The underlying sand in which the borings were finished was saturated, poorly sorted, and contained abundant gravel.

In addition, nine test pits were excavated as part of the geotechnical investigation (Attachment A). The test pits confirmed the thickness of the demolition debris. Three of the test pits encountered the former concrete basement slab (documented to be intact) as well as a buried foundation wall. Based on these logs we now know that the refusals encountered during earlier Geoprobe™ -based investigations were due to the old concrete slab.

Most significantly, the borings do confirm that a thin, perched water table underlies the site and the four existing monitoring wells are screened in this unit. The perching unit appears to be continuous and relatively thick. It is not known if the perched water unit and perching layer continues toward the Hudson River, which is one-quarter mile west of the site. However, there are no supply wells located in that direction.

PROPOSED SCOPE OF WORK

Additional Horizontal Delineation -

The QAPP for this project is presented as Attachment B and provides details on sampling and analytical procedures. A site-specific HASP is provided as Attachment C.

Most recently ten borings were attempted both outside and inside of the dry cleaner and six borings could not be completed because of refusal during multiple attempts. JRH and NYSDEC now believe these refusals were caused by the old basement slab and not bedrock. Groundwater data to date confirm that there is no ongoing contamination source present in soil. The data do confirm that low-level concentrations of PCE and breakdown products are present in groundwater north of Van Tassel Cleaners.

Four additional shallow borings/monitoring wells will be attempted on-site to determine the western and southern horizontal extent of the low-level groundwater contamination as well as establish upgradient conditions. Knowing what we know now, there is no guarantee these boring attempts will be successful, however, equipment specialized in penetrating concrete will be used. These delineation borings will be terminated four feet into the low permeability (perching) unit estimated to be 16 feet below grade. If the perching unit is not encountered then the borings will be drilled as a deeper boring (refer to next section).

The shallow borings/monitoring wells will be located as follows: two in the McDonalds drive through to determine westerly or downgradient conditions; one south of the dry cleaner; and one to the east or upgradient of the strip mall. Proposed locations of these borings/monitoring wells are shown on Figure 1.

At each boring location, soil samples will be collected continuously using a four-foot long/1.5–inch diameter Macrocore™ sampler. Headspace screening of the cores will be performed using a PID (11.7 eV lamp). Please refer to Section 3.3 of the QAPP for specific methodology. An experienced hydrogeologist will log all soil samples for geologic characteristics. The sample immediately above the clay layer and the sample with the highest PID reading in each boring will be sent to a New York State DOH ELAP certified laboratory and analyzed for Method 8260 and 8270 constituents. If there are no PID readings then the sample immediately above the perching clay will be collected for analysis.

Once the appropriate depth is achieved PVC well screen will be installed in the open borehole. Based on the thickness of the perched water unit, it is anticipated that each well will consist of 10 feet of screen-comparable to the existing monitoring wells. At a minimum the screen will extend at least five feet into the perched water table. The annular space between the borehole and the well point will be backfilled with Morie sand to one to two feet above the top of the screen.

Hydrated bentonite seal will be installed above the sand in the remainder of the annular space. The wells will be completed at grade with a small diameter flush-mount manhole and concrete seal.

All sample locations will be surveyed to provide horizontal and vertical control. The top of each well casing will be surveyed to a common datum and tied into the existing monitoring well network.

Deeper Soil and Groundwater Sampling-

To address concerns regarding whether contamination is deeper than the perched water table unit, a Geoprobe™ will be used to collect groundwater samples in five deep borings drilled into the sand unit below the low permeability layer. These proposed locations are shown on Figure 1 and are co-located with the four shallow borings/wells with an additional, fifth deep boring located on the north side of the building.

At each boring location, soil samples will be collected continuously using a four-foot long/1.5–inch diameter Macrocore™ sampler to four feet below the top of the sand underlying the low permeability perching unit (the depth to the sand unit on site has been measured between 16.5 and 33.3 feet below grade) or to a depth of 40 feet- whichever is deeper. Headspace screening of the cores will be performed using a PID with an 11.7 eV lamp (refer to Section 3.3 of the QAPP). An experienced hydrogeologist will log all soil samples for geologic characteristics. It is not anticipated that contaminated soil will be encountered below the perched water table; however, EPA Methods 8260 and 8270 will be used to analyze one confirmatory soil sample in each boring.

If visual/olfactory evidence of contamination and/or elevated PID readings is noted then the borings will be advanced until the vertical extent of contamination has been determined. Soil samples will be analyzed by EPA Methods 8260 and 8270 to define the depth of contamination.

A mill slot sampler with 3/8 inch polyethylene tubing and a peristaltic pump will be used to collect the groundwater samples in the sand unit. A New York State DOH ELAP certified laboratory would analyze the groundwater (and any soil) samples by EPA Methods 8260 and 8270.

No monitoring wells will be installed in the sand below the confining layer unless PID readings indicate contamination. To prevent cross contamination after the sampling, a rod fitted with an expandable point will be sent down the hole and grouted through the center of that rod as it is pulled back up.

If wells are installed in the deeper unit, the tops of each casing will be surveyed vertically to a common site datum. Well installation procedures are provided in Section 8.0 of the QAPP.

Sampling of Monitoring Wells-

Groundwater sampling procedures are provided in Section 6.0 of the QAPP (Attachment B). JRH will resample the four existing groundwater-monitoring wells and sample the four new monitoring wells to determine the horizontal extent of the low-level VOC contamination around the dry cleaner.

The wells will be purged and sampled by an experienced JRH sampling crew. JRH will measure water levels and collect groundwater samples from the seven monitoring wells using low-flow sampling methods. Prior to sampling, each well will be purged a minimum of three casing volumes using a peristaltic pump with per-well dedicated tubing set in the middle of the well screen. This is performed to ensure representative samples from the formation surrounding the wells and to eliminate standing water in the wells. Temperature, pH, dissolved oxygen, turbidity and conductivity measurements will be collected and recorded after the removal of each casing volume. EPA Methods 8260 and 8270 will be used to analyze all water samples. Well sampling logs will be prepared. The same procedures will be followed if deep wells are installed.

Determination of Groundwater Flow Direction-

Water level measurements will be collected every three months and synoptically in each of the wells to determine the direction of groundwater flow. A designated measuring point on the top of each well casing will be surveyed vertically to a common datum. It is anticipated that three rounds of water level data will be collected from the seven wells. The data will be presented in a table and groundwater elevation contour maps generated for each round. This applies to the deeper sand unit if monitoring wells are installed in that unit.

Soil Vapor Intrusion Investigation-

A soil-gas investigation will be conducted. The objectives of the investigation will be to determine if site related compounds are present in soil gas and if so, determine if the gas presents a vapor intrusion concern. The investigation will be consistent with the draft NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Soil gas sampling procedures are provided in Section 7.0 of the QAPP (Attachment B) and are briefly summarized below.

This investigation would involve the collection of outside air and sub-slab air samples. It is anticipated that three sub-slab monitoring/sampling points will be installed in the portion of the building with one point as close to the dry cleaning machine as possible. Outdoor air samples will be collected at the same time sub-slab and indoor air samples are collected. These samples will be collected outside opposite the dry cleaning machine. It is understood that if sub-slab vapor contamination is found, it may be necessary to collect additional sub-slab vapor and indoor air samples in the other building units.

JRH will send the sub slab and outdoor air samples to a qualified laboratory for analysis of VOCs by EPA Method TO-15. The reporting limits will meet the specification required via TO-15. For example, the limits for TCE are 0.25 ug/m^3 in indoor air and 1.0 ug/m^3 in sub-slab air. PCE and TCA are 1.0 ug/m^3 each for both indoor and sub slab air.

Sub-slab vapor sampling probes will be constructed of 1/8-inch to ¼-inch diameter tubing that extends no more than two inches into the sub-slab material. Prior to sampling each sub-slab gas point will be purged to evacuate a minimum of one well volume to ensure collection of a representative sample. Purging will be completed using a hand held SKC sample pump, affixed with a low flow regulator, at a rate of 0.1 liter per minute (L/min). Following purging, the samples will be collected directly from the tubing into a six liter laboratory supplied Summa canister at a flow rate of 0.1 L/min using pre-calibrated, laboratory supplied regulators. Specific procedures are presented in the QAPP (Attachment B).

Receptor Survey-

Because any further contaminant detections will be downgradient with respect to groundwater flow of the dry cleaner and along the downgradient or western property line, a receptor survey will be conducted. A well search as specified in DER-10 will be conducted. We do not believe the site is in the capture zone of a public supply well field but this will be verified.

Also as part of this survey an environmental database search under ASTM protocol will be conducted. The purpose of this search will be to identify sites downgradient of the site that may have conducted groundwater monitoring. Once these potential sites (within one mile) are identified, Freedom of Information Law (FOIL) requests will be filed with Westchester County and the NYSDEC to obtain information on groundwater conditions downgradient with respect to groundwater flow of the site.

It may be difficult to determine if contaminants from the site have migrated under other sites. However, because the site is upgradient with respect to groundwater flow of an industrialized area it is not likely that there was or will be any impact to human health and the environment from contaminated groundwater that may have migrated off-site. However, these data will be included and evaluated in the qualitative health assessment.

QUALITY ASSURANCE

Trained and experienced professionals from JRH will observe all investigative work and conduct all well sampling. Well purging and sampling as well as sample preservation and handling will be conducted using JRH Standard Operating Procedures (SOPs). A strict chain of custody will be maintained through delivery of samples to the analytical laboratory. The laboratory will be NYSDOH ELAP-certified and analyze all samples by EPA Methods 8260 and 8270. JRH reserves the right to collect blind duplicate samples for submittal to the laboratory and/or collect additional samples outside of the scope of this plan should anomalous or unexpected results be obtained. These samples would be in addition to standard trip, field and method-required blanks.

The Sampling and Analysis (Table 1) in Section 3.0 of the QAPP summarizes all media and samples to be collected.

HEALTH AND SAFETY

A site-specific health and safety plan, taking into account that this is an active business in a busy shopping center, has been prepared and will be adhered to by all on-site environmental personnel. The HASP is presented as Attachment C and will be available on-site during the conduct of all applicable environmental activities.

An important component of the site-specific health and safety plan will be the NYSDOH Community Air Monitoring Plan (CAMP). For the Geoprobe™ investigation, JRH will implement a site specific community air monitoring plan for organic vapors and dust, as outlined in the NYSDOH Generic Community CAMP as presented in Appendix 1A of the Draft DER-10, Technical Guidance for Site Investigation and Remediation (2002). As outlined below, the CAMP is designed to provide protection for the surrounding, specifically the downwind, community (i.e. off-site receptors including residences, businesses and on-site workers not directly involved with the subject work activities) and to confirm that the work activities do not spread contamination off-site through the air.

To establish ambient air background concentrations, air will be monitored at locations along the perimeter of the site. Air monitoring will be conducted using the MiniRae 2000 photoionization detector or equivalent (PID), equipped with an 11.7 eV lamp capable of detecting volatile chlorinated compounds. Dust monitoring will be conducted using the Dustrak Model 8520 Meter. Monitoring equipment will be calibrated and maintained in accordance with the manufacturer's specifications. Equipment will be zeroed and checked for accuracy daily. Specifically, PID equipment will be checked against the calibration gas periodically (minimum of twice daily) to document the extent of instrument drift.

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate outside work area (i.e., the exclusion zone) during all activities. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. If the prevailing wind direction changes the focus of the monitoring will be immediately adjusted.

The equipment will be calibrated at least daily using factory-supplied 100-ppm isobutylene to represent the VOCs of concern. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below. All readings will be recorded and be available for DEC/DOH personnel to review.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the work area perimeter, activities will be shut down.
- Nuisance odors are not likely a concern at the site and if present, may not be recorded by the PID. However, if the individual monitoring the perimeter of the site detects any foul, acrid or sweet odor, action will be immediately taken to suppress the odor.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using the Dustrak 8520 which is capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed.
- Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
- If after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures

and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings will be recorded on a form, scanned in PDF format, placed on a data disk, and be made available for DEC/DOH personnel to review. In addition, data will be downloaded from instruments (where appropriate) and made available on disk for distribution.

SCHEDULES AND REPORTING

Within six weeks after the analytical data are received, a draft Remedial Investigation Report will be submitted to the NYSDEC. Once the data is received it will be entered into a Data Usability Summary Report (DUSR) as required by DER-10. Lori Beyer of Data Validation Services Corp. will prepare the DUSR. Her resume is presented in Attachment D.

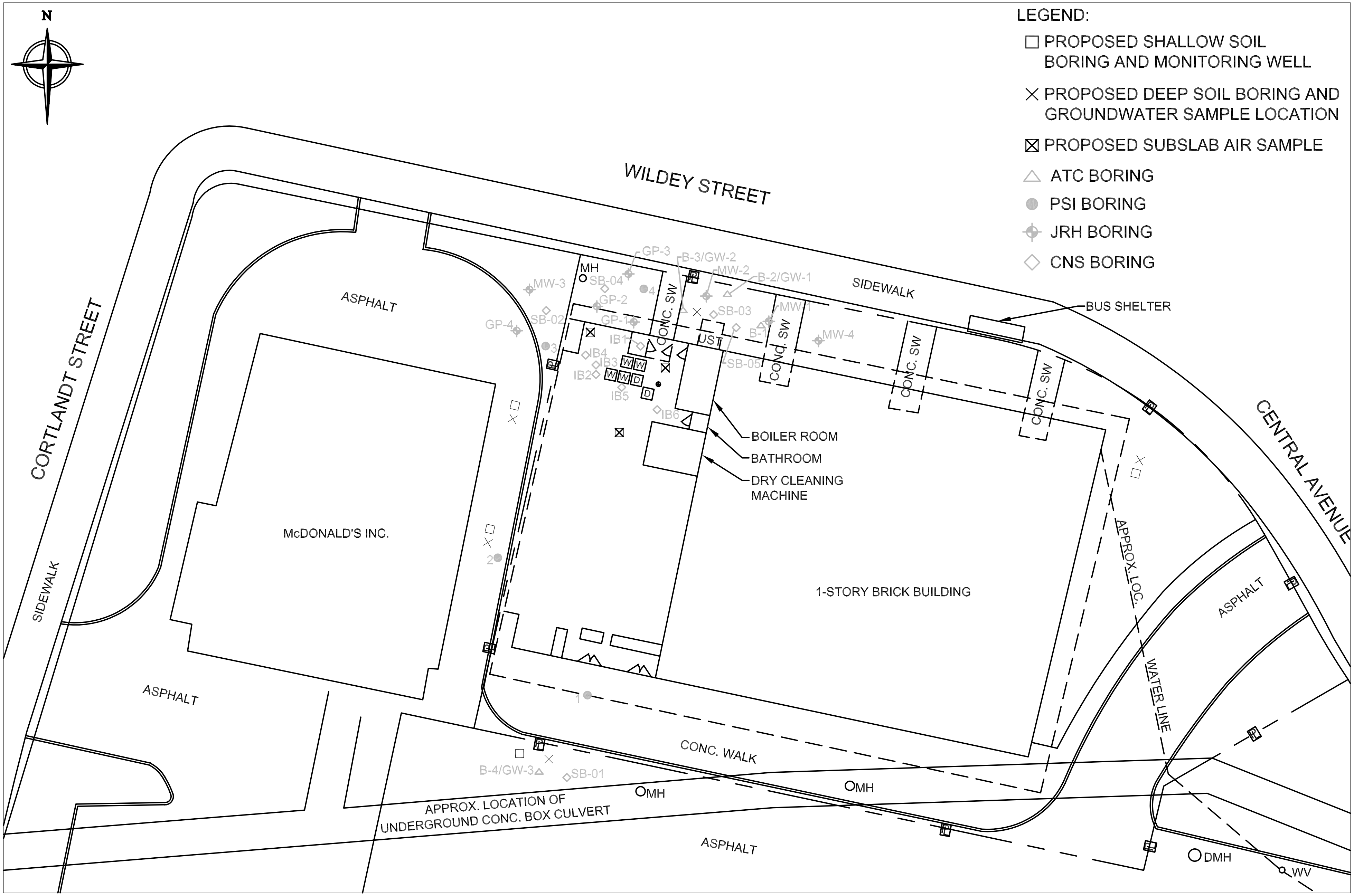
The site characterization information and data derived from this supplemental investigation will be combined with existing information and data. This will allow a complete characterization of the nature and extent of contamination and the development of a comprehensive conceptual site model.

The conceptual site model will be developed using the information gathered to date, qualified as appropriate, and supplemented with additional information, including a scaled site plan and geologic cross-sections that present sampling locations, aerial and vertical extent of soil and groundwater contamination, property lines, groundwater elevations, subsurface geology, locations/elevations of utility corridors, floor drains and other subsurface features that may affect contaminant migration or remedial design. This cross section will include sampling locations, aerial and vertical extent of soil and groundwater contamination, property lines, groundwater elevations, subsurface geology, locations/elevations of utility corridors, floor drains, and other subsurface features that may affect contaminant migration.

The draft report will include the qualitative health assessment as per DER-10. A qualitative health assessment will characterize the on- and off-site exposure setting (the physical environment and potentially exposed human populations), identify exposure pathways and evaluate contaminant fate and transport. These data will allow a determination as to whether a public health exposure exists or potentially exists (on-site and off-site), per the requirements of DER-10.

The report will also include summary tables of all historical remediation/groundwater data in conjunction with and in direct comparison to current data. Groundwater flow maps for each monitoring event will also be provided. Appendices will include all environmental reports generated to date as well as current analytical laboratory reports. The report will include recommendations.

Figure 1



PREPARED BY:	TITLE:	DWN:	SCALE:	DATE:	PROJECT NO.:
J.R. HOLZMACHER P.E., LLC The Third Generation of Excellence In Water Supply, Water Resources, Civil and Environmental Engineering 300 WHEELER ROAD SUITE 303 HAUPPAUGE, NEW YORK 11788 PHONE # (631) 234-2220 FAX # (631) 234-2221 E-MAIL: info@holzmacher.com	VAN TASSEL CLEANERS RIVER PLAZA SHOPPING CENTER 130 WILDEY STREET TARRYTOWN, NEW YORK 17591	APK	1" = 30'	09/24/07	RMC 06-01
		CHKD: JMD	APPD: JMD	REV.: -	NOTES: –
		FIGURE NO.: 1			

Attachment A
Soil Boring Logs

ROBERT MARTIN COMPANY

Fax Transmittal Cover Sheet

To	JIM DEMARTINIS	No. of Pages	12
		Date	11/8/05
Company	J R HOLZMACHER	From	Lloyd Roos, Esq.
Fax Number	631-234-2221	Fax Number	914-592-5486
Phone Number		Phone Number	914-593-7918

☐ Urgent ☐ For Your Review ☐ Reply ASAP ☐ Please Comment

RIVER PLAZA S.C.

Robert Martin Company, LLC.
100 Clearbrook Road
Elmsford, NY 10523

www.robertmartincompany.com

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

FAX transmittal

River Drive Center 1 Elmwood Park, NJ 07407 T: 201.794.6900 F: 201.794.0366

To: Jerry Rockhill

Company:

Fax: 914 592 4836

From: G Kelley

Date: 11/7/05

Page(s) with cover:

Re:

Langan Proj. No:

Hard Copy To Follow

☐ Yes ☐ No

Notes/Comments:

Here are the Boring Logs at the Pathmark site in Tarrytown (only 2-3 years ago.

LOG OF BORING NO. B-1

DATE March 9, 1982 SURFACE ELEV. ± 101' LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	RESISTANCE*	DESCRIPTION	Liquid Limit / Plastic Limit	Water Content %
0			Dark gray to gray m-f SAND, sm gravel, tr brick and wood (Misc. Fill)		
		120			
5		48	becomes dark gray f SAND, sm silt, tr gravel, concrete and mica		
10		2	Gray to black f-m SAND, sm silt and f. gravel (SM)		
			becomes dark gray f-m SAND, sm f gravel, tr silt (SP/SM)		
		6	Dark gray slightly organic SILT, tr f sand and decomposed fiber (ML)		
15					105.8
		5	Dark brown and black fibrous PEAT and organic silt (PT/MH)		
		6			243.0
20		2			113.2
		4	Gray SILT tr f sand and decomposed fiber (ML)		67.6
			Gray varved silty CLAY, tr f gravel, fiber, mica and v.f. sand seams (CL/ML)		
25		21			
			Light gray and brown m stiff SILT, tr clay and v f sand seams (ML)		32.8
30		9	becomes blueish gray and lt pink clayey SILT, tr f sand (ML)	29.0 / 22.2	27.2
35		69	Gray f-m SAND, sm gravel, tr to sm silt (SM/SP)		

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD

DEPTH TO WATER 9'3" DATE 3/9/82

REMARKS

* BLOWS/FOOT

110/200D

LOG OF BORING NO. B-2

DATE March 9, 1982 SURFACE ELEV. ± 101' LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	RESISTANCE*	DESCRIPTION	Liquid Limit / Plastic Limit	Water Content %
0			3" Asphalt, gray m-f sand and gravel (Compacted Fill)		
5		89 100/4"	Dark gray m-f-c SAND, sm gravel, tr brick, wood, metal (Misc. Fill)		
10		4	Gray to brown soft SILT, sm f sand, tr gravel (ML)	45.0 / 28.3	32.3
15		2	Dark brown and black fibrous PEAT, tr organic silt (PT)		268.4
20		23	Dark gray and brown SILT, tr gravel, sand and mica (ML)		16.5
25		22	Gray silty f SAND, sm gravel (SM/SP)		
30		60	becomes gray f SAND, sm silt and gravel (SM/SP)		
			end of boring @ 31.5 ft		
35					

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD __

* BLOWS / FOOT

DEPTH TO WATER 9'10" DATE 3/9/82

REMARKS

LOG OF BORING NO. B-3

DATE March 10, 1982 SURFACE ELEV. ± 103' LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	RESISTANCE*	DESCRIPTION	Water Content %
0			Dark gray to gray m-f SAND, sm gravel, tr cinder, silt, concrete (Misc. Fill)	
5	▮	29		
10	▮	45	Dark gray f-m SAND, tr to sm silt, tr gravel(SP/SM)	
15	▮	13	Brown SILT, tr f gravel and sand (ML)	
	▮		-becomes gray and brown SILT, sm f sand, tr gravel (ML)	20.1
20	▮	17	Brown and gray f-m SAND, sm silt, tr gravel (SM)	
25	▮	108	Becomes gray f-m-c SAND, tr to sm silt, tr f. gravel (SM/SP)	
30	▮	63		
			end of boring @ 31.5 ft	
35				

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD ____

DEPTH TO WATER 8'8" DATE 3/11/82

REMARKS ____

* BLOWS / FOOT

LOG OF BORING NO. B-4

DATE March 10, 1982 SURFACE ELEV. ± 101.5' LOCATION See Fig 1

DEPTH, FEET	SAMPLES	*RESISTANCE	DESCRIPTION	Water Content %
0			3" ASPHALT, gray m-f SAND and GRAVEL (Compacted Fill)	
5		43	Gray c-m-f SAND, sm gravel, tr brick frgts, wood, cinder (Misc. Fill)	
10		4	Greenish gray to brown SILT, sm v f sand, tr f gravel and vegetation (ML)	31.4
15		20	Brown f-m SAND, sm silt, tr to sm gravel and cobble (SM)	
			end of boring @ 16.3 ft	
20				
25				
30				
35				

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD

DEPTH TO WATER 11'2" DATE 3/1?/82

REMARKS

* BLOWS/FOOT

LOG OF BORING NO. B-5

DATE March 11, 1982 SURFACE ELEV. ± 102' LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	*RESISTANCE	DESCRIPTION	Water Content %
0			Dark brown to black m-f SAND, sm silt, tr gravel, wood, and concrete. (Misc. Fill) (Concrete floor from 2 to 3 ft)	
5	■	50/4"		
	■	11		
10				
	■	9	Dark gray and brown f SAND sm silt, tr mica, gravel (SM)	
15	■		Gray soft SILT, sm v f sand, tr gravel and vegetation (ML)	20.7
	■	15	becomes black to greenish gray soft SILT, tr to sm f sand, tr mica (ML)	
20			Brown and lt gray f-m SAND, sm silt, tr f-m gravel (SM)	
25	■	100/4"	becomes gray and brown f-m SAND, tr silt and gravel (SM/SP)	
			end of boring @ 25.8 ft	

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD ____

DEPTH TO WATER 10' DATE 3/11/82

REMARKS ____

* BLOWS / FOOT

LOG OF BORING NO. B-6

DATE March 11, 1982 SURFACE ELEV. ± 101' LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	*RESISTANCE	DESCRIPTION	Liquid Limit / Plastic Limit	Water Content %
0					
5		33	Brown and gray m-f-c SAND, tr silt, gravel, wood, and cinder (Misc. Fill)		
10		8	Dark gray v f SAND, sm silt, tr v f gravel and vegetation (SM)		32.0
		3	Greenish gray v soft SILT, sm f sand, tr seeds and veg. (ML)		
15			Dark brown and black fibrous PEAT and organic SILT (PT/MH)	53.4 / 38.4	163.5
	ST-1		becomes black fibrous PEAT, sm organic silt (PT)	372 / 240	
20	ST-2				
		18	Gray to brown SILT, tr f sand, gravel, mica and decomposed fiber (ML)		
25		9	Blueish gray varved silty CLAY, tr v f sand seams (CL/ML)	32.8 / 24.1	24.8
30	ST-3			36.8 / 22.3	
		39	Gray f-c SAND, sm silt and f-m gravel (SM/SP)		
			end of boring @ 33.3 ft		

SAMPLER: 2-INCH O.D. SPLIT BARREL
140 LB. HAMMER, 30 INCH DROP, DRILL ROD ____

* BLOWS / FOOT

DEPTH TO WATER 9'6" DATE 3/11/82

REMARKS ST = Shelby Tube Sample

LOG OF TEST PIT NO. 1

DATE 6/17/74 SURFACE ELEV. 102.5± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION	Grain Size Distribution
0		FILL: 75% rubble consisting of brick, concrete, metal pipes 25% sand (hit basement wall)	
5	■	Brown c-f SAND, little gravel, trace to little silt, with cobbles and boulders (SP-SM)	*
10		NOTE: First excavation for TP-1 encountered basement approximately 5 ft below grade. Moved test pit.	
15			

COMPLETION DEPTH 6.5 ft DEPTH TO WATER No water encountered

* See test curve

LOG OF TEST PIT NO. 2

DATE 6/17/74 SURFACE ELEV. 101.5± LOCATION See Fig 1

DEPTH, FEET	SAMPLES	DESCRIPTION	
0		FILL: 50% Boulders, mixed with sand, silt, brick, wire, pipes, and concrete (Hit concrete slab @ 5.5 ft, could not penetrate).	
5			
10			
15			

COMPLETION DEPTH 5.5 ft DEPTH TO WATER No water encountered

FIG. 3

LOG OF TEST PIT NO. 3

DATE 6/17/74 SURFACE ELEV. 101.5± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION		-200 Sieve %
0		FILL: Gray-brown fine SAND, some silt, trace c-m Sand with concrete, brick, wood, cobbles, boulders, tree stump (horizontal position), 3 ft dia. tank 4 ft from surface (horizontal position)		
10		Black, slightly organic SILT, some f. Sand (OL)		
		Gray fine SAND, some silt (SM)		25,24
15				

COMPLETION DEPTH 13 ft DEPTH TO WATER Slight seepage of water @ 11 ft.

LOG OF TEST PIT NO. 4-5 (50 ft long)

DATE 6/17/74 SURFACE ELEV. 100.5-99.5± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION		LL/PL	Water Content %	-200 Sieve %
0		FILL: Boulders and SAND, with wood, concrete, metal and brick				
10		Black organic SILT, some sand (OL)				
		Gray fine SAND, some silt (SM)			38	34
		Gray organic SILT, trace clay, layered with gray f. Sand (ML-OL)		40/32		
15						

COMPLETION DEPTH 13 ft DEPTH TO WATER Water seepage @ 10 ft.

FIG. 4

LOG OF TEST PIT NO. 6

DATE 6/17/74 SURFACE ELEV. 101.5± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION		Water Content %
0–8		FILL: 50-60% boulders & concrete, with brick, wood, metal wire, and steel bars		27
		Topsoil, gray slightly organic silt, little sand (OL)		
10		Mottled gray and orange-brown c-f SAND, little silt, trace of gravel & clay (SM)		18

COMPLETION DEPTH 11.5 ft DEPTH TO WATER No water encountered

LOG OF TEST PIT NO. 7

DATE 6/17/74 SURFACE ELEV. 100± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION		-#200 Sieve %
0–7.5		FILL: Mostly sand and silt, with considerable cobbles, some brick, concrete, and roots (excavated alongside an old foundation wall, bottom @ approx. 7 ft)		
		- Thin layer of Topsoil Gray m-f SAND, trace of c. sand and silt (SM)		14

COMPLETION DEPTH 9.5 ft DEPTH TO WATER 7 ft rapid seepage

FIG. 5

LOG OF TEST PIT NO. 8

DATE 6/7/74 SURFACE ELEV. 103± LOCATION See Fig. 1

DEPTH, FEET	SAMPLES	DESCRIPTION		-#200 Sieve %
0		FILL: Concrete, brick, cinders		
	■	Brown c-f SAND, little silt, with cobbles and boulders (SM)		19
5				
10				
15				

COMPLETION DEPTH 6.0 ft DEPTH TO WATER No water encountered

LOG OF TEST PIT NO.

DATE SURFACE ELEV. LOCATION

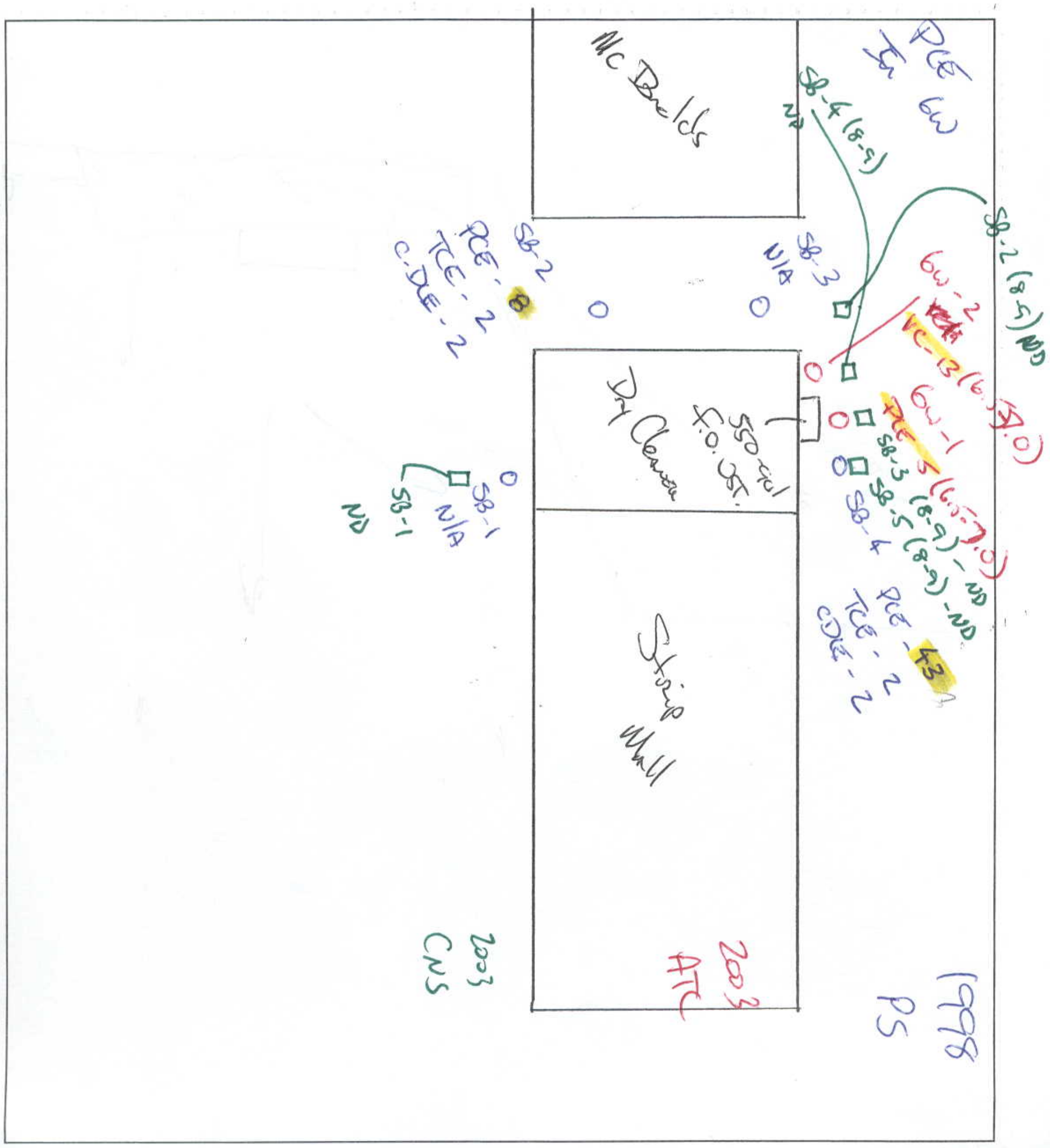
DEPTH, FEET	SAMPLES	DESCRIPTION
0		
5		
10		
15		

COMPLETION DEPTH DEPTH TO WATER

FIG. 6

P.W. GROSSER CONSULTING ENGINEER & HYDROGEOLOGIST, P.C.
630 JOHNSON AVENUE SUITE 7
BOHEMIA, NEW YORK 11716-2618
(631) 589-6353 FAX (631) 589-8705
www.pwgrosser.com EMAIL: info@pwgrosser.com

JOB ______
SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______



Attachment B
QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

Supplemental Investigation
Van Tassel Cleaners
130 Wildey Street
Tarrytown, New York

Prepared by:
J.R. Holzmacher P.E. LLC
300 Wheeler Road
Suite 300
Hauppauge, NY 11788

Project No. RMC 0601
Revised September 29, 2007

QUALITY ASSURANCE PROJECT PLAN
SUPPLEMENTAL INVESTIGATION

Van Tassel Cleaners
Tarrytown, New York
JRH # RMC 0601

Title	Signature	Date
JRH Project Manager		
Laboratory QA/QC Manager Chemtech		
Project QA Officer		

QUALITY ASSURANCE PROJECT PLAN

1.0 OBJECTIVE AND PURPOSE

The Quality Assurance Project Plan (QAPP) outlines the technical and analytical approach that J.R. Holzmacher P.E. LLC (JRH) will employ during the soil, groundwater and soil vapor sampling in the vicinity of Van Tassel Cleaners located in the River Plaza Shopping Center. The Work Plan provides a site summary, site history and proposed sampling plan. As an attachment to the work plan, this QAPP provides a description of project objectives, sampling methods, analytical procedures, and quality assurance requirements that will be used to obtain valid, representative field samples and measurements. Standards contained in the QAPP will be used to ensure the validity of data generated for this project.

This QAPP was prepared for the pre-remediation soil, groundwater, and soil vapor sampling to set guidelines for the generation of reliable data measurement activities such that data generated are scientifically valid, defensible, and comparable and of known precision and accuracy.

This QAPP is an extension of the Work Plan and contains a discussion of the quality assurance protocols to be used by JRH and laboratory personnel.

1.1 DEFINITIONS

The parameters that will be used to specify data quality objectives, and to evaluate the analytical system performance for all analytical samples are precision, accuracy, representativeness, completeness and comparability (PARCC). Definitions of these and other key terms used in this QAPP are provided below.

Accuracy - the degree of agreement of a measurement with an accepted reference value. Accuracy is generally reported as a percent recovery, and calculated as:

Measured Value x 100 Accepted Value

Analyte - the chemical or property for which a sample is analyzed.

Comparability - the expression of information in units and terms consistent with reporting conventions; the collection of data by equivalent means; or the generation of data by the same analytical method. Aqueous samples will be reported as ug/l and solid samples will be reported in units of mg/kg, dry weight.

Completeness - the percentage of valid data obtained relative to that which would be expected under normal conditions. Data are judged valid if they meet the stated precision and accuracy goals.

Duplicate - two separate samples taken from the same source by the same person at essentially the same time and under the same conditions that are placed into separate containers for independent analysis. Duplicate samples are intended to assess the effectiveness of equipment decontamination, the precision of sampling efforts, the impacts of ambient environmental conditions on sensitive analyses (e.g., volatile organics analysis (VOA), and the potential for contaminants attributable to reagents or decontamination fluids. Identifying such potential sources of error is essential to the success of
the sampling program and the validity of the environmental data. Each QC sample is described below. As a minimum, each set of ten or fewer field samples will include a trip blank, a duplicate and one sample collected in a sufficient volume to allow the laboratory to perform a matrix spike.

Episode - a continuous period of time during which sampling activities are undertaken. Cessation of activities for more than 48 hours terminates the episode.

Field Blanks - field blanks (sometimes referred to as "equipment blanks" or "sampler blanks") are the final analyte-free water rinse from equipment decontamination in the field and are collected at least one during a sampling episode. If analytes pertinent to the project are found in the field blank, the results from the blanks will be used to qualify the levels of analytes in the samples. This qualification is made during data validation. The field blank is analyzed for the same analytes as the sample that has been collected with that equipment.

Precision - a measure of the agreement among individual measurements of the sample property under prescribed similar conditions. Precision is generally reported as Relative Standard Deviation (RSD) or Relative Percent Difference (RPD). Relative standard deviation is used when three or more measurements are available and is calculated as:

Quality Assurance (QA) - all means taken in the field and inside the laboratory to make certain that all procedures and protocols use the same calibration and standardization procedures for reporting results; also, a program which integrates the quality planning, quality assessment, and quality improvements activities within an organization.

Quality Control (QC) - all the means taken by an analyst to ensure that the total measurement system is calibrated correctly. It is achieved by using reference standards, duplicates, replicates, and sample spikes. Also, the routine application of procedures designed to ensure that the data produced achieve known limits of precision and accuracy.

Representativeness - degree to which data represents a characteristic of a set of samples. The representativeness of the data is a function of the procedures and caution utilized in collecting and analyzing the samples. The representativeness can be documented by the relative percent difference between separately collected but otherwise identical samples.

Replicate - two aliquots taken from the same sample container and analyzed separately. Where replicates are impossible, as with volatile organics, duplicates must be taken.

Trip Blanks - trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic samples. One trip blank should accompany each cooler containing volatile organics; it will be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOCs.

2.0 PROJECT MANAGEMENT

The Project Manager for JRH is Jim DeMartinis. Because the sampling phase of the project is short in duration (estimated one week), he will also serve as the Field Team Leader and as such, will collect all samples with assistance from JRH field staff. The Geoprobe™ contractor, Zebra Environmental has the proper equipment to work both inside and outside of the dry cleaner and will work under his direction.

The Chemtech Consulting Group in Mountainside, New Jersey (NYSDOH Certification No. 2222) will analyze the soil samples, the groundwater samples and subsurface vapor samples. The Laboratory Manager will be Amit Vaiyda. Chemtech has been informed regarding the scope of work and number of samples to be analyzed. Chemtech has analyzed samples for JRH in calendar years 2004 through 2006 so a good working relationship has been established between the companies. Most importantly, the confidence, responsiveness and quality with the laboratory have been established.

Mr. DeMartinis as Project Manager will be responsible not only for field sampling activities but also will coordinate efforts with the Client, the laboratory, the drilling contractor, the NYSDEC, and the NYSDOH. He will also be responsible for checking all data, coordinating with the laboratory, and preparation of reports. Chemtech will maintain ELAP certification for the required analysis during the entire sample analysis period.

3.0 DATA ACQUISITION

3.1 Sampling Process Design

The Supplemental Work Plan, revised September 2007, describes the scope of work in detail. Table 1 summarizes the sampling and analysis program. Following is a brief summary of sample collection activities.

Table 1
Sampling and Analysis Summary

Sample	Number	total	Rationale	Method
Shallow Soil	1 to 2 per boring based on screening results	4-8	Determine if PCE soil source exists	8260 & 8270
Deep Soil (Sand Unit)	One per boring	5	Determine if contamination has reached deeper aquifer	8260 & 8270
Shallow Ground Water	One sample each New (4) and existing (4) wells- (twice)	16	Define extent of low level PCE contamination	8260 & 8270
Deep Ground Water	One groundwater grab per boring; deep well completed only if warranted based on soil screening	5	Define extent of contamination in deep aquifer	8260 & 8270
Sub-Slab Vapor	Three inside dry cleaner	6	Determine if soil vapor is a concern	TO - 15

Over the past several years, borings were attempted both outside and inside of the dry cleaner and many borings could not be completed because of refusal during multiple attempts. JRH and NYSDEC now believe these refusals were caused by the old basement slab and not bedrock. Three additional borings will be attempted on-site to determine the western and southern horizontal extent of the low-level groundwater contamination.

Shallow borings and monitoring wells will be located as follows: two in the McDonalds drive through to determine westerly or downgradient conditions; one south of the dry cleaner; and one to the east or upgradient of the strip mall. Proposed locations of these borings/monitoring wells are shown on Figure 1 of the Work Plan. To address concerns regarding whether contamination is deeper than the perched water table unit, a Geoprobe™ will be used to collect groundwater samples in deep borings drilled into the sand unit below the low permeability layer. Locations of the deep soil borings are also shown on Figure 1, and are co-located with the four shallow borings noted above, with a fifth deep boring located on the north side of the building.

The four existing groundwater-monitoring wells and the four new monitoring wells will be sampled to determine the horizontal extent of the low-level VOC contamination around the dry cleaner. The wells will be purged and sampled by an experienced sampling crew. Water level measurements will be collected periodically and synoptically in each of the wells to determine the direction of groundwater flow. Water level measurements and groundwater sampling procedures are provided in Section 6.0.

A soil-gas investigation will also be conducted. The objectives of the investigation will be to determine if site related compounds are present in soil gas and if so, determine if the gas presents a vapor intrusion concern. The investigation will be consistent with the draft NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. This investigation would involve the collection of sub-slab air samples. Subsurface vapor sampling procedures are provided in Section 7.0.

3.2 Logistics

Unencumbered access to the site with the soil removal equipment is expected to be available.

3.3 Soil Screening

All soil cores will be screened using a PID (11.7 eV lamp) and logged by an experienced hydrogeologist for geologic characteristics. The sample with the highest PID reading in each boring will be sent to Chemtech and analyzed by EPA Methods 8260 and 8270. For the shallow borings, if there are no PID readings, the sample directly above the low permeability layer will be collected for analysis. For the deeper borings, if there are no measured PID readings, then the soil below the confining layer will be collected for analysis.

All field equipment will be calibrated prior to use according to the manufacturer's instructions. The results of calibrations and any records of repair will be maintained in the field book. Equipment that fails calibration or fails to operate properly will be removed from service and segregated from the operational equipment. Such equipment will be repaired and re-calibrated if possible, or replaced. Preventive maintenance of field equipment is performed according to the procedures indicated in the manufacturer's manuals.

3.3.1 Headspace Screening Procedure

1. Samples collected during drilling procedures must be taken in advance of the drill bit.
2. No samples shall be collected from the auger flights.
3. A separate sample must be collected for laboratory analysis.
4. The following procedure must be used:

a. Half-fill a one-gallon Ziploc® baggie.
b. Zip to close.
c. Vigorously shake the bag for at least 30 seconds once or twice in a 10-15 minute period to develop headspace.
d. If ambient temperatures are below 32 degrees Fahrenheit (0 Celsius) development of headspace should be conducted in a heated vehicle or building.
e. Unzip the corner of the bag approximately one to two inches and insert the PID probe through the plastic.

f. Record the maximum meter response (should be within the first 2-5 seconds). Erratic responses should be discounted as a result of high organic vapor concentrations or conditions of elevated moisture in the headspace.

3.4 Sampling Methods Requirements

The Project Manager will be responsible for ensuring that appropriate sample collection procedures are followed and will take appropriate actions to correct any identified deficiencies. All samples collected will be maintained under chain-of-custody and stored and shipped in laboratory-supplied coolers.

3.4.1 Soil

At each soil boring location, soil samples will be collected continuously using a four-foot long/1.5–inch diameter Macrocore™ sampler. The shallow delineation borings will be terminated four feet into the low permeability (perching) unit, at an estimated depth of approximately 16 feet below grade. The shallow borings shall be completed as shallow monitoring wells as discussed in Section 3.4.2 below. If the perching unit is not encountered in the shallow boring then the boring will be drilled as a deeper boring. At each boring location, soil samples will be collected continuously using a four-foot long/1.5–inch diameter Macrocore™ sampler to four feet below the top of the sand (the depth to the sand unit on site has been measured between 16.5 and 33.3 feet below grade) or to a depth of 40 feet- whichever is deeper. To prevent cross contamination after the deep boring sampling, a rod fitted with an expendable point will be sent back down the hole and grouted through the center of that rod as it is pulled back up, unless it is determined based on soil screening results that it is appropriate to complete the deep boring as a monitoring well.

Equipment specialized in penetrating concrete will be used to hopefully eliminate refusal. EPA Methods 8260 and 8270 will be used to analyze soil samples for VOCs and SVOCs. Analytical results will be compared to the NYSDEC Recommended Soil Cleanup Objectives (RSCOs) specified in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) guidance document to determine if additional investigation and/or remediation are warranted.

3.4.2 Groundwater

As noted above, the new shallow monitoring well locations a soil boring will be drilled using a Geoprobe™ equipped with a 1.5-inch diameter macro-core sampler, and soil samples will be collected continuously from grade and terminated four feet into the low permeability (perching unit), at an estimated depth of approximately 16 feet below grade. Once the appropriate depth is achieved PVC well screen will be installed in the open borehole. Based on the thickness of the perched water unit, it is anticipated that each well will consist of 10 feet of screen-comparable to the existing monitoring wells. At a minimum the screen will extend at least five feet into the water table.

The annular space between the borehole and the well point will be backfilled with Morie sand to one to two feet foot above the top of the screen. A hydrated bentonite seal will be installed above the sand pack in the remainder of the annular space. The wells will be completed at grade with a small diameter flush-mount manhole and concrete seal.

Deep borings will be drilled to the depths as described above. No monitoring wells will be installed in the sand below the confining layer (deep borings) unless PID readings indicate contamination as described above. These deep borings will be grouted with bentonite slurry immediately after completion. A mill slot sampler with 3/8 inch polyethylene tubing and a peristaltic pump will be used to collect the groundwater samples in the sand unit.

Note that the annular spaces of any deep monitoring wells (if installed) will also be grouted from the top of the well screens to land surface to prevent cross contamination between different water bearing zones. Monitoring well installation procedures are provided in Section 8.0.

Groundwater sampling procedures are provided in Section 6.0. Water levels will be measured and groundwater samples collected from the monitoring wells using low-flow sampling methods. Prior to sampling, each well will be purged a minimum of three casing volumes using a peristaltic pump with per-well dedicated tubing set in the middle of the well screen. This is performed to ensure representative samples from the formation surrounding the wells and to eliminate standing water in the wells. Temperature, pH, dissolved oxygen, turbidity and conductivity measurements will be collected and recorded after the removal of each casing volume. Well sampling logs will be prepared.

A designated measuring point on the top of each well casing will be surveyed horizontally and vertically to a common datum. It is anticipated that three rounds of water level data will be collected from the seven wells. The data will be presented in a table and groundwater elevation contour maps generated for each round. Groundwater samples will be analyzed for VOCs by EPA Method 8260 and SVOCs by EPA Method 8270.

Groundwater for VOCs analysis will be preserved by acidification to a pH of <2 using hydrochloric acid (HC1), cooled to 4°C, and maintained at this temperature until time of analysis.

Immediately following collection of the samples, they will be placed in a cooler with "freezer-pats" in order to maintain sample integrity, all volatile sample bottles to be filled to capacity with no headspace for volatilization. If necessary to meet a maximum recommended holding time, the samples are to be shipped by overnight courier to the laboratory.

3.4.3 Soil Vapor

It is anticipated that three sub-slab monitoring/sampling points will be installed in the building. Outdoor air samples will be collected at the same time sub-slab samples are collected. These samples will be collected outside opposite the dry cleaning machine.

Sub-slab vapor sampling protocols are provided in Section 7.0. Prior to sampling each sub-slab gas point will be purged to evacuate a minimum of one well volume to ensure collection of a representative sample. Purging will be completed using a hand held SKC sample pump, affixed with a low flow regulator, at a rate of 0.1 liter per minute (L/min).

3.5 Sampling Equipment Decontamination

It is anticipated that dedicated sampling equipment will be used at all locations. However if not the case for some reason all sampling equipment will be cleaned between sampling locations to prevent cross-contamination. All reusable sampling equipment that comes in contact with soil samples will be decontaminated prior to each sample by using the following steps:

1. Detergent (Alconox) solution wash
2. Potable water rinse
3. Detergent (Alconox) solution wash
4. Potable water rinse
5. Solvent rinse (methanol)
6. Deionized water rinse

3.6 Sample Handling and Custody Requirements

This section describes sample identification and chain-of-custody procedures that will be used for field activities. The purpose of these procedures is to ensure that the quality of samples is maintained during collection, transportation, storage, and analysis.

3.6.1 Sample Containers - Soil

The sample container, preservation, and holding time requirements for each sample matrix will meet the specified standards for analytical EPA Methods 8260 and 8270. The containers for the soil sample analysis are 4 oz., wide mouth, straight-sided; flint glass jars (70mm neck finish) with Teflon lids. The holding time for VOCs in soils is 14 days. A normal turnaround from the laboratory is expected.

All soil samples will be shipped the same day they are obtained to the analytical laboratory for VOC analysis. The samples must be stored at or near 4°C and analyzed within specified holding times. Chemtech meets the specifications for documentation, data reduction and reporting. The laboratory will follow all method specifications pertaining to sample holding times contained in the specific analytical method. Screening analysis will be carried out using USEPA Method OLM04.0 and the analytical laboratory will adhere to required QA/QC procedures.

3.6.2 Sample Containers – Water

EPA Methods 8260 and 8270 will be used to analyze groundwater samples. The VOC containers will be two 40-ml. VOA vials per sample. The holding time for VOCs is 14 days. All soil samples will be shipped the same day they are obtained to the analytical laboratory for VOC analysis. Chemtech meets the specifications for documentation, data reduction and reporting. The laboratory will follow all method specifications pertaining to sample holding times contained in the specific analytical method. Screening analysis will be carried out using USEPA Method OLM04.0 and the analytical laboratory will adhere to required QA/QC procedures.

3.6.3 Sample Containers – Vapor

EPA Method TO-15 will be used to analyze vapor samples. Each sample will be collected directly from the tubing into a six-liter laboratory supplied Summa canister at a flow rate of 0.1 L/min using pre-calibrated, laboratory supplied regulators. Holding time for vapor samples is 14 days.

JRH will send the indoor and outdoor air samples Chemtech for analysis of VOCs by EPA Method TO-15. The reporting limits will meet the specification required via TO-15. For example, the limits for TCE are 0.25 ug/m^3 in indoor air and 1.0 ug/m^3 in sub-slab air. PCE and TCA are 1.0 ug/m^3 each for both indoor and sub slab air.

3.6.4 Sample Labels

A sample label will be attached to each sampling container prior to the sampling event. Information to be included on the label will include the following:

- Sample number
- Date and time of sample collection
- Initials of person collecting the sample
- Project number
- Type of preservative, if any.

Individual samples will be identified using a unique sample number that includes the prefix for a location code. Refer to the attached table for sample numbering.

3.6.5 Chain-of-Custody Record and Shipment

There will be no preservatives added in the field. All samples will be transferred to the appropriate sampling containers and placed into a chilled (4^{o}C) transport container for shipment to the laboratory. The chilled transport containers (coolers) will be utilized for temporary storage of the samples. The laboratory will provide sampling containers and coolers.

The shipping container used will be designed to prevent breakage, spills and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the "freezer-pats". The container is to be securely sealed, clearly labeled, and accompanied by a COC record. Separate shipping containers should be used for "clean" samples and samples suspected of being heavily contaminated. During winter months, care should be taken to prevent samples from freezing. Sample bottles will not be placed directly on "freezer-pacs".

Chain-of-custody (COC) procedures will be followed from the time of sample collection to the conclusion of laboratory analysis.

Field COC procedures include:

- Label containers with sample location and sample information plus the intended analytical parameter(s). Date, time and sampler information will be written on the label in the field.
- Complete chain-of-custody forms for all samples en route to laboratory. Upon transferring samples to the laboratory sample custodian, designated staff will sign, date and note the time of transfer on the chain-of-custody form.
- Ship samples in ice chests sealed with custody seals, unless relinquished directly to a laboratory representative. The laboratory sample custodian confirms the integrity of the seals at the laboratory.
- Ensure that the samples are in possession or view of field staff or in secure storage at all times.
- Transport samples to the laboratory as soon as possible, observing appropriate preservation and holding-time requirements.

Upon receipt of the samples at the laboratory, the laboratory sample custodian will inventory the samples by comparing sample labels to those on the COC document. The custodian will enter the sample number into a laboratory tracking system by project code and sample designation. The custodian will assign a unique laboratory number to each sample and will be responsible for distributing the samples to the appropriate analyst or for storing samples in an appropriate secure area.

3.6.6 Decision Points

A normal lab turnaround is required for this project. At that point the data will be provided to and reviewed by JRH and the NYSDEC. The need for additional analyses will be determined at this time as well as the need to collect additional, confirmatory samples at the site.

3.7 Documentation Procedures

Documentation of field procedures, observations, and measurements will be provided through the use of field logs, chain-of-custody, and photographs.

Overall documentation of the nature and timing of field activities will be provided daily in the sampling personnel's field notes. The sample team or individual performing a particular sampling activity will keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated.

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

Good field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), and making regular and complete entries in the field logbook. Proper documentation the field logbook is necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly making the resultant data complete, comparable and defensible.

3.8 Project File Specifications

The Project Manager in his/her office location will keep all project information in a central Project File maintained. The Project File will be assigned a unique project number that will be clearly displayed on all project file folders (including electronic files). Electronic files will be maintained in a similarly organized Project File located on the Central Network system that is backed up on a weekly basis. Both hard copy and electronic Project Files will contain, at a minimum copies or originals of the following key project information:

- All correspondence including letters, transmittals, telephone logs, memoranda, and emails;
- Meeting notes;
- Technical information such as analytical data; field survey results, field notes, field logbooks and field management forms;
- Project calculations;
- Subcontractor agreements/contracts, and insurance certificates;
- Project-specific health and safety information/records;
- Project document output review/approval documentation;
- Reports: Monthly Progress, Interim Technical and Draft/Final Technical.

3.9 Analytical Methods

Constituents of interest at the site include VOCs and SVOCS. Analytical methods will follow standard U.S. Environmental Protection Agency (EPA) procedures.

The analytical instrument methods expected for use during this project are as follows:

Parameter	Instrument Method Summary
VOCs SVOCs	EPA 8260 EPA 8270
Vapors	EPA TO-15

3.10 Equipment Calibration and Maintenance Procedures

All field equipment will be calibrated prior to use according to the manufacturer's instructions. The results of calibrations and any records of repair will be maintained in the field book. Equipment that fails calibration or fails to operate properly will be removed from service and segregated from the operational equipment. Such equipment will be repaired and re-calibrated if possible, or replaced. Preventive maintenance of field equipment is performed according to the procedures indicated in the manufacturer's manuals.

Laboratory analytical equipment and instruments will be calibrated in accordance with the laboratory's internal quality assurance/quality control (QA/QC) program.

3.11 Quality Control Samples

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

Because soil sampling will be conducted, QC field samples proposed for this investigation are duplicates, matrix spike, and matrix spike duplicates. Laboratory QC will include calibration standards, laboratory control samples, reagent blanks, surrogate spikes, and laboratory duplicates.

4.0 DATA VALIDATION AND USABILITY

All field data will be summarized and recorded in the project-specific field book. Descriptive data including soil types, field screening results and observations will be summarized in an appropriate format.

The analytical laboratory will conduct necessary QC calculations that will be summarized in final laboratory reports. Copies of the analytical data will be provided to the NYSDEC as Category B deliverables for review. An electronic copy is desirable but paper copy is acceptable. All final laboratory reports will be included as an appendix or appendices to the final report. All analytical data will also be summarized in tabular form.

Analytical data will be assessed to ensure that they are of acceptable quality. This assessment will include a review of the following:

- Sampling dates
- Dates of analysis
- Requested analysis
- Chain-of-Custody documentation
- Sample preservation
- Holding times
- Method blanks
- Surrogate recoveries
- Laboratory duplicates
- Field duplicates
- Laboratory control samples
- Method reporting limits above requested levels
- Any additional comments or difficulties reported by the laboratory
- Overall laboratory assessment of data quality

Following data validation and reporting, all project-generated and compiled data and information will be reconciled with the project objectives to assess the overall success of sampling activities. This data assessment, including points of achievement and departure from project specific objectives, will be discussed in the QA section of the final report. A data usability summary report (DUSR) as described in the schedule and reporting section of the attached work plan shall be prepared.

5.0 Data Management and Reporting Plan

5.1 Data Use Objectives

The typical data use objectives for this are:

- Confirm that there is no ongoing contamination source present in soil
- Determine the direction of groundwater flow
- Identify sites downgradient of the site that may have conducted groundwater monitoring

5.2 Data Presentation Formats

Project data will be presented in consistent formats for all letters, monthly progress reports (if required), interim technical reports, and draft/final technical reports. Specific formats will be tailored to best fit the needs of the data being presented but general specifications are described below.

5.3 Data Records

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

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

5.4 Tabular Displays

The following data may be presented in tabular displays:

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

5.5 Graphical Displays

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

- Sample location and sampling grid;
- Boundaries of sampling area;
- Constituent concentrations at each sample location;
- Geographical extent of impacts;
- Constituent concentration levels,
- Changes in concentration in relation to distance from the source, time, depth or other parameters;
- Features affecting intramedia transport; and
- Potential receptors.

6.0 GROUNDWATER MONITORING- SAMPLING, PROCEDURES, & PROTOCOLS

The seven wells will be initially monitored and groundwater samples will be analyzed for EPA Method 8260 and EPA Method 8270 constituents by a NYSDOH-certified laboratory and deliverables would conform to NYSDEC ASP Category B. As part of the reporting process, all data will be evaluated and recommendations for modifications in the frequency of sampling and number of wells to be sampled will be presented. Construction details for the selected monitoring wells are provided in Table 1 and the locations are shown on Figure 1. Additional monitoring well survey data are also provided in Table 1.

6.1 Groundwater Sampling Protocols

During each round of sampling, groundwater samples will be collected from the four existing monitoring wells, as well as the three newly installed monitoring wells, using the low flow well sampling techniques described herein.

Prior to a sampling round, water levels will be measured in all monitoring wells. These water level data will be collected on a single date, prior to the field sampling, and will be tabulated and used to compile groundwater contour maps.

Three to five well casing volumes will be purged using a low flow submersible pump and disposable polyethylene tubing or by bailing. Field measurements of pH, specific conductance, and temperature will be collected and documented.

Specific conductance, pH, and temperature will be measured, at a minimum, after each purged volume. Stabilization of these parameters +/- 10% from successive purged volumes indicates that the groundwater within the well is at or approaching equilibrium and the well can be subsequently sampled.

A stainless steel, Teflon, PVC, or polyethylene bailer will be used to obtain the groundwater samples. Samples must be collected within three (3) hours of purging. All samples will be sent to the laboratory for analysis within 24 hours of sampling.

The following standard protocol for groundwater sampling has been established to conform to NYSDEC rules and regulations. The standard methods for preparation, collection and transfer of groundwater samples, as well as record keeping, are detailed below. These methods must be followed to provide representative samples of chemical analysis.

After collection of an acceptable sample in accordance with this protocol, the sample will be submitted to a NYSDOH ELAP certified laboratory. The preparation, collection, preservation, transfer and record keeping of each sample will be coordinated with the analytical laboratory to ensure reliable test results.

6.2 Sampling Periods

The wells will be monitored and the groundwater samples will be analyzed for EPA Method 8260 and 8270 constituents by a NYSDOH- certified laboratory and deliverables would conform to NYSDEC ASP Category B. As part of the reporting process, all data will be evaluated and recommendations for modifications in the frequency of sampling and number of wells to be sampled will be presented.

6.3 Pre-Sampling Preparation/Equipment

- Health and Safety: The health and safety protocols for sample collection will conform to typical Level D industry standards.

- Authorized Personnel: All individuals involved in the sampling will have read this Plan, be technically qualified, and follow the protocol whenever groundwater samples are obtained.

- Staging: Prior to any sampling event, personnel will take the following steps responsible for sampling:

  1. Review the sampling procedures;
  2. Assemble and inspect field equipment necessary for sample collection, and verify that equipment is clean and in proper working order;
  3. Calibrate equipment to the manufacturer's specifications;
  4. Examine shuttles, bottles and preservatives. Contact the laboratory immediately if any problems are found or observed;
  5. Confirm sample delivery time and method of sample shipment with the laboratory;
  6. Establish a well purging and sampling schedule for the activities to be performed each day; and
  7. Establish a temporary staging area consisting of plastic sheeting.

6.4 Groundwater Level Measurement Procedures

a. Clean all water-level measuring equipment (e.g., steel tape or water level indicator) using appropriate decontamination procedures.

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

   1. Remove well casing cap.

   2. Measure the static water level in the well with a decontaminated steel tape or electronic water level indicator. The tape or water level indicator shall be rinsed with deionized water in between individual wells to prevent cross-contamination. Synoptic rounds of water level measurements shall all be completed in the same day.

3. Measure distance from water surface to reference measuring point on well casing, and record in field notebook. (Note that the measurement is being taken from the established survey reference mark (notch) located at the top of the PVC riser pipe in each well.

4. Measure total depth of well and record in field notebook or on log form. All water level measurements are to be recorded to the nearest 0.01-foot.

5. Remove all down hole equipment, replace and secure well casing cap and locking protective caps.

6. Calculate elevation of water:

EW = E –D

Where:

EW = Elevation of water;

E = Elevation of point of measurement (i.e., survey reference point); and

D = Depth to water

6.5 Procedures for Well Purging

Well purging is necessary to obtain a sample representative of the groundwater in the formation and not standing/stagnant water in the well.

- Examination of the well

1) Identify the well and record the well number of the field data sheet.
2) Verify that the well is not damaged. Notify the JHH if well damage is obvious or suspected, so that the well can be repaired or replaced.
3) Put on new disposable gloves.
4) Carefully remove well cover to avoid entry of foreign material into well.
5) If needed, the exterior and interior of the exposed protective well box should be wiped with clean filter paper (or equivalent) wetted with distilled water.

- Purging the Well
-

1) Three to five casing volumes of water will be removed from the well prior to sampling with either a submersible pump and dedicated polyethylene tubing, or with a dedicated bailer, or properly decontaminated bailer (stainless steel, Teflon or PVC). The well volume is calculated using the following formula:

$$V = R^2 (H)(0.49)$$

Where: V = standing water volume, in gallons, to be purged

R = inside radius of well in inches

H=linear feet of standing water in the casing (total depth to groundwater)

0.49 = correction factor that includes conversion from inches to feet and *assumes* three well volumes will be purged

OR: purge until water temperature, conductivity and pH stabilize (i.e., remain constant within 10% of each reading). If a well purges dry or is slow to recharge, only one well volume of water needs to be purged.

2) Temperature, specific conductance, and pH will be measured during purging. At a minimum, measurements will be taken after each well volume purged.

3) All purging and sampling equipment must be stored and transported in a manner that minimizes the possibility of accidental contamination.

6.6 Procedures for Record Keeping

1) The sampling team will record the following information regarding the well purging procedure in the field notebook and/or on a Groundwater Sampling Record/Field Observation Log such as the form shown in Figure 3:

- Day/date/time
- Weather conditions
- Air temperature
- Condition of the well (rusty, bent casing, etc.)
- Person(s) doing the purging
- Groundwater level prior to purging
- Depth to the bottom of the well
- Minimum volume of groundwater to be purged (3 well volumes)
- Chemical properties of evacuated water: temperature specific conductance, pH
- Method of purge water disposal

- Physical properties of evacuated water: Color, odor, turbidity, presence of sheen
- Volume of groundwater purged from the well.

The following field measurement procedures that discuss specific steps in the calibration and use of field instruments should be interpreted to reflect the manufacturer's recommended procedures for the actual instruments being utilized.

6.7 Procedures for the Measurement of Groundwater pH and Temperature

6.7.1 Calibration

a) Immerse the tip of the electrode in water overnight. If this is not possible due to field conditions, immerse the electrode tip in water for at least an hour before use.
b) Rinse the electrode with demineralized water.
c) Immerse the electrode in a pH 7 buffer solution.
d) Adjust the temperature compensator to the proper temperature.
e) Adjust the pH meter to read 7.0.
f) Remove the electrode from the buffer and rinse with demineralized water.

6.7.2 Measurement

a) Collect a groundwater sample using either a stainless steel, Teflon or PVC bailer and pour a small amount of this sample into an extra sample jar that will not be used to store chemically analyzed samples.

b) Immerse the electrode into the extra sample jar. Do not immerse the electrode into a sample that will be analyzed by the laboratory.

c) Read and record the pH of the solution after adjusting the temperature compensator to the sample temperature.

d) Rinse the electrodes with demineralized water.

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

f) Record Results in the field notebook.

6.8 Procedure for the Measurement of Groundwater Specific Conductance

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

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

c) Immerse the electrode in the sample and measure the conductivity.

d) Adjust the temperature setting to the sample temperature.

e) Record the results in the field notebook.

6.9 Procedures for Groundwater Sampling

The following procedure shall be used for monitoring well groundwater sampling:

a) Prepare for purging. Decontaminate bailer and discard rope. If a submersible pump is used, discard pump discharge line. If using a disposable bailer and dedicated rope, prepare new bailer and appropriate length of rope.

b) After purging, allow static water level to recover for ten minutes.

c) Obtain sample from well with either a stainless steel, Teflon, PVC or disposable bailer suspended on either a polypropylene monofilament or a stainless steel, coated-coated wire. The maximum time between purging and sampling will be three (3) hours.

d) Lower the bailer slowly to avoid degassing.

e) Collect samples by pouring bailers directly into sample bottles from bailers.

f) Place samples in cooler and chill to 4°C. Samples will be delivered to the designated laboratory within 24 hours.

g) Re-lock well cap.

h) Fill out field notebook, well sample log sheet, labels, custody seals and chain-of-custody forms.

6.10 Field Procedures Documentation

Data reporting practices will be followed carefully and data entries will be validated regularly to ensure that raw data are accurate. All the field data generated during field measurements, observations and field instrument calibrations, will be entered directly into a bound field notebook.

One or more bound books will be maintained for the site, and each book will be consecutively numbered. The books will remain with the main project files. Copies will be made for the JHH and for the person who made the entries, if requested.

All entries in the logbook will be made in ink. When a mistake is made in the log, it will be crossed out with a single ink line and will be initialed and dated. Special care will be taken in the description and documentation or sampling procedures. Sampling information to be documented in the field notebook and/or associated forms are as follows:

- Weather conditions;

- Sample number;
- Date and time of sample collection;
- Source of sample (well, trench, etc.);
- Purged well – type of equipment, purge volume, rate of purge, decontamination procedures and method of disposal;
- Location of sample – document with a site sketch and/or written description of the sampling location so that accurate re-sampling can be conducted if necessary;
- Sampling equipment (i.e. bailer);
- Analysis and QA/QC required;
- Filtering, if required;
- Field instrument calibration including date of calibration, standards used and their source, results of calibration and any corrective actions taken;
- Field data (pH, temperature, conductivity, etc.);
- Field observations – all significant observations will be documented;
- Sample condition (color, odor, turbidity, sheen, etc.);
- Site conditions;
- Sample shipping procedure, date, time, destination, and if legal seals were attached to transport container(s);

  Comments – Any observation or event that occurred that would be relevant to the site; for example weather changes and effect in sampling.

6.11 QA/QC Sampling

Field Blanks will be collected to evaluate the cleanliness of groundwater sampling equipment, sample bottles, and the potential for cross-contamination of samples due to airborne contaminants present in the air at the site during handling of equipment and sample bottles. Field blank samples will be collected from the bailers used to collect the groundwater samples. The frequency of field blanks taken will be one per decontamination event for each type of sampling equipment, at a minimum of one per equipment type per day.

Where required, field blanks will be obtained prior to the occurrence of any analytical field-sampling event by pouring deionized or potable water over a particular piece of sampling equipment and into a sample container. The analytical laboratory will provide field blank water and sample containers with preservatives for the collection of field blanks. The field blanks, as well as the trip blanks will accompany field personnel to the sampling location.

The field blanks will be analyzed for the same parameters as the samples and shall be shipped with the samples taken subsequently that day. Field Blanks shall be taken in accordance with the procedure described below:

a) Decontaminate sampler/sampling equipment using the procedures specified in this plan.

b) Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate sample bottles.

c) The sample shall be immediately placed in a sample cooler and maintained at a temperature of 4°C (39.2°F) until received by the laboratory.

d) Fill out sample log, labels and chain-of-custody forms, and record in field notebook.

If disposable bailers are utilized, the first step in the procedure will be deleted and replaced as follows:

- Remove wrappings from a brand new, unused disposable bailer.

A laboratory supplied trip blank consisting of an aliquot of distilled, deionized water, which will be sealed in a sample bottle(s) prior to initiation of sampling. The trip blank will be used to determine if any cross contamination occurs between aqueous samples and/or the environment during shipping. Trip blanks will be analyzed for aqueous VOCs only. The laboratory will prepare glass vials (40 ml) with Teflon-lined lids prior to sampling. The sealed trip blanks will be placed in a cooler with the empty sample bottles and brought to the site by laboratory personnel or via overnight courier. One trip blank per shipment will be analyzed.

Duplicate samples will be collected and analyzed to check laboratory reproducibility of analytical data. At least 5% (one per every 20 samples) of the total number of samples collected samples will be duplicated to evaluate the precision of the methods used. Duplicate samples will be collected using the same method as non-duplicate samples. Bottles for the sample and duplicate sample will be filled alternately until all sample and duplicate sample bottles have been filled.

Matrix spike (MS) and matrix spike duplicates (MSD) for organic analysis are preformed at a rate of at least 5% (one per every 20 samples) of the total number of samples collected. Further, reanalysis is required at times, due to determination of anomalous results during analysis. To ensure that the laboratory has sufficient volume for the MS/MSD analysis, triple sample volume must be submitted for aqueous organic extractable and volatile samples once per every 20 samples in a sample delivery group (SDG).

6.12 Corrective Action

If, during the course of sampling, it is determined that field procedures are not yielding representative groundwater samples, this Plan will be modified as required and reported to the JHH and the NYSDEC. Any alteration to field procedures will be included as an amendment to the Plan.

6.13 Selected Laboratory and Sample Analysis

Soil and groundwater samples will be analyzed by Chemtech Consulting Group (NYSDOH Certification No. 2222). After installation the well points will be allowed rest a minimum of twenty four hours prior to sampling to allow the point to equilibrate to surrounding pressures. These three new monitoring wells, along with the four existing wells will be sampled and sent to the lab the same day to ensure accuracy. Soil sampling will be performed for the purpose of classifying soils and determining the presence of groundwater. No soil samples will be submitted for laboratory analysis, although samples will be screened for volatile organics using a photoionization detector (PID) or equivalent.

7.0 SOIL-GAS SAMPLING PROCEDURE

At each monitoring point location a small diameter borehole will be hand drilled through the floor slab to a depth of two inches below the slab base. Section 2.7.2 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York will be used as a guideline. Following is a brief description of the methodology.

(1) *The soil-gas monitoring points will be sampled by inserting 1/8-inch to ¼ inch diameter polyethylene tubing into the boring to a depth of two inches below the top of the slab.*

(2) *The hole is sealed with a rubber stopper to form an airtight seal and prevent ambient air from entering.*

(3) *The tubing is purged to ensure a representative sample can be collected.*

(4) *Purging is conducted using a hand-held SKC pump (or equivalent) at a rate of 0.1 liters per minute (L/min).*

(5) *Following purging, the sample is collected directly from the tubing into a Summa canister at a flow rate of 0.1 L/min).*

(6) *Samples are sent via laboratory or overnight courier to Chemtech or equivalent NYSDOH-certified laboratory for analysis.*

(7) *EPA Method TO-15 will be used to analyze the samples for VOCs.*

When collecting the samples, it will be determined if there is communication between the two sample points in the building. Recording the ambient static air pressure by using a meter does this. At the second point, apply a slight suction to the hole. Next, check the first point to see if there is a change in the gauge reading from its original reading.

Soil gas samples will be sent via laboratory or overnight courier to Chemtech Laboratories of Mountainside, New Jersey, a NYSDOH-certified laboratory for analysis. EPA Method TO-15 will be used to analyze samples for VOCs.

8.0 MONITORING WELL INSTALLATION-Shallow and Deep wells

(1) Identify the proposed location of the monitoring well boring. Perform a brief site survey, to determine the location of pre-called mark outs and potential underground and above ground utilities. Decide to hand clear using a posthole digger or hand auger to five feet below grade.

(2) Determine the desired depth of the proposed monitoring well, and the corresponding number of rods, which will be needed to meet the criteria.

(3) Remove the machine and accompanying mobile power unit from the trailer, using caution when moving it down the ramp. Fill the gas tank if needed.

(4) Move the Geoprobe™ into position over the borehole location. After connecting the power cables, unfold the probe, and place in the proper probing position.

(5) Lay out all accessory equipment near the work site beforehand, such as probe rods, caps, etc. that will be used in the survey.

(6) Perform an initial test probe. Attach a 1" drive point to the threaded end of a point holder. Add a drive cap to the holder, and place under the probe hammer in the driving position (see Owner's Manual), and turn on the Geoprobe™ power source. Drive the point holder into the ground, until the drive cap is a few inches above the surface. Remove the drive cap, thread a 1" probe rod onto the holder, and drive once again. Thread successive rods in a similar manner until reaching desired depth.

*Note: Each Geoprobe™ operator must wear the required personal protection gear before operating the machine. Please refer to Health and Safety Plan for details.

(7) Remove the probe rods using the Rod Grip Puller, attaching a puller cap to the top probe rod, retracting upward with the machine, and detaching each successive rod.

(8) Attach an expendable drive point to the threaded end of a point holder. Add a drive cap to the holder, and place under the probe hammer in the driving position. Drive the point holder into the ground, until the drive cap is a few inches above the surface. Remove the drive cap, and thread successive probe rods in the same manner as described above. Make sure that the probe rod assembly is straight as it is being driven into the ground. After reaching the required depth, the well can be installed.

(9) For PVC Caps: Attach a cap to the end of a screen(s). Thread one or two five-foot risers to the top of screen assembly. With the assistance of a second person, firmly grasp and lower the assembly through the circular opening in the top probe rod, without releasing and dropping the assembly to the borehole bottom. Attach additional five foot. riser sections until the assembly reaches the bottom of the probe rods (the well bottom). At least one foot of riser should extend past the top probe rod above the ground surface.

(10) To retract the probe rods surrounding the well pipe, reposition the probe machine so the Rod Grip Puller can be attached to the lower portion of the top probe rod. One person should operate the Geoprobe™ machine while a second person grasps and firmly presses down on the PVC screen/riser assembly. Observe whether the risers stay in place or move up with the rods. If risers stay in place, stable formation conditions are present. Continue retracting and detaching each successive probe rod.

(11) If risers move up with the probe rods, the drive point is likely located in heaving sands.
If the rods continue to rise, place a piece of spare PVC riser over the top of the riser, and carefully hammer the assembly back into the ground as rods are retracted. (Do not hammer directly on the pipe as this could damage or contaminate the opening).

(12) Create a sand barrier around the well screen by pouring Morie Number One sand (or equivalent) into annular space to two-feet above the top of the well screen. (Note: some sand may already be present due to collapse of the formation). The sand forms a barrier, which prevents the grout from penetrating into the aanular space around the well screen..

(13) Next, grout the annular space above the sand pack. Use medium-sized bentonite chips (such as Pure Gold™), which are poured on the top of the sand pack in the annular space surrounding the riser. Sufficiently hydrate the bentonite by pouring tap water on top of it, which initiates the sealing process. This should be done to at one foot below land surface.

(14) If not immediately sampling, label the riser cap with permanent ink, add a surface cover (preferably water resistant) and secure cover with electrical/duct tape.

(15) If necessary, thoroughly clean and scrub all Geoprobe equipment (probe rods, caps, etc.) with soap and water. Then complete a final rinse of equipment with distilled water. Be sure to wear thick rubber gloves while cleaning.

Attachment C

SITE HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

Supplemental Investigation
Van Tassel Cleaners
130 Wildey Street
Tarrytown, New York

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Project No. RMC 06-01
September 2007

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1.0 INTRODUCTION

This section of the Site Health and Safety Plan (HASP) document defines general applicability and general responsibilities with respect to compliance with Health and Safety programs. This plan has been prepared for soil sampling activities to be conducted to determine if subsurface contamination is present. Soil and groundwater sampling activities are estimated to occur over a one-week period with follow-up sampling as necessary.

1.1 Scope and Applicability of the Site Health and Safety Plan

The purpose of this HASP is to define the requirements and designate protocols to be followed at the Site during supplemental investigation activities. Applicability extends to all government employees, contractors, subcontractors, and visitors.

All personnel on site, contractors and subcontractors included, shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This HASP summarizes those hazards in Table 3.1 and defines protective measures planned for the site.

This plan must be reviewed and an agreement to comply with the requirements must be signed by all personnel prior to entering the exclusion zone or contamination reduction zone.

During development of this plan, consideration was given to current safety standards as defined by the Environmental Protection Agency (EPA)/Occupational Health and Safety Administration (OSHA)/National Institute of Occupational Safety and Health (NIOSH), health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following reference sources have been consulted:

- OSHA 29 CFR 1910.120 and EPA 40 CFR 311
- USEPA, Office of Emergency and Remedial Response, Emergency Response Team, Standard Operating Safety Guides
- NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values

1.2 Visitors

There will be no outside visitors allowed at the sampling locations. Outside visitors are defined as those not directly involved with investigation activities.

2.0 KEY PERSONNEL/IDENTIFICATION OF HEALTH AND SAFETY

2.1 Key Personnel

The following personnel and organizations are critical to the sampling activities at the site estimated to occur over a one-week period. The organizational structure will be reviewed and updated periodically by the site supervisor.

Field Investigation Team (FIT) Representatives:

Jim DeMartinis (JRH)-Project Manager
Eric Geisbusch (JRH)
Andrea Kartee (JRH)

JRH is defined as J.R. Holzmacher P.E., LLC. All persons involved at the site will have OSHA HAZWOPER training.

2.2 Site Specific Health and Safety Personnel

The Site Health and Safety Officer (SHSO) has responsibility for ensuring that the provisions of this HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. The SHSO is also responsible for conducting site inspections on a regular basis in order to ensure the effectiveness of this plan.

The SHSO at the site is Jim DeMartinis (JRH).

Designated alternates include:

Eric Geisbusch (JRH)
Andrea Kartee (JRH)

2.3 Organizational Responsibility

The FIT is responsible for performing the sample collection activities delineated in the Supplemental Investigation Work Plan including the following tasks:

1. Soil Screening and Sampling
2. Groundwater Sampling

3.0 TASK SAFETIES AND HEALTH RISK ANALYSIS

3.1 Historical Overview of Site

This HASP defines the hazards and methods to protect personnel from those hazards identified in previous site work or background information. An overview of historical information concerning the site is contained in the following document:

- The Remedial Action Plan for Van Tassel Cleaners, 130 Wildey Street, Tarrytown, New York dated January 2005 and prepared by JRH.
- The Supplemental Investigation Work Plan for Van Tassel Cleaners, 130 Wildey Street, Tarrytown, New York dated March 2007 prepared by JRH.

The subject property is a dry cleaner within an approximate 3.3-acre parcel located on the southeast corner of the intersection of Wildey and Cortlandt Streets in Tarrytown, New York. The entire parcel is improved with two commercial/retail buildings. Building one is an approximate 24,000 square foot, one-story, masonry structure with no basement. It is now occupied by Walgreens. Building two is an approximate 9,000 square foot, one story masonry structure with no basement. Building two is a strip-mall divided into six units each occupied by separate tenants including Van Tassel Cleaners, the subject of previous and ongoing environmental investigations.

A Phase I Environmental Site Assessment (ESA) of the property was conducted in 1998 identified three potential environmental concerns, which warranted additional investigation to determine if they presented a significant environmental risk to the property. The outstanding issues were as follows:

- Underground waste oil storage tank - The site inspection conducted as part of the Phase I ESA revealed the presence of a 550-gallon underground fuel oil tank located on the north side of Building Two (west end).

- Suspect Asbestos Containing Materials (ACM) - Due to the age of the strip-mall building PSI indicated that there was a potential that asbestos containing materials were present. Samples were collected from the building and analyzed for asbestos. Floor tile located in the dry cleaning shop were determined to contain asbestos above regulatory limits. Because the materials were in good condition PSI recommended removal was not warranted, but that the ACM be managed under an Operations and Management (O&M) Plan.

- Dry Cleaning Operations - The dry cleaning shop was operated with an open loop cleaning system until 1980 when the facility was converted to a closed loop system. Due to the presence of the open loop system there is a potential that dry cleaning chemicals were discharged to the environment, therefore, it was recommended that a limited subsurface investigation be performed to determine if historical dry cleaning operations have impacted the subsurface.

In 1998 a limited subsurface or Phase II ESA investigation of the site was conducted. Analytical results indicated that tetrachloroethene (a/k/a PCE and perc) was detected at elevated concentrations in both soil and water. Trichloroethene and cis-1, 2-dichloroethene, degradation products of PCE were also detected in each of the two groundwater samples collected, but at concentrations below their respective groundwater standards.

Subsequently a focused subsurface site investigation was conducted on the site. Analytical results indicated that one or more SVOCs were detected at concentrations above their respective Recommended Soil Cleanup Objectives (RSCOs). PCE and vinyl chloride were detected in groundwater collected at concentrations equal to or above their respective groundwater standards. The presence of SVOCs in soil at the site was likely related to fill material while the presence of PCE and vinyl chloride are likely attributable to dry cleaning operations.

The underground fuel oil tank was removed and replaced in 2004. Representatives of the Village of Tarrytown were on-site to inspect the installation of the new tank. Upon removal the tank was visually inspected and documented to be intact with no evidence of leaks or holes. No evidence of impacted soils was noted in the excavation. Analytical results for the excavation indicated that SVOCs were detected at concentrations exceeding their respective RSCOs. Although the detected SVOC compounds can be associated with fuel oil, based on visual inspection of the tank, tank excavation, and soil boring data, they are most likely attributable to the fill materials (creosote treated wood, brick, concrete, metal fragments) beneath the site.

Four shallow groundwater-monitoring wells (MW-1 through MW-4) were installed and sampled in March 2004. Analytical results indicate that vinyl chloride was detected in the samples collected from wells MW-1, MW-2 and MW-3 at concentrations above the groundwater standard. Tetrachloroethene (PCE) was detected in the sample collected from well MW-3 at a concentration slightly above the groundwater standard. PCE and cis-1, 2-dichloroethene were also detected in sample MW-2, but at concentrations below their respective groundwater standards. No VOCs were detected above their respective groundwater standards in sample MW-4.

On October 7, 2004, JRH conducted a second round of gauging groundwater sampling. Analytical results indicated that vinyl chloride was detected in the samples collected from wells MW-1, MW-2 and MW-3 at concentrations above the groundwater standard. Vinyl chloride was also detected in these wells during the March 2004 sampling event. Tetrachloroethene (PCE) was detected in the sample collected from well MW-3 at a concentration slightly above the groundwater standard. PCE was also detected in sample MW-2, but at a concentration below the groundwater standard. Cis-1, 2-dichloroethene was detected in the samples from well MW-2 and MW-3 at concentrations slightly exceeding the groundwater standard. Cis-1, 2-dichloroethene was also detected in the sample from well MW-1 (4.8 ug/l), but at a concentration below the groundwater standard. Trichloroethene (TCE) was detected in samples MW-2 and MW-3, but at concentrations below the groundwater standard. No VOCs were detected above their respective groundwater standards in sample MW-4.

Additional subsurface Investigations were conducted in and around the dry cleaner in 2005 and confirmed previous findings. However, the ability to investigate certain locations was hampered by property lines, underground utilities and the presence of a second concrete slab below the dry cleaner.

3.2 Task-by-Task Risk Analysis

The evaluation of hazards is based upon the knowledge of the site background presented in Section 3.1 above, and anticipated risks posed by the specific tasks to be performed.

The following subsections describe each task/operation in terms of the specific hazards associated with it. In addition, the protective measures to be implemented during completion of those tasks are also identified.

Table 3.1 provides a summary of task analysis and chemical hazards potentially encountered at the Site.

Table 3.1
TASK ANALYSIS
POTENTIAL CHEMICAL HAZARDS OF CONCERN

Chemicals	PEL/TLV	IDLH	Warning Properties	Routes of Exposure of Irritation
Vinyl Chloride	1/5 ppm	5 ppm	Pleasant odor	Inhalation
Perchloroethene	25/25 ppm	150 ppm	Colorless, nonflammable liquid with ether-like odor	Inhalation, Injestion, Skin Contact
Trichloroethene	25/50 ppm	1000 ppm	Sweet chloroform-like odor	Inhalation, Ingestion, skin contact
1,1-Dichloroethene	1/5 ppm	20 ppm	Colorless liquid with slightly acrid chloroform-like odor	Inhalation
1,2-Dichloroethene	200/200 ppm	1000 ppm	Pleasant, aromatic odor	Inhalation, ingestion, skin contact
PAHs	0.2 mg/m^3	1750 mg/m^3	Black or brown amorphous liquid	Inhalation, dermal

NE – Not established

Ca – Cancer
Notes:
1. PEL= Permissable Exposure Limit-Time weighted average (8 hours)
1. TLV = Threshold Limit Value-Time weighted average (8 hours)
2. IDLH = Immediately Dangerous to Life or Health

3.3 Physical Hazards -Soil Sampling

A. Hazard Identification and Prevention

- Safety related work practices would be used to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Overhead power lines, buried cables and electrical equipment used on site all pose a danger of shock or electrocution if workers contact or sever them during field operations.

- New York State law requires that a utility mark out to be performed at a site at least 72 hours prior to starting any subsurface work. JRH's drilling subcontractor will contact Dig Safely at 1-800-962-7962 to request a mark out of underground utilities in the proposed excavation and drilling areas. Work will not begin until the required utility clearances have been completed.

- Public utilities typically do not mark-out utility lines that are located on private property. Therefore, JRH will exercise due diligence and try to identify the location of any private utilities at the site. A private utility contractor will clear on-site subsurface disturbance locations for utilities prior to the commencement of any such work. JRH will also use as-built drawings for the area being investigated, perform a line locating survey, and identify a no-dig/drill zone and hand dig if there is insufficient data to determine the location of utility lines.

- Care must be taken to ensure loose clothing does not get tangled in any moving equipment while borings are being drilled.

- There may be slip or trip hazards associated with rough, slippery or elevated work surfaces at the site. The sampling sites could contain a number of slip, trip and fall hazards for site workers, such as: holes, pits, or ditches; excavation faces and slippery surfaces (steep grades, uneven grades, snow and ice and sharp objects).

- Drilling or excavating is dangerous during electrical storms. All field activity must terminate when thunderstorms are evident. Extreme heat and cold, ice and heavy rain can produce unsafe conditions for drilling work. Such conditions, when present, will be evaluated on a case-by-case basis to determine if work shall terminate.

- The use of an excavator and other equipment that are gasoline or fuel powered presents the possibility of encountering fire and explosion hazards.

- Plants and animals that are known to be hazardous to humans may affect work that takes place. Spiders, bees, wasps, hornets, ticks, poison oak and poison ivy are only some of the hazards that may be encountered. Individuals who may potentially be exposed to these hazards should be made aware of their existence and instructed in their identification. Emergencies resulting from contact with a natural hazard should be handled through the normal medical emergency channels. Individuals who are sensitive to these types of "natural" hazards should indicate their susceptibility to the SHSO.

- Work on-site will involve the use of heavy construction equipment such as an excavator. The unprotected exposure of site workers to this noise during field activities can result in noise induced hearing loss. The SHSO will monitor the noise exposure for the initial trip and determine whether noise protection is warranted for each of the team members. The SHSO will ensure that either ear muffs or disposable foam earplugs are made available to all personnel and are used by the personnel in the immediate vicinity of the field operation as required.

3.4 Chemical Hazards

3.4.1 General Description

There is no evidence that contamination is present at this site. However, potential chemical hazards at this site are evaluated below. It is anticipated that petroleum compounds and dust could be of concern. The potential for exposure to vapors, contaminated dusts, and contaminated soil/groundwater during surface during drilling is of utmost concern.

3.4.2 Potential Chemical Health Hazards

Perchloroethene (PCE)

Perchloroethene is a colorless, nonflammable liquid with an ether-like odor, with an OSHA PEL of 300 ppm. The ACGIH has established a TLV of 25 ppm for this chemical due to its harmful effects. Exposure to perchloroethene above the Permissible Exposure Limit (PEL) can eventually produce unconsciousness and death. Early signs of exposure include buildup of fluid in the lungs, eye and respiratory irritation, severe shortness of breath, sweating, nausea, dizziness, confusion, difficulty speaking, and lightheadedness. Long-term exposure may also damage the central nervous system, liver, and kidneys, memory loss, and respiratory failure.

Vinyl Chloride

Vinyl Chloride is a manufactured colorless gas that does not occur naturally. The ACGIH has established a TLV of 1 ppm for this chemical due to its harmful effects. This chemical is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire coatings, and packaging materials. Liquid vinyl chloride breaks down easily into other chemicals, some of which are harmful. Early signs of short-term exposure at high levels include sleepiness, weakness, GI bleeding, and abdominal pain. Long-term exposure at high levels includes cancer, blood and lymphatic system damage, and liver damage, maybe even death.

Polycyclic Aromatic Hydrocarbons (PAHS or SVOCs))

PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances such as tobacco or charbroiled meat. PAHs are regulated based on effects of respiratory tract and skin irritation as well as eye irritation and nervous system disturbances. Acute exposures cause difficulty in breathing, skin/eye irritation and burns.

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

3.4.3 First Aid

If soil or groundwater comes in contact with the eyes immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Contact lenses should not be worn but can be protected by safety glasses/goggles. If contaminated soil comes in contact with the skin, wash the skin with soap and water prior to leaving the site. If a person breathes in large amounts of dust, move the exposed person to fresh air at once. If contaminated soil has been swallowed, get medical attention immediately (NIOSH, 1987).

4.0 PERSONNEL REQUIREMENTS

Consistent with OSHA 29 CFR 1910.120 regulation covering Hazardous Waste Operations and Emergency Response, all site personnel are required to be trained in accordance with the standard. At a minimum, all personnel are required to be trained to recognize the hazards on-site, the provisions of this HASP, and the responsible personnel. The SHSO at the site pre-entry briefing(s) or periodic site briefings will discuss this plan.

5.0 PERSONNEL PROTECTIVE EQUIPMENT TO BE USED

This section describes the general requirements of the EPA designated Levels of Protection (A through D), and the specific levels of protection required for each task at the Site.

5.1 Levels of Protection

Personnel will wear the appropriate protective equipment when response activities involve known or suspected atmospheric contamination, vapors, gases, or particulates may be generated by site activities, or when direct contact with skin-affecting substances may occur. Full face piece respirators protect lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals.

The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B is the primary level of choice when encountering unknown environments.

Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.

Level D: Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective ensemble (i.e., material, format) will depend upon contaminants and degrees of contact.

The Level of Protection selected is based upon the following:

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

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

5.2 Level D Personnel Protective Equipment:

- Disposable Tyvek^{R} coveralls (as needed)
- Disposable Nitrile Exam gloves (as needed)
- Disposable Tyvek^{R} booties (as needed)
- Steel-tipped work boots
- Safety glasses
- Hard hat
- 3M N95 Dust Masks with Exhalation Valves (if needed)

5.3 Reassessment of Protection Program

The Level of Protection provided by PPE selection shall be upgraded or downgraded based upon changes in site conditions or investigation findings. When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

- Commencement of a new work phase.
- Change in job tasks during a work phase.
- Change of season/weather
- When temperature extremes or individual medical considerations limit the effectiveness of PPE.
- Change in work scope, which affects the degree of contact with contaminants.

5.4 Work Mission Duration

Before the workers actually begin work in their PPE ensembles, the anticipated duration of the work mission will be established. Several factors limit mission length, including:

- Air supply consumption (SCBA use)-**Not Applicable.**
- Suit/Ensemble permeation and penetration rates for chemicals-**Not Applicable.**
- Ambient temperature and weather conditions (heat stress/cold stress).
- Capacity of personnel to work in PPE.

5.5 Personal Protective Equipment Recommended for Site

The following specific clothing materials are recommended for the site:

A. Soil Sampling – Level D

Site activities will require PPE as follows: hardhat, disposable Tyvek^R coveralls (if needed), disposable Tyvek^R booties (if needed), safety glasses and chemical resistant gloves. Particulate respirator-3M N95 Dust Masks with exhalation valves will be available.

5.6 SOP for Personal Protective Equipment

Proper inspection of PPE features several sequences of inspection depending upon specific articles of PPE and it's frequency of use. The different levels of inspection are as follows:

- Inspection and operation testing of equipment received from the factory or distributor.
- Inspection of equipment as it is issued to workers.
- Inspection after use or training and prior to maintenance.
- Periodic inspection of stored equipment.
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.
- The primary inspection of the PPE in use for activities at the Site will occur prior to immediate use and will be conducted by the user. This ensures that the specific device or article has been checked-out by the user and that the user is familiar with its use.

TABLE 5.1
SAMPLE PPE INSPECTION CHECKLIST

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - Imperfect seams
  - Non-uniform coatings
  - Tears
  - Malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
  - Observe for cracks
  - Observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack:

- Discoloration
- Swelling
- Stiffness

During the work task:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
- Closure failure.
- Tears.
- Punctures.
- Seam Discontinuities.

GLOVES

Before use:

- Visually inspect for:
  - Imperfect seams
  - Tears
  - Non-uniform coating
  - Pressurize glove with air; listen for pinhole leaks.

5.7 Specific Levels of Protection Planned for the Site

The following levels of protection will be utilized during activities at the Site:

- Level D

6.0 FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

This section explains the general concepts of an air-monitoring program and specifies the surveillance activities that will take place during project completion at the Site.

The purpose of air monitoring is to identify and quantify airborne contaminants in order to verify and determine the level of worker protection needed. Initial screening for identification is often qualitative, i.e., the contaminant, or the class to which it belongs, is demonstrated to be present, but the determination of its concentration (quantification) must await subsequent testing. Two principal approaches are available for identifying and/or quantifying airborne contaminants:

- The on-site use of direct-reading instruments.

- Laboratory analysis of air samples obtained by a gas-sampling bag, collection media (i.e., filter, sorbent) and/or wet-contaminant collection methods.

6.1 Direct-Reading Monitoring Instruments

Unlike air sampling devices, which are used to collect samples for subsequent analysis in a laboratory, direct-reading instruments provide information at the time of sampling, enabling rapid decision-making. Data obtained from the real-time monitors are used to assure proper selection of personnel protection equipment, engineering controls, and work practices. Overall, the instruments provide the user the capability to determine if site personnel are being exposed to concentrations that exceed exposure limits or action levels for specific hazardous materials.

Of significant importance, especially during initial entries, is the potential for IDLH conditions or oxygen deficient atmospheres. Real-time monitors can be useful in identifying any IDLH conditions, toxic levels of airborne contaminants, flammable atmospheres, or radioactive hazards. Periodic monitoring of conditions is critical, especially, as exposures may have increased since initial monitoring or if new site activities have commenced.

6.2 Site Air Monitoring and Sampling Program

A. Air Monitoring Instruments

- **Organic Vapor Monitoring**

Instrument : Photoionization Detector (PID) with for use during all intrusive activities (10.6 Ev lamp).

Monitoring for organic vapors will be conducted in the breathing zone of employees using a PID during intrusive activities. Refer to Table 6.1 for total volatile organic vapor and benzene action levels.

- **Combustible Gas Monitoring**

Instrument: Combustible Gas Indicator (CGI)/ Oxygen Meter

Continuous air monitoring with a CGI/Oxygen meter will be conducted in areas where flammable vapors or gases are suspected. All work activities must stop where the monitor indicates the concentration of flammable vapors exceeds ten percent of the lower flammable limit (LEL) at a location with a potential ignition source. The area must be ventilated to reduce the concentration to below ten percent of the LEL.

- **Dust Monitoring**

Instrument: TSI DustTrak Model 8520 (or equivalent)

Continuous dust monitoring during all site activities will be conducted. Dust mitigation must be employed should readings exceed 10 mg/m^3.

- **Calibration and Record Keeping**

Equipment used will be calibrated in accordance with the manufacturers' specifications. The PID and CGI will be calibration checked before and after use under approximately the same conditions at which the instrument will be used. Calibration information will be kept in the field notebook or instrument log. The date, time, location, instrument serial number, calibration gas and concentration, will be noted.

B. Action Levels

TABLE 6.1		
SITE AIR MONITORING AND SAMPLING PROGRAM SUMMARY		
Instrument	**Action Level**	**Action**
PID (11.7 ev)	Continuous readings to 9ppm	Remain in level D PPE.
PID	Continuous reading of 10 to 100 ppm above background	Level D PPE but screen with Drager detection tube for benzene. If benzene detected >1 ppm upgrade to Level C and wear an organic vapor (OV) cartridge/air-purifying respirator (APR). Investigate source.
PID	Continuous reading over 100 ppm background	Stop Work. Reevaluate work conditions and procedures, Contact SHSO prior to continuing for authorization.
Combustible Gas Indicator	Continuous reading of 0% to 1% lower explosive level (LEL).	Remain in level D PPE. If no benzene present, assume source is methane. Continuously monitoring LEL.
Combustible Gas Indicator	Continuous reading of 1% to 10% LEL	Level D unless benzene is present. Investigate source and ventilate, if possible. SHSO may require upgrade to Level C PPE.
Combustible Gas Indicator	Continuous reading > 10% LEL	Stop Work. Evacuate work area and ventilate source of combustible gas, if possible, Contact SHSO prior to continuing for authorization.
Dust Monitor	Continuous reading >10.0 mg/m^3	Suppress by spraying the dusty area with water.

Notes: PEL = Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit
REL = National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limit
TLV = American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value

C. Reporting Format

- Air Monitoring Log

6.3 Site Ambient Air Sampling

A. **Sampling Criteria**

A site ambient air sampling program will be considered if the following criteria are met:

1. Meteorological conditions
2. Health and safety observations
3. Particulate levels are two to three times above background.
4. Site specific activities
5. Site activity increases airborne contaminant(s) exposure potential.

7.0 SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

7.1 Buddy System

During all Level B, C or D activities or when some conditions present a risk to personnel, the implementation of a buddy system is recommended if not mandatory. A buddy system requires at least two (2) people to work as a team, each looking out for each other. Table 8.1 lists those tasks, which require a buddy system and any additional site control requirements.

TABLE 7.1
PERSONNEL REQUIREMENTS

Task	Control Measures
Soil Sampling	Line of sight, buddy system

7.2 Site Communications Plan

Successful communications between field teams and personnel in the support zone is essential. The following communications systems will be available during activities at the Site.

- Hand Signals
- Direct Vocal Communication
- For hand signal communications, the following definitions will apply during activities at the Site:

TABLE 7.2 HAND SIGNAL DEFINITIONS	
Signal	**Definition**
Hands clutching throat	Out of air/cannot breath
Hands on top of head	Need assistance
Thumbs up	OK/I am all right/I understand
Thumbs down	No/Negative
Arms waving upright	Send backup support
Grip partners wrist	Exit area immediately

7.3 Work Zone Definition

The three general work zones established at the Site are the Exclusion Zone, Contamination Reduction Zone, and Support Zone. One of the basic elements of an effective site-sampling program is the delineation of work zones at each sampling site. The purpose of establishing work zones is to:

- Reduce the accidental spread of hazardous substances by workers or equipment from the contaminated areas to the clean areas
- Confine work activities to the appropriate areas thereby minimizing the likelihood of accidental exposures
- Facilitate the location and evacuation of personnel in case of an emergency
- Prevent unauthorized personnel from entering controlled areas

Although a site may be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances, this plan uses the three most frequently identified zones in similar projects. These zones are the Exclusion Zone (sometimes referred to by others as the “hot zone”), the Decontamination Zone, and the Support Zone (sometimes referred to by others as the “clean zone”). Movement of personnel and equipment between these zones should be minimized and restricted to specific access control points to minimize the spreading of contamination.

7.3.1 Exclusion Zone

The Exclusion Zone is the area where contamination is either known or expected to occur and where the greatest potential for exposure exists. No contamination is actually known to exist on this site. However, the greatest potential for exposure exists where borings and drilling activities are planned. Therefore, the following protective measures will be taken in the Exclusion Zone.

Unprotected onlookers will be restricted from the sampling site such that they are 25 feet upwind or 50 feet downwind of excavation or drilling activities.
Those conducting activities and sampling in the Exclusion Zone will wear the applicable Personal Protective Equipment (PPE). The actions to be taken and PPE to be worn in the Exclusion Zone if VOCs are determined with the PID to be above background are described in Section 6 and Table 6.1.

7.3.2 Decontamination Zone

A Decontamination Zone will be established between the Exclusion Zone and the Support Zone, and will include the personnel, equipment and supplies that are needed to decontaminate equipment and personnel. The size will be selected by the SHSO to be sufficient to conduct the necessary decontamination activities. Personnel and equipment in the Exclusion Zone must pass through this zone before leaving or entering the Support Zone. This zone should always be established and maintained upwind of the Exclusion Zone.

7.3.3 Support Zone

The Support Zone will surround the Decontamination Zone and the Exclusion Zone. Break areas, operational direction and support facilities will be located in this area. Eating, smoking and drinking will be allowed only in this area.

7.4 Nearest Medical Assistance

Figure 7.1 shows a map of the route to the Phelps Memorial Hospital Center, which is the nearest hospital that can provide emergency care for individuals who may experience an injury or exposure on site. The hospital is located 1.81 miles to the north of the site at 701 N Broadway, Sleepy Hollow, NY 10591 914-366-3000. The route to the hospital was verified by the SHSO, and is be familiar to all site personnel.

FIGURE 7.1

NEAREST HOSPITAL ROUTE

START
13 Wildey Street
Tarrytown, New York 10591

FINISH
701 N Broadway
Sleepy Hollow, NY 10591

1: Start out going WEST on WILDEY ST toward CORTLANDT ST.	<0.1 miles	Map
2: Turn RIGHT onto CORTLANDT ST.	0.2 miles	Map
3: Turn RIGHT onto BEEKMAN AVE.	<0.1 miles	Map
4: Turn LEFT onto POCANTICO ST.	0.2 miles	Map
5: Turn LEFT onto N BROADWAY / US-9.	1.1 miles	Map
END 6: End at **Phelps Memorial Hospital Ctr:** 701 N Broadway, Sleepy Hollow, NY 10591, US		Map

Total Est. Time: 5 minutes **Total Est. Distance:** 1.81 miles

7.5 Safe Work Practices

Table 7.3 provides a list of standing orders for the Exclusion Zone.
Table 7.4 provides a list of standing orders for the Decontamination Zone.

7.6 Emergency Alarm Procedures

The warning signals described in Section 9.4 "Evacuation Routes and Procedures," will be deployed in the event of an emergency. Communication signals will also be used according to section 7.2.

TABLE 7.3
STANDING ORDERS FOR EXCLUSION ZONE

- No smoking, eating, or drinking in this zone.
- No horseplay.
- No matches or lighters in this zone.
- Check-in on entrance to this zone.
- Check-out on exit from this zone.
- Implement the communications system.
- Line of sight must be in position.
- Wear the appropriate level of protection as defined in the HASP.

TABLE 7.4
STANDING ORDERS FOR CONTAMINATION REDUCTION ZONE

- No smoking, eating, or drinking in this zone.
- No horseplay.
- No matches or lighters in this zone.
- Wear the appropriate level of protection.

8.0 DECONTAMINATION PLAN

Consistent with the levels of protection required, the Decontamination Table(s) provides a step-by-step representation of the personnel decontamination process. These procedures should be modified to suit site conditions and protective ensembles in use.

8.1 Standard Operating Procedures

Decontamination involves the orderly controlled removal of contaminants. Standard decontamination sequences are presented in the Decontamination Table (8.1). All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination. Personnel shall clean on-site as much gross contamination from clothing and equipment, as possible.

8.2 Levels of Decontamination Protection Required for Personnel

The levels of protection required for personnel assisting with decontamination will be Level D. The SHSO is responsible for monitoring decontamination procedures and determining their effectiveness.

8.3 Equipment Decontamination

Sampling equipment will be dedicated to each sample as practicable. Appendix A is the decontamination protocol for equipment. After on-site decontamination, non-disposable materials, such as gloves and booties, will be placed in plastic bags and for proper disposal off site.

8.4 Disposition of Decontamination Wastes

Contaminated disposable materials will be left in a secured condition on-site.

TABLE 8.1 LEVEL D DECONTAMINATION STEPS	
Step 1	Remove outer garments (i.e., coveralls) and boots
Step 2	Remove gloves
Step 3	Wash hands and face

9.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

This section describes contingencies and emergency planning procedures to be implemented at the Site. This plan is compatible with local, state and federal disaster and emergency management plans, as appropriate.

9.1 Pre-Emergency Planning

During the site briefing held periodically/daily, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. Table 9.1 identifies potential hazards associated with site activities, along with the available emergency prevention/control equipment and its location. The plan will be reviewed and revised, if necessary, on a regular basis by the SHSO. This will ensure that the plan is adequate and consistent with prevailing site conditions.

TABLE 9.1 EMERGENCY RECOGNITION/CONTROL MEASURES

HAZARD	PREVENTION/CONTROL	LOCATION
Fire/Explosion	Fire Extinguisher	On-Site
Spill	Sorbent Materials	On-Site
Air Release	Evacuation Routes	Not Applicable

9.2 Personnel Roles and Lines of Authority

The Site Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area, and evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified and follow-up reports completed. The SHSO may be called upon to act on the behalf of the site supervisor, and will direct responses to any medical emergency. The individual contractor organizations are responsible for assisting the project manager in his/her mission within the parameters of their scope of work.

The Site Supervisor is: James DeMartinis
The alternate is: Eric Geisbusch

9.3 Emergency Recognition/Prevention

Table 3.1 provides a listing of chemical and physical hazards on-site. Additional potential hazards associated with site activities are listed in Table 9.1, along with the available emergency prevention/control equipment and its location. Personnel will be familiar with techniques of hazard recognition from preassignment training and site-specific briefings. The SHSO is responsible for ensuring that prevention devices and equipment are available to personnel.

9.4 Evacuation Routes/Procedures

In the event of an emergency which necessitates an evacuation of the site, the following alarm procedures will be implemented:

- Insure that a predetermined location is identified off-site in case of an emergency, so that all personnel can be accounted for.

- Personnel will be expected to proceed to the closest exit with their buddy, and mobilize to the safe distance area associated with the evacuation route. Personnel will remain at that area until the re-entry alarm is sounded or an authorized individual provides further instructions.

9.5 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a medical emergency, personnel will take direction from the HSO and notify the appropriate emergency organization(s). In the event of a fire or spill, the site supervisor will notify the appropriate local, state and federal agencies.

TABLE 9.2
List of Emergency Contacts

Organization	Contact	Telephone
Police		911
Fire		911
Hospital	Phelps Memorial Hospital Center	914-366-3000
EPA Emergency Response Team		800-424-8802
NYSDEC	Spill Hotline	800-457-7362
National Response Center		800-424-8802
Center for Disease Control		404-488-4100
Chemtrec		800-424-9300

9.6 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the Exclusion Zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the Site Supervisor.

Any person being transported to a clinic or hospital for treatment should take with them information on the chemical(s) they have been exposed to at the site. This information is included in Table 3.1.

Any vehicle used to transport contaminated personnel will be treated and cleaned as necessary.

9.7 Fires or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the project manager or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available on site to control or extinguish the fire; and,
- Remove or isolate flammable or other hazardous materials, which may contribute to the fire.

9.8 Spill or Leaks

In the event of a spill or a leak, site personnel will:

- Inform their supervisor immediately;
- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials.

9.9 Emergency Equipment/Facilities

The following emergency equipment/facilities will be utilized on-site.

TABLE 9.3 LIST OF EMERGENCY EQUIPMENT/FACILITIES	
List of Emergency Equipment/Facilities	**Storage Location**
First Aid Kit	Support Zone
Fire Extinguisher	Support Zone
Spill Kits	Support Zone
Berm Materials	Support Zone
Eye Wash	Support Zone
Real Time Air Equipment	Exclusion Zone

10.0 REFERENCES

1. *Aldrich Chemical Book*, RTECS
2. *American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values*
3. *Chemical Protective Clothing Performance Index Book*, Forsburg
4. *Dangerous Properties of Industrial Materials*, SAX and Lewis
5. *Emergency Response Guide Book*, DOT P 5800.5, 1990
6. *EPA 40 CFR 311 Health and Safety Regulations*
7. *EPA/Office of Emergency and Remedial Response/Environmental Response Team Standard Operating Safety Guide*
8. *Extremely Hazardous Substances*, EPA, Noyes
9. Guides *to Occupational Exposure Values* – 1992
10. *Guidelines for the Selection of Chemical Protective Clothing*, Little
11. *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, Sittig, np (Noyes)
12. *Hazardous Chemicals Data Book*, G. Weiss, ndc (Noyes)
13. *Hazardous Chemicals Desk Reference*
14. *NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines*
15. *OHMTADS Database*
16. *OSHA 29 CFR 1910.120 Health and Safety Regulations*
17. *The Merck Index, an Encyclopedia of Chemicals, Drugs, and Biologicals,* Merck & Co., Inc.
18. *Threshold Limit Values and Biological Exposure Indices, ACGIH*, 1991-1992
19. *V.S.L.G. Chris Man*

APPENDIX A

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES

APPENDIX A

STANDARD OPERATING PROCEDURES

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES

Summary

Equipment, tools, materials, etc. used in the investigation and collection of samples at field investigation sites must be properly prepared and cleaned/decontaminated during and after each sampling event. The degree of cleaning/decontamination will be dependent upon site conditions and the nature and type of contamination, if present, the intent and goal(s) of the investigation, and data quality objectives, as well as other site-specific requirements. The importance of this action must be impressed upon the sampling team and those assisting the team, such as a backhoe or drill rig operator.

Procedure

1. Heavy Equipment Decontamination

All equipment, tools and materials associated with sampling events must be cleaned or decontaminated prior to usage. Items such as drill rigs, auger flights, track hoes, and backhoe all present potential sources of contamination to environmental samples. Therefore, all heavy equipment utilized at a site must undergo the following decontamination procedures:

- The equipment will first be high pressure, hot washed or steam-cleaned with potable water; and,
- The equipment will be rinsed thoroughly with potable water.

Contain, collect and dispose of all decontamination fluids in accordance with site/project-specific requirements. The bucket of track hoes and backhoes may be cleaned over the excavation allowing high pressure decontamination wash water to return to the excavation.

3. Cleaning of Field Sampling Equipment

All equipment and tools used to collect samples for chemical analyses, including spatulas, spoons, scoops, trowels, split-spoons; augers, etc. will be decontaminated using the following procedures:

- Non-phosphate detergent wash;
- Potable water or distilled/deionized water rinse; and
- Air or oven-dry.

If the equipment is to be stored for future use, allow to dry and then wrap in aluminum foil (shiny-side out) or seal in plastic bags.

Collect or dispose of all decontamination fluids in accordance with site/project-specific requirements.

4. Personal Clothing Decontamination

All footwear worn in and around the contamination area will be washed down using soap and water to remove any soil or oily residue remnants. If disposable gloves, booties or suits (such as Tyvek® suits) are worn, these suits or booties are to be removed and disposed of in a designated 55-gallon drum on site for future disposal. Any other clothing that comes in contact with the potentially contaminated soil should not be worn more than 24-hours and should be washed prior to wearing again.

Attachment D
Lori A. Beyer
Resume

Lori A. Beyer
14 West Point Drive
East Northport, New York 11731
(631) 757-0511

OBJECTIVE: General Manager/Laboratory Director with a solid technical background combined with Management experience in environmental testing industry. Outstanding organizational, leadership, communication and technical skills. Customer focused, quality oriented professional with consistently high marks in customer/employee satisfactions.

EXPERIENCE:

1998-Present L.A.B. Validation Corp., 14 West Point Drive, East Northport, NY
President

- Perform Independent third party Data Validation services for all analytical/environmental-testing methods.
- Data Usability Summary Reports

1998-Present American Analytical Laboratories, Inc. 56 Toledo Street, Farmingdale, NY
Laboratory Director

- To plan, direct and control the operation, development and implementation of programs for the entire laboratory in order to meet AAL's financial and operational performance standards.
- Ensures that all operations are in compliance with AAL's QA manual and other appropriate regulatory requirements.
- Actively maintains a safe and healthy working environmental that is demanded by local laws/regulations.
- Monitors and manages group's performance with respect to data quality, on time delivery, safety, analyst development/goal achievement and any other key performance indices.
- Reviews work for accuracy and completeness prior to release of results to customers.

1966-1998 Nytest Environmental, Inc. (NEI) Port Washington, New York
General Manager

- Responsible for controlling the operation of an 18,000 square foot facility to meet NEI's financial and operational performance standards.
- Management of 65 FTEs including Sales and Operations
- Ensure that all operations are in compliance with NEI's QA procedures
- Ensures that productivity indicators, staffing levels and other cost factors are held within established guidelines
- Maintains a quantified model of laboratory's capacity and uses this model as the basis for controlling the flow of work into and through the lab so as to ensure that customer requirements and lab's revenue and contribution targets are achieved.

1994-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Technical Project Manager

- Responsible for the coordination and implementation of environmental testing programs requirements between NEI and their customers
- Supervise Customer Service Department
- Assist in the development of major proposals
- Complete management of all Federal and State Contracts and assigned commercial contracts
- Provide technical assistance to the customer, including data validation and interpretation
- Review and implement Project specific QAPP's.

1995-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Corporate QA/QC Officer

- Responsible for the implementation of QA practices as required in the NJDEP X26174 and X22651 Contract
- Primary contact for NJDEP QA/QC issues including SOP preparation, review and approval
- Responsible for review, verification and adherence to the Contract requirements and NEI QA Plan

1992-1994 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Manager

- Responsible for the accurate compilation, review and delivery of analytical data to the company's customers. Directly and effectively supervised a department of 22 personnel.
- Managed activities of the data processing software including method development, form creation, and production
- Implement new protocol requirements for report and data management formats
- Maintained control of data storage/archival areas as EPA/CLP document control officer

1987-1991 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Specialist

- Responsible for the review of GC, GC/MS, Metals and Wet Chemistry data in accordance with regulatory requirements
- Proficient with USEPA, NYSDEC, NJDEP and NEESA requirements
- Review data generated in accordance with SW846, NYSDEC ASP, EPA/CLP and 40 CFR Methodologies

1986-1987 Nytest Environmental, Inc (NEI) Port Washington, New York
GC/MS Analyst

EDUCATION:

1982-1985 State University of New York at Stony Brook, New York; BS Biochemistry
1981-1982 University of Delaware; Biology/Chemistry
5/91 Rutgers University; Mass Spectral Data Interpretation Course, GC/MS Training
8/92 Westchester Community College; Organic Data Validation Training
9/93 Westchester Community College; Inorganic Data Validation Training